An Analysis of the 2015 Nigerian Presidential Election

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Abstract

Much time has gone into analyzing the 2015 Nigerian Presidential election, a veritable repeat of the 2011 election between incumbent Goodluck Jonathan and retired General Muhammadu Buhari. Previous elections in Nigeria have been fraught with violence and charges of electoral fraud. While the Nigerian electoral commission worked hard to ensure that these elections were fair, violence and charges of fraud materialized.

Electoral forensics applies statistical techniques to elections, frequently testing for evidence of fraud or of unfairness. Using binomial regression, we tested the official results from the 2015 Nigerian Presidential election for evidence of differential invalidation. Differential invalidation involves invalidating ballots based on whom they are cast.

The results do not strictly indicate evidence of this type of electoral unfairness. The marginal p-values (0.1420 and 0.0346) only suggest that there may be a problem. Furthermore, the invalidation process in Ebonyi state appears to be completely different from that in other states. This leads one to wonder why that difference exists.

Keywords: Nigeria, Electoral Forensics, Elections, Binomial Regression

Introduction

Democratic elections are becoming an international norm. Governments gain legitimacy from such elections as they are receiving their power directly from the people. However, not all elections are democratic, nor are all elections that claim to be democratic actually democratic. In many countries, election unfairness is the rule, violence on election day is frequent, and claims of fraud are numerous (Goodwin-Gill, 2006).

To combat these problems—or to detect them—organizations monitor the election as it happens. Such groups include the Organization for Security and Cooperation in Europe (OSCE), the African Union, and the National Democratic Institute (NDI). The organizations can either send foreign monitors to the state holding the election or empower locals to do this.

However, as Josef Stain apparently stated, "It's not the people who vote that count. It's the people who count the votes (Bazhanov, 2002)." More is needed than just watching that people are allowed to freely vote. Ensuring that the votes are equitably counted is also required for the election to be fair. Thus, in addition to election monitoring, there needs to be an analysis of the election outcomes designed to detect unfairness in the counting of the ballots. The field of electoral forensics applies statistical methods to election research questions to evaluate evidence of fairness. Regression is one of the most powerful tools to detect differential invalidation; meaning invalidation rates of ballots can be analyzed by subgroup to identify differences. These subgroups could be based on ethnicity, disability, or voting preference. Because of the structure of the data collected in this study, binomial regression is used to detect differential invalidation. Binomial regression is a statistical technique in which the response variable is the sum of "successes" (invalidated votes) over a given number of trials (total votes cast).

Nigerian Background

Nigeria gained its independence from the United Kingdom on October 1, 1960, and transitioned to its first republic three years later. For the three-year life of the First Republic, Sir Abubakar

Tafawa Balewa was the Prime Minister and Nnamdi Azikiwe was the President. The coup d'état of 1963, which ended the First Republic, became the leitmotif of Nigeria. Between independence and 1999, power alternated between the military and the people, between autocracy and democracy. However, the last military government of General Abdulsalami Abubakar in 1999 ensured the effective transition to a democratic government. This government marked the beginning of a government of the people selected through an electoral voting process conducted by the Independent National Electoral Commission (Suberu, 2007).

Nigeria conducts political elections every four years. The elections are held in three levels: National Assembly elections (federal legislature), Presidential elections (federal executive), and gubernatorial and state assembly elections (state executive and legislature respectively).

The President is elected directly by voters to a four-year term, with a two-term limit (Tar & Zack-Williams, 2007). While the electoral system is a single-member plurality system, there are adjustments made to ensure that the President has support throughout Nigeria. According to Article 134(2) of the Nigerian Constitution, a candidate can win the presidential election only if they win a majority of the votes cast and "not less than one-quarter of the votes cast at the election each of at least two-thirds of all the States in the Federation and the Federal Capital Territory, Abuja." This requirement ensures that the President has some support in both the North and the South of the country, which helps to avoid another civil war in Nigeria like the Biafra war of 1967–1970.

Since the beginning of the Fourth Republic in 1999, the Presidency has been held by the People's Democratic Party (PDP). As such, it is the most influential party in the country (Tar & Zack-Williams, 2007). The most recent election of 2015 came down to two candidates: the incumbent President Goodluck Jonathan, a southerner and flag bearer of the PDP, and retired General Muhammadu Buhari, a northerner and flag bearer of the All Progressive Congress (APC) party. The APC Party was formed from

the merger of four opposition parties and some members of the PDP who had defected to the APC party (Lewis & Kew, 2015).

The 2015 election was special for many reasons. First, it was a repeat battle between the incumbent President and the retired General. The 2011 Presidential election, which pitted these candidates against each other saw Goodluck Jonathan win, 59% to 32% (Animashaun, 2015). Second, this election was a test of the incumbent President's ability to retain the support of the people who had lost patience with government graft scandals, high unemployment, and the Boko Haram insurgency in the north-eastern part of the country ("How Nigeria's presidential election works," 2015). These issues had arisen during the administration of the incumbent President and formed the basis of General Buhari's campaign and slogan — "Change" ("How Nigeria's presidential election works," 2015). Finally, the candidates were from two different parts of the country: Jonathan is from the south and Buhari is from the north. As such, there is an expected level of support from their native regions. For example, the states in the south, east, and parts of the west tend to support a southern candidate, while the northern states tend to support a northerner. Figures 1 and 2 illustrate the distribution of votes in the 2011 and 2015 elections between the candidates across Nigeria. In the midst of this, however, are swing votes coming from highly-populated states.

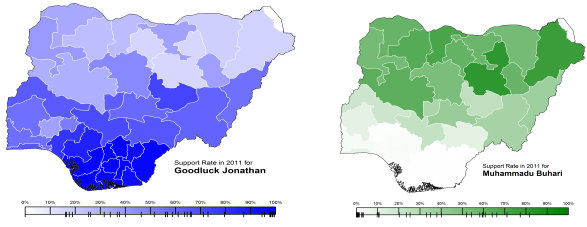

Figure 1. Support levels for Jonathan and Buhari in the 2011 Nigerian Presidential election. Maps created by authors from data available from the Center for Electoral Forensics (*Election dataset for Nigeria*, 2017).

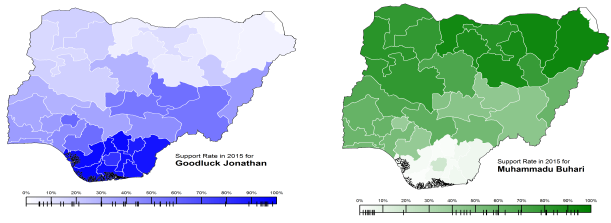

Figure 2. Support levels for Jonathan and Buhari in the 2015 Nigerian Presidential election. Maps created by authors from data available from Independent National Electoral Comission (*2015 Presidential Election*, 2015).

For these reasons, various news stations predicted the Presidency would be won by Buhari. However, there has been long-standing concerns about the vote rigging, violence, and electoral fraud that has characterized Nigeria's elections (Lewis & Kew, 2015). For example, in the 2011 election, the NDI heavily criticized the elections (*Final Report on the 2011 Nigerian General Elections*, 2012). Apart from marked violence, the NDI report cited irregularities, including underage voting, vote buying, stealing of ballot boxes, and lack of secrecy in voting. Due in part to this report, INEC worked hard to enact various measures to curb the concerns on elections in the future. INEC spent more than $40,000,000 on ensuring that the elections would be free and fair (Whitehead & Saater, 2015). As a result of these changes, the INEC Chairman, Attahiru Jega, stated, "the [2015] elections were reasonably free and fair", and he "attributed the success of the elections to sacrifices made by INEC officials" (Adibe, 2015).

Even with this praise of the 2015 elections, election-day violence was present. Boko Haram, a known terrorist organization, attacked several voting centers in the North, killing at least 39 (Whitehead & Saater, 2015). Given the long-standing reputation of Nigeria's electoral politics, additional doubts remain on the credibility of the election. The goal of this study is to analyze this presidential election for evidence that the INEC fell short of its goal.

Analysis Background

While the rules and regulations for elections differ from country to country, several similarities exist across those countries claiming to be democratic—primarily, that all adults are free to vote for whomever they decide, the candidates and parties have equal access to the media, and each person's vote counts the same, regardless of characteristics of that person or of that vote (Omotola, 2010). Of these expectations, the first two measure the level of freedom in the election and the last measures its fairness. In this sense, an election is fair if each vote has the same probability of being counted, independent of candidates, party, or demographics. During the counting process, a vote considered valid by the appropriate election authority is counted, while one that is invalidated is not. Should one group of people have a significantly higher invalidation rate than others, then the election could be biased.

For instance, if ballots cast by blind people have a higher probability of being rejected, the election may be biased against blind people. Similarly, if ballots cast in favor of a specific candidate have a higher invalidation rate than those cast for the opponent, then the election may be unfair against the supporters of the first candidate. However, if ballots are systematically invalidated according to candidate choice, then there will be a relationship between the proportion of ballots invalidated and the proportion of ballots cast for that candidate. If that relationship is negative, then the invalidation helped the candidate (fewer invalidated ballots in the states supporting the candidate). If the relationship is positive, then the invalidation helped the opponent.

With regression, the relationship between the invalidation rate and candidate support can be examined to test for such a correlation. Should a statistically significant dependence between the two variables be detected, then there would be evidence of differential invalidation—unfairness—in that election.

Materials and Methods

Election Data

Unfortunately, as we are not privy to the actual ballots and the invalidation decision for each, we must rely on publically available aggregated vote counts. Official election results were obtained directly from the Nigerian electoral commission (INEC) website. For the 2015 Nigerian election, at the state level, the number of cast ballots, invalidated ballots, and ballots cast for each candidate are provided (*2015 Presidential Election*, 2015). Thus, we worked not with individual ballots, but with vote counts and proportions.

Regression Methods

Regression is a set of methods that can be used to test independence between numeric variables. While Ordinary Least Squares (OLS) is a traditional way to estimate that dependence; other methods can take advantage of the inherent structure of the data to better leverage the information. The dependent variable is a count (votes declared invalid) with the number of trials known (votes cast in the state). Thus, the dependent variable is a random variable distributed as something akin to the binomial distribution.

All calculations were performed using the R statistical environment, v 3.3.1 ("The R Project for Statistical Computing," 2016). Mapping was done using R and shapefiles from GADM (Hijmans et al., 2015). R packages used are lawstat (Gastwirth et al., 2017) and sp (Pebesma & Bivand, 2005).

There are four requirements for a random variable to follow a binomial distribution. One limitation of this study was that only three of the requirements are guaranteed to be met by the election data available; those include 1) known number of trials (number of votes cast), 2) each trial results in one of two outcomes (invalidated ballot or not), and 3) a constant success rate (under the null hypothesis, the invalidation rate is independent of the candidate support rate).

The final requirement is that the votes are independent. Extant research suggests that this assumption is frequently violated with election data (Lesthaeghe & Neidert, 2009; Mebane & Sekhon, 2004). The effect of violating this requirement, however, is that the assumed dispersion is greater than unity.

Recall that the binomial distribution is a member of the (one-parameter) exponential class, because it can be written in that general form (Bickel & Doksum, 2007; McCullagh & Nelder, 1989):

$$f(y;\square) = \exp\left[\frac{x\square - b(\square)}{a(\phi)} + c(y,\square)\right]$$
$$= \exp\left[\frac{x\,\mathrm{logit}(\pi) - \log(1-\pi)}{1} + 0\right]$$

For binomial data, $a(\phi)=1$. For overdispersed binomial data, $a(\phi)>1$.

From a practical standpoint, this difference only requires that the model be fit using maximum *quasi*-likelihood estimation(Wedderburn, 1974) instead of the maximum likelihood estimation initially proposed by McCullagh and Wedderburn (1972).

Results

The canonical link for the binomial distribution is the logit function. However, to increase the veracity of the model, we used five link functions and checked that the predictions were similar. Those five functions are the logit, probit, cauchit, log-log, and complementary log-log. Figure 3 is a scatter plot of the data with the five prediction curves provided. Note that the five models make essentially the same predictions. The complementary outcomes strongly support the contention that the models are appropriate for this data.

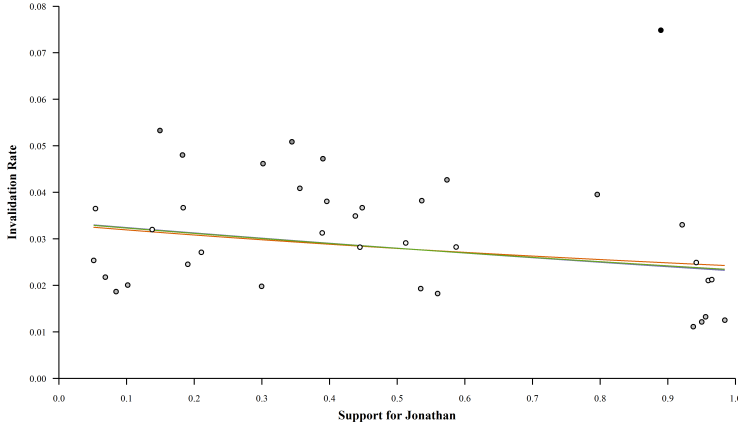

Figure 3. Prediction curves for the five models with the observed invalidation rates and level of support for Jonathan. The outlier (marked by a solid black dot in the upper right) is Ebonyi state.

Note that in each of the models, the Ebonyi state is an outlier. Reading through the election-day reports from Ebonyi did not turn up any explanation for its high invalidation rate. Because of lack of data (Nigeria apparently did not measure invalidations at the state level in 2011), we are unable to determine if this is a feature of Ebonyi or if it is random noise. Frequently, outliers have little effect on determinations of statistical significance and such is the case here. The substantive conclusions are unchanged whether Ebonyi is included or not.

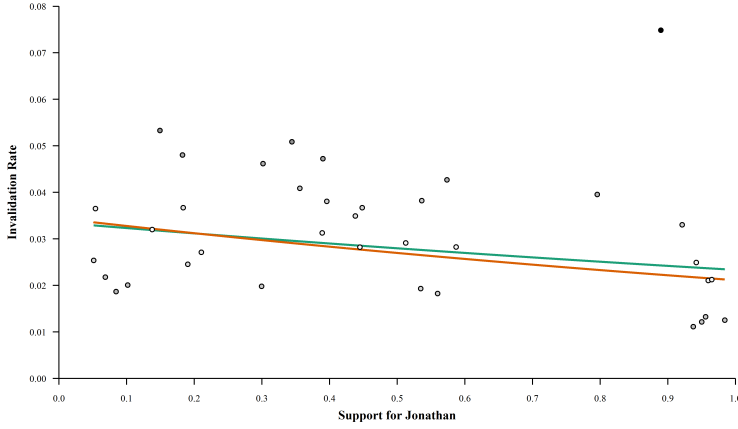

Figure 4. Prediction curves for the logit models. The top line (green) is the model including Ebonyi state. The bottom line (brown) excludes it.

As all link functions produced the same conclusions with respect to evidence of electoral unfairness, the following results are based on the model using the logit link (Figure 4). Recall that the null hypothesis is that there is no statistical relationship between the invalidation rate and the candidate support rate. Should systematic problems exist in either the electoral system or the particular election, such that ballots are invalidated in large part based on who they were cast for, then the null hypothesis is not true.

Table 1: Regression tables for the logit model with and without including Ebonyi state. Note that excluding it allows us to conclude a statistically significant relationship between invalidation rate and candidate support rate; excluding it does not.

		Estimate	Std Err	t-value	p-value
With Ebonyi	**Constant**	-3.3615	0.1281	-26.242	<< 0.0001
	Jonathan Support	-0.3725	0.2477	-1.504	0.1420
Without Ebonyi	**Constant**	-3.3343	0.1139	-29.287	<< 0.0001
	Jonathan Support	-0.5017	0.2279	-2.201	0.0346

Because the p-value (0.1420) of the model that includes Ebonyi state is greater than the usual $\alpha = 0.05$, we cannot reject the null hypothesis (Table 1). That is, significant evidence of differential invalidation does not exist here. Note, that the model, which excludes Ebonyi state, *does* suggest differential invalidation (p-value = 0.0346). Because of the number of models examined, however, a Bonferroni adjustment suggests that this low p-value may be a result of the inherent downward bias of p-values calculated for multiple tests (Westfall, Johnson, & Utts, 1997). As such, we are not prepared to conclude that there is evidence of systematic differential invalidation based on this data and this model.

Discussion and Conclusions

Nigeria's elections typically involve irregularities ranging from vote buying to ballot box stuffing (*Final Report on the 2011 Nigerian General Elections*, 2012). Through actions, such as improved security, put in place by the INEC, the 2015 elections were called "free and fair" by the chairman of the INEC (Adibe, 2015). However, because of the history of elections in Nigeria, doubts remain about the fairness of this election. We tested the 2015 election for unfairness using regression tests of the invalidation rate against the candidate support level, testing for invalidation as a function of support for Goodluck Jonathan.

The INEC website provided us with sufficient data. The proportion of invalidated votes and level of candidate support were calculated for each state. The invalidation rates ranged from a low of 1.17% (Akwa-Ibom) to a high of 7.49% (Ebonyi). In Akwa-Ibom, Jonathan won with 93.7% of the vote; Jonathan was a native of this region and winning this state was no surprise. The highest invalidation rate was in Ebonyi state, also won by Jonathan with 88.9%. Ebonyi state is governed by candidates from Jonathan's PDP party; thus, the results in that state are also not surprising.

We used binomial regression, a type of generalized linear model, to estimate the relationship between the invalidation rate and the support for Jonathan in each of Nigeria's 36 states and the Federal Capital Territory. The model suggests that the invalidation rate in Ebonyi state is significantly higher than in other states that Jonathan won. However, the model including Ebonyi and the model excluding it produced the same substantive conclusion. The election results do not give significant evidence of differential invalidation.

Limitations of this Research

The results of this study do not indicate a statistical relationship between the independent and dependent variable for the incumbent candidate. This, of course, does not prove that the election was fair. Statistical techniques rely on the data for their power. For this set of data, the sample size is rather small at 37. Thus, had we election results at the local government area (LGA) level, of which there are 774, our tests would be much more powerful for detecting differential invalidation.

Second, this test only examined one aspect of fairness in the election, that of counting—or not counting—the ballots. There are other aspects of fairness, such as the nine listed by Goodwin-Gill that "guarantee universal and equal suffrage to adult citizens" to "ensure that candidates who obtain the necessary number of votes required by law are duly installed in office" (Goodwin-Gill, 2006). Those nine are, and we quote,

- *hold elections at reasonable intervals, as established by law;*

- *permit all seats in at least one chamber of the national legislature to be freely contested in a popular vote;*
- *guarantee universal and equal suffrage to adult citizens;*
- *ensure that votes are cast by secret ballot or by equivalent free voting procedure, and that they are counted and reported honestly with the official results made public;*
- *respect the right of citizens to seek political or public office, individually or as representatives of political parties or organizations, without discrimination;*
- *respect the right of individuals and groups to establish, in full freedom, their own political parties or other political organizations and provide such political parties or other organizations with the necessary legal guarantees to enable them to compete with each other on a basis of equal treatment before the law and by the authorities;*
- *ensure that law and public policy work to permit political campaigning to be conducted in a fair and free atmosphere in which neither administrative action, violence nor intimidation bars the parties and the candidates from freely presenting their views and qualifications, or prevents the voters from learning and discussing them or from casting their vote free of fear of retribution;*
- *provide that no legal or administrative obstacle stands in the way of unimpeded access to the media on a non-discriminatory basis for all political groupings and individuals wishing to participate in the electoral process;*
- *ensure that candidates who obtain the necessary number of votes required by law are duly installed in office and are permitted to remain in office until their term expires or is otherwise brought to any end in a manner that is regulated by law in conformity with democratic parliamentary and constitutional procedures (Goodwin-Gill, 2006).*

The statistical methods of this paper arguably test none of these. Thus, the election could have been unfair based on these other requirements of fairness.

Despite these two limitations, electoral forensics was contributed by this study and the results serve as an excellent complement to election observing. Whereas election observers can only declare unfairness if they witness it firsthand, electoral forensics can be used to objectively detect it from afar. In this election, however, we did not detect a significant level of differential invalidation.

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