Analysis of the 2018 Egyptian Presidential Election

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Abstract

Many democratic countries battle with differential invalidation, which results in a lack of election fairness caused by casting out the ballots of one demographic at a higher rate than others. In Egypt's 2018 presidential election, many critics argued that ballots were being invalidated based on whether the Governorate supported the incumbent president Abdel Fattah el-Sisi or not. Egypt has had a heavy military force set upon the country for many years, and the poverty faced by many of its citizens further complicates the political landscape of the country.

Electoral forensics brings the world of political science and statistics together to understand and catch differential invalidation. By using regression analysis, statisticians and politicians can detect unfairness based on the invalidation rate compared to the support rate of a candidate. In this paper, we tested the 2018 Egyptian presidential election.

Our p-value ($p = 9.88 \times 10^{-7}$) was statistically significant in detecting unfairness, which implies there may be a problem with fairness in this election. It is important to understand Egypt's political history, the state of the county, and the elections themselves before jumping to conclusions, and it is equally as important to understand the statistics behind the analysis as well. This leads to a world of questioning, analyzing, and investigating.

Introduction

Unfortunately, many countries that claim to be democratic contain election unfairness in the roots; a lot of times, it goes deeper than ballot box stuffing. In most cases, unfairness is violent and versatile; many citizens are imprisoned for speaking out against a candidate, votes are invalidated from regions that are not supportive, and candidates buy votes. To detect these problems, many organizations study, speak out, and send monitors out against this unfairness. The Human Rights Watch (HRW), the African Union, and the National Democratic Institute (NDI) are just a few of these organizations that contribute to making election unfairness known.

In addition to organizations seeking unfairness, there are resources available to others in an attempt to bring unfair candidates to justice. This is important because the citizens of a country should have a say in who is in office; furthermore, it is unreasonable to allow citizens to vote but invalidate their votes or threaten criminal accusations if the citizens do not vote in the favorable way. The goal of Electoral Forensics is to use statistical methods, along with political science knowledge, to question and evaluate detected unfairness. Many types of regression, including, in our case, binomial regression, are used to evaluate a relationship between invalidated votes and the support rate of a chosen candidate. If this relationship is negative, it is a sign that the invalidation rate drops as support rate increases, indicating that Govornates that do not support the chosen candidate have their votes invalidated more often than those that do. Therefore, our null hypothesis is that there is no detected unfairness; this being said, our alternate hypothesis states there is significant evidence of unfairness. If the p-value is less than the alpha value (for example, $p < 0.05$), then we can reject the null hypothesis and accept our alternate hypothesis.

Egyptian Background

On June 18th, 1953, Egypt gained its independence. Although Egypt became mostly independent in 1922, Britain (as well as France) still had control over the Suez Canal. Mohammed Naguib, who led the Egyptian Revolution in 1952, took office as the first independent president in 1953. Presidents were not chosen by the citizens until 2005, when the first election based on popular vote from Egyptian citizens was held in the country. Although becoming a true democratic country was enlightening to many citizens, there was also quite a bit of controversy. In Egypt's election history, there has been a strong military hold over the citizens, which was always an issue when it came to elections.

In Egypt's 2012 election, many were enthused and assumed President Morsi would eliminate some of the military's strong hold due to the fact that he was affiliated with the Muslmin Brotherhood and stood for the Freedom and Justice party; however, his run was short-lived. In 2013, Morsi was deposed by the military directed by Abdel Fattah el-Sisi (*BBC News* 2019), and in 2014, Sisi ran for president against Hamdeen Sabahi, winning by a landslide (about 97%). A few critics even believed Sisi's votes had been inflated. As the New York Times observed: "...Hamdeen Sabahi, had won less than 3 percent of the vote. He finished basically tied with the number of ballots that had been defaced to protest what critics called the undemocratic climate and limited choices," (Kirkpatrick 2014). Another notable fact is that an Egyptian judge, Nabil Salib, wrote in a newspaper that democratic vote should be banned because so many Egyptians were "poor and uneducated," (Kirkpatrick 2014). Many argue this is where the controversy started.

The 2018 election suffered further accusations of unfairness. One of the biggest red flags was that the candidates who attempted to run against Sisi and did not support him, like Colonel

Ahmed Konsowa, Lieutenant General Sami Anan, Ahmed Shafik, and Khaled Ali with Anwar al-Sadat, as well as their supporters, were put under arrest for speaking out against Sisi ("Egypt: Planned Presidential Vote Neither Free nor Fair" 2018). Another alarming fact is that Sisi threatened those boycotting and protesting the election with military force, including the army ("Egypt: Planned Presidential Vote Neither Free nor Fair" 2018). Sisi's government also greatly restricted freedom of expression, so the space for criticism was eliminated. For example, the Association of Freedom of Thought and Expression, a local rights group, identified at least 496 websites blocked in Egypt, including those of news, media sites, human rights, and political movements ("Egypt: Planned Presidential Vote Neither Free nor Fair" 2018).

This was just the beginning. The candidate that ran against Sisi was Moussa Mostafa Moussa, a member of Sisi's government on his supporting side who did not join the election until the very last day. This put many citizens in a bad spot; either vote for Sisi himself, or vote for Sisi through his supporter Moussa. At last, when the election was said and done, Sisi won by 97%, practically the same amount of votes he won in 2014. Due to all of the events leading up to, and after, the election, many critics theorized there was some sort of unfairness happening.

Election Data

As we cannot actually count the ballots, official election results were used from the National Electoral Commission (NEC). For the 2018 Egyptian election, the number of cast ballots, invalidated ballots, and ballots cast for both Sisi and Moussa were provided by region (Yehia 2018). For the regression, we used a combination of these proportions and vote counts. Notice that, on the table, there is a row for the outside votes. These outside votes are for citizens residing out of Egypt; therefore, for the purpose of this election, we excluded these votes to primarily focus on the details within the country itself.

Regression

Regression is used to look for significant relationships between a predictor variable and it's response; in our case, a statistically significant relationship between Sisi's support rate and the invalidation rate. We are looking for evidence of differential invalidation (DI), and regression will help us to detect DI. Differential invalidation occurs when the ballots for one ethnicity or demographic or candidate supporter are invalidated at a higher rate than for others; meaning, the region that does not support a particular candidate has their votes invalidated more often than those regions that are in support of the candidate (Forsberg 2021). There are illegal and legal forms of DI. If one demographic tends to make more mistakes on filling out a ballot than others, thereby rendering their ballots invalid, this is a legal form of DI. For example, older voters may have an issue filling out a ballot because the boxes and words are too small in comparison to younger voters. This does not mean it is right, it is just legal. If ballots for one candidate are inspected more closely and thereby rejected at a higher rate than those cast for the other candidate, this is an illegal form of DI (Forsberg 2021).

Differential invalidation occurs when the ballots for one candidate are invalidated at a higher rate than those of the other candidate. For the 2018 Egyptian presidential election, we want to test for a relationship between the invalidation rate and Sisi's support rate using regression, a way to test for a relationship between numeric variables. Although using something like the Ordinary Least Squares (OLS) is the typical way to test dependence, other regression models are used depending on the model of the data to gain clear results and more information. There are a few types of other regression models that can be used: the classic linear model, the generalized linear model, and the vector generalized linear model. For this project, we used the vector generalized linear model (VGLM).

The dependent variable, the invalidation rate of ballots, behaves as a beta-binomial. A regular binomial distribution deals with two separate outcomes (in our case, validated and invalidated votes). There are also other criteria for a binomial distribution:

1. The number of trials is fixed; a probability can only be calculated if you do it a certain number of times.
2. Each observation is independent; invalidating one ballot should not have an effect on any other ballot being valid or invalid.
3. The probability of one outcome is exactly the same as the others.

A beta distribution is a type of probability distribution that represents an outcome of a family of proportions (Dogucu 2021). For example: how likely is it that there will be rain? I may think it is 0.20; you may think it is 0.30. A beta-binomial distribution is a Bayesian model used quite frequently in studies. Furthermore, because we are using data at the Governorate level, the variation in the measurements is much bigger than we would want for a binomial distribution. Although this overdispersion can be adjusted using the maximum quasi-likelihood estimation, it is adjusting the data rather than modeling the data. Therefore, we use the beta-binomial distribution to help with the overdispersion. Because it is not in the exponential class, we must use the vector generalized linear model, rather than a linear model or generalized linear model, with the beta-binomial distribution to correct for the lack of exponentiality.

Analysis

All of the calculations were performed using RStudio, version 1.4. The packages used were readr for neatly loading our data set (Wickham and Hester n.d.) and VGAM to make our model (Yee 2021). Our plot was also developed using RStudio.

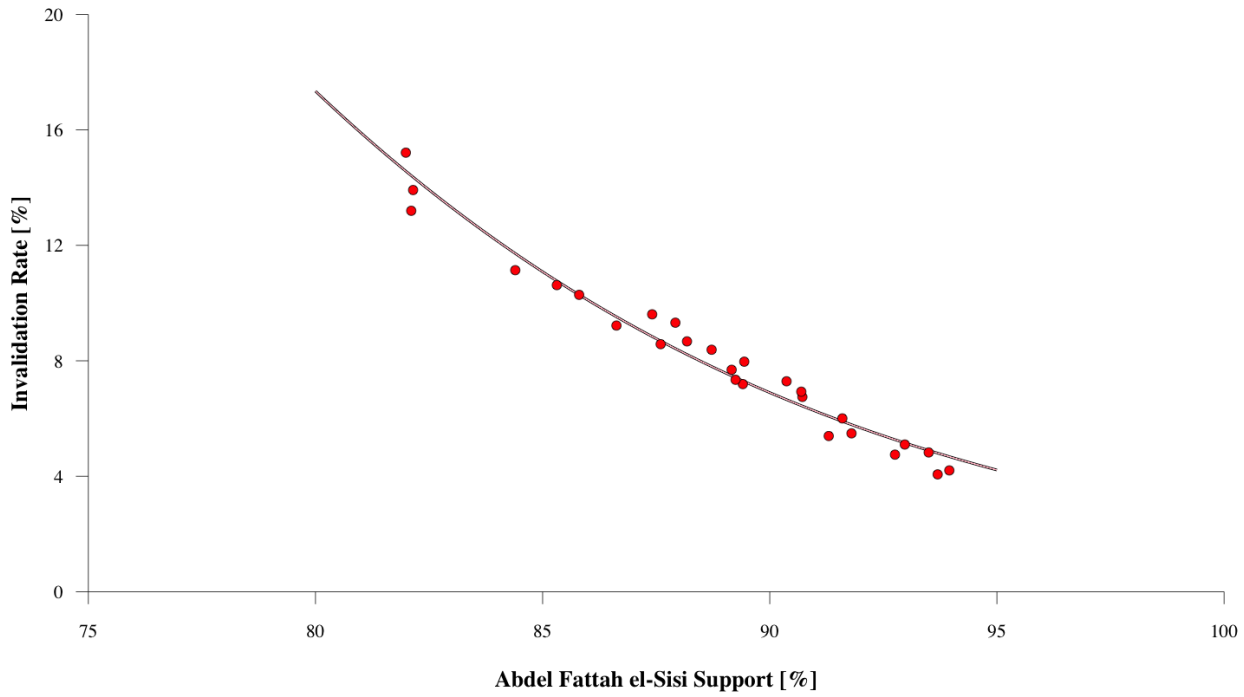

Figure 1. As Sisi's support is increased, the invalidation rate drops. Therefore, our slope is negative. Note that this is the data without the outside votes; when the regression was run with the outside votes, the analysis was roughly the same.

Because our slope was negative, those areas supporting Sisi are less likely to have their ballots counted (because the invalidation rate is dropping as Sisi has support). On the other hand, the regions that do not support Sisi are more likely to have their votes invalidated. Let's look at our regression table:

Sisi's support

Intercept	Standard Error	t-value	p-value
-25.44	5.20	-4.90	9.88×10^{-7}

Table 1. This table shows that there is statistical evidence of differential invalidation in Egypt's 2018 presidential election.

Because the p-value is very small ($9.88 \times 10^{-7} < 0.05$) we can reject our null hypothesis that there is no significant evidence of DI in Egypt's 2018 election, and accept our alternate hypothesis that there is statistical significance of DI. It is also important to note that the p-value is not even close to 0.05, 0.01, or 0.001; therefore, there is statistical significance that there is DI in Egypt's 2018 presidential election. As said, when the outside votes were included, the results were roughly the same.

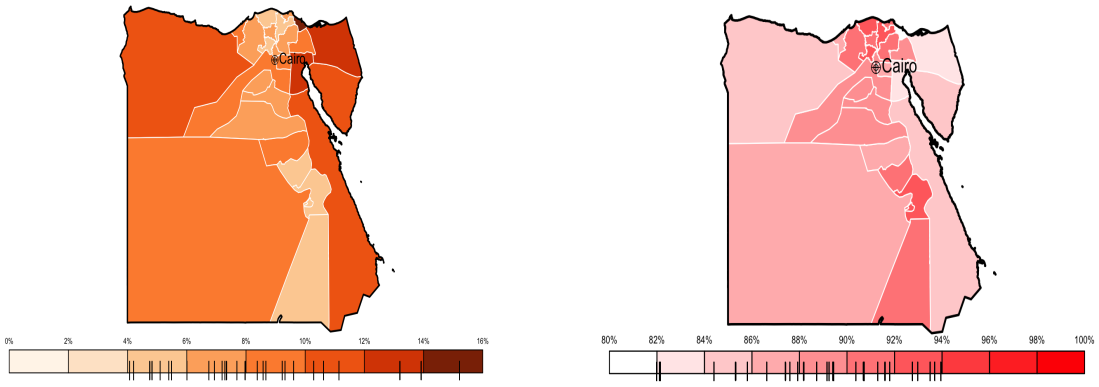

Figure 2. Maps of the invalidation rate (left) and Sisi's support rate (right). Notice that in the darker regions on the left, the invalidation rate is high. These areas on the right are light, showing they do not support Sisi as much. This is a visual of DI; the regions where Sisi is not popular have the greatest rates of invalidation.

Conclusion

Many of the unfairness from Egypt's 2018 election comes from differential invalidation. We have observed this above with the negative slope (as invalidation rates decrease, Sisi's

support increases) that is backed by our tiny p-value. Furthermore, observing the maps gives us further evidence of differential invalidation. Many critics in Egypt have believed that there was unfairness as early as the 2014 election. Perhaps an extension of this study could be evaluating the 2014 election and comparing it to results from 2012 and 2005, if the data is available. Using vector generalized linear models, there is statistically significant evidence that there is unfairness in Egypt's 2018 election, and the negative slope tells us this unfairness is differential invalidation.

Although there is statistical evidence of unfairness, there were limitations to this study. Some included are:

1. We could not be there to count the ballots, so we had to rely on information from the internet. Although our source was reliable, it is important to keep this in mind.
2. Due to issues with websites being down during the 2018 election, it was hard to get more information about unfairness happening in Egypt. We relied on many news articles and the HRW to gain out information, but lacking inside information was a challenge.
3. We only had the time and resources to evaluate Egypt's 2018 election. It may be worthwhile to go back and apply regression to the others as well, so long as the data is available.

Limitations aside, we did detect statistical evidence of unfairness. It is important to do this work in order to bring candidates and governments to justice, and it is also vital to bring electoral forensics into light so others can have access to information as well and know how to get involved.

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