

The Choice Is Mine: The Relationship Between Economic Development and Electoral Competition

DRAFT

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Abstract

The positive relationship between development and democracy is well-established at a cross-country level, and its causes have been debated extensively. However, less is known about the impact of economic development at a micro level on political behavior, particularly on the competitiveness of elections, which is important for democratic accountability. In this paper, I use a difference-in-difference model and an instrumental variable to estimate the effect of new mines opening in some areas of one county in rural Liberia and not others as a shock to the level of economic development in the area, primarily through the provision of low-skilled jobs to local residents, between the 2005 and 2011 elections. Specifically, I examine the differential change in the concentration of votes on a single or small number of candidates at the level of the polling station between areas with mines and those without. I instrument for new mines opening with the presence of mineral deposits to control for any potential time-varying confounding variables. I find that across the presidential, House, and Senate elections, there are consistent increases in the competitiveness of votes in areas that receive new mines between the two elections. These increases do not appear to be due to changes in the number of candidates running for office. Areas around the mines, however, are less likely to vote for the incumbent.

It has long been accepted that there exists a positive correlation between the level of democracy in a country and its level of economic development. Indeed, with a few exceptions, the richest countries in the world are overwhelmingly democracies. Many of the theories that seek to explain this relationship focus on large-scale changes to social structures brought on by industrialization and economic growth. Yet many of these modernization theories also make claims that forces may be at work at the individual level, such as increases in income enabling individuals to work less and participate in local civil society more. In this study, I use micro-level data from Liberia to examine the short-run consequences of economic development.

This study makes three small contributions to a very well-studied question. First, I unpack some of the political processes that may be at work at the local level in the relationship between economic development and democratic consolidation. Using data from individual polling stations across two elections, I examine how changes in the level of economic development in an area affect individuals' vote choices, candidates' decisions to compete, and support for incumbent candidates. In the process, I examine modernization theory in the current context of rural Liberia. Using Liberia as a case helps shed light on the question of whether the logic of modernization theory should be considered a historical phenomenon tied to the context of the Industrial Revolution, and how its mechanisms might be applied to current states.

Second, I make a methodological contribution to a field plagued by reverse causation and omitted variable bias. I use the opening of new mines in rural, post-war Liberia between two elections as a shock to the level of economic development in the area. This strategy enables me to use mineral deposits as instrumental variables to isolate the exogenous variation in the level of economic development and produce an unbiased estimator of the effect of these mines on voting behavior.

Third, this study makes a contribution to our understanding of the effects of natural resource exploitation at a time when Sub-Saharan Africa is in the process of dramatically scaling up its development on mineral extraction. Africa has the highest level of reserves of a number of key minerals, including phosphate, gold, manganese, and diamonds, and received almost \$70 billion in investment in 2009 [Economic Commission for Africa, 2011, 2009]. In Liberia specifically, the IMF has projected that the mineral sector will increase to over 20% of the country's GDP by 2015 [Natural Resource Watch, 2012]. This study, which is generally quite positive about the effect of mines on local political behavior, does not test any of the key mechanisms through which natural resources often seem to curse the countries that exploit them with poor governance, conflict, and poverty. Nevertheless, it does suggest that there may be some positive local effects of increases in development, even if it comes from natural resource extraction.

In the following section, Section 1, I discuss the large body of theory on economic development and quality of democracy. In Section 2 I provide some background on the Liberian case, and in Section 3 I describe my data and empirical strategy. Section 4 presents the results of my analyses of the effect of mines on the level of competition, support for incumbents, and number of candidates, and Section 5 concludes.

1 Theory

Electoral competition at the local level is an important, even definitional, measure of democratic quality. Particularly in Sub-Saharan Africa, where voting in ethnic or regional blocks is a common detriment to accountability through democratic elections, increases in the competitiveness of local elections are important measures of increases in democratic governance.

The question of how economic development affects democratic politics is one of the oldest in political science. A strong cross-national correlation between democracy and development has led to a number of causal theories arguing that democracy is more likely to form or consolidate at higher levels of economic development. Many of these scholars argue that increases in wealth usher in a basket of social changes including increased participation in civil society, tolerance, and ability to make informed electoral choices. In this section I argue that the modernization literature suggests that the local impact of mines should be an increase in the level of electoral competition.

I also briefly review the literature on the “resource curse,” which has largely argued that natural resource wealth, particularly that from oil and diamonds, does not have the positive democratic effects of wealth from industrial production. I argue that these theories are focused on the national level, and cannot be tested using local data. I ultimately do not test any hypotheses related to the resource curse, but do suggest that resources may in this case have some positive effects on the quality of democracy in the short-term.

1.1 The importance of electoral competition

Electoral competition is a definitional component of democracy, but our understanding of competition should be deeper than simply a binary coding of whether competitive elections are held or not. To understand the quality of democracy, particularly in sub-Saharan Africa where block voting is a widely documented phenomenon that diminishes the power of democratic accountability, local levels of competition are an important indicator of democratic consolidation.

Electoral competition is a core component of classic definitions of democracy. [Dahl \[1971\]](#) defines a polyarchy, for example, as a polity that is high on the two dimensions of participation and contestation, where contestation implies that opposition parties are free to participate in elections. [Schumpeter \[1976\]](#) suggests a procedural definition of democracy that is purely based on whether individuals in the polity acquire power through the competitive struggle for the people’s vote. Others contend that there must have been a peaceful transition of power between two parties to prove that elections are actually competitive (and are not just cannily won) [[Przeworski et al., 2000](#)], or that countries are more democratic if no party wins more than a certain threshold of votes [[Arat, 1988](#), [Lindberg, 2004](#)]. Thus, the concept of competitiveness is fundamentally embedded in dominant theories of democracy.

Countries that have higher levels of democratic competition should perform better for their citizens. This argument follows from a theory of the state as a firm that produces public services in exchange for revenue [Lake and Baum, 2001, McGuire and Mancur Olson, 1996, Deacon, 2003]. States produce a monopoly on the legitimate use of violence within a given territory [Weber, 1991], which gives them a comparative advantage on the provision of goods and services that mitigate market failures. Nevertheless, senior managers in these monopolies can be replaced with varying levels of difficulty. More democratic states have lower barriers to exit and costs of participation, and thus produce higher quantities of public goods at lower prices. More autocratic states, by contrast, have more monopoly power, and politicians can thus extract higher levels of rents and provide fewer goods at higher prices. Thus, democracy is predicted to have welfare benefits for its citizens.

The empirical evidence on social spending, human development outcomes, and political violence suggests that higher levels of democratic accountability do produce positive outcomes for citizens. In terms of spending, more democratic countries seem to spend more on public health [Ghobarah et al., 2004, Ross, 2006], primary education [Stasavage, 2005, Ross, 2006, Tavares and Wacziarg, 2001, Brown and Hunter, 2004], and even pollution control [Deacon, 2003]. Increased electoral competition may also provide incentives for politicians to stop communal violence [Wilkinson, 2006].

1.2 Economic development, interest group politics, and democratic quality

The positive relationship between democracy and development has long been fodder for theorists of democratization and democratic consolidation. Modernization theory posits that rising levels of economic wealth are associated with a bundle of social changes including industrialization, urbanization, education, and the expansion of the middle class that make democracy better able to function [Lipset, 1959]. Later work has shown that, at least after the end of the 19th century, economic growth seems to work more through consolidation (making it less likely that democracy will fail) than through increasing the probability of a transition from autocracy to democracy [Przeworski et al., 2000, Epstein et al., 2006].

The debate on modernization theory has largely been conducted with cross-national quantitative analysis, and there has been little micro-level work testing the channels through which modernization theory may actually work. Lipset's (1959) early work simply looked at relative proportions of democracies in different groups of countries, including stable and unstable democracies and autocracies. Lerner [1958] incorporates survey data on psychological factors into his cross-country analysis, arguing that urbanization and social mobility contribute to a sense of "empathy" that enables a participation in democratic processes. Later work uses more sophisticated statistical methods, and begins to test patterns over time rather than simply cross-sectional levels of democracy [Przeworski et al., 2000, Epstein et al., 2006, Boix and Stokes, 2003]. Despite some dissenting

voices,¹ most scholars accept these cross-national trends as evidence in favor of the argument that development facilitates a modernization process that enables democracy to function.

In this paper, I use micro-level evidence from Liberia to test one important channel through which economic development may affect democratic consolidation: voting behavior and electoral competition. Many of the mechanisms of modernization theory predict changes over decades or generations, such as increases in education as the state builds capacity and school-age children develop into mature citizens who are better able to make informed, logical choices between candidates for office [Lipset, 1959]. However, increased exposure to outsiders and increased personal wealth may have effects in the short term as well. Increases in income may enable individuals to invest more in information about different candidates or enable increases in spending on leisure time that can be used for community organizing. Increased exposure to outsiders may have short-term effects on tolerance towards outsiders [Allport, 1954, Samii, 2012].

However, in the case of rural African politics, it is likely that the primary driver of a relationship between development and democratic quality works through the attractiveness of clientelistic transfers. The dominant models of ethnic politics argue that is driven by voters' attempts to maximize their expected values of private or club goods Posner [2004, 2005], Fearon [1999], Chandra [2007], Bates [1983]. Case study evidence from Liberia suggests that clientelism plays a large role in Liberian politics [USAID, 2008]. In democracies in which voters have low information or politicians low credibility, voters may prefer to receive short-term transfers of patronage rather than long-term programmatic benefits [Keefer, 2004]. Thus, voters may accept worse policy outcomes in exchange for one-off transfers from candidates, and politicians can collect rents because there is a lower performance incentive [Stokes, 2005]. In such systems, group-based voting may be used as an informational short-cut or signal of the expected value of these private or semi-private transfers [Chandra, 2004, 2007]. Baldwin [2010] makes an interesting argument that voters may "vote with the chief" because their ability to benefit from patronage depends on the closeness of their chief's relationship with the politician in power.

The dominance of patronage in many developing country democracies and autocracies has led some to argue that the correlation between democracy and development may in fact be driven by changes in clientelistic equilibria [Magaloni, 2006]. Essentially, politicians can buy off individuals' votes in poor countries, but as individuals become richer, the marginal utility of income drops and they are more likely to gain more utility from voting according to their ideological or partisan preferences than to vote for a less-preferred party because of a one-off transfer [Stokes, 2005]. Under these clientelistic models, we would expect that increases in wealth should be associated with decreases in ethnic or block voting, as the marginal utility of a clientelistic transfer goes down when individuals become richer. Clientelism in Africa often manifests itself as block or ethnic

¹Robinson [2006] argues that there is no inter-temporal relationship between democracy and development, which he interprets as evidence against the modernization hypothesis. However, considering the susceptibility of democracies and autocracies to regime change during economic downturns, there may be competing effects in the short run and long run that cancel each other out in regressions with country fixed effects.

voting, where individuals vote as an identity group to maximize their expected value of a private or club good. Indeed, it is particularly important to look at the competitiveness of elections at the local rather than national level in Africa because of the prevalence of these phenomena and their tendency to undermine democratic accountability.

1.3 Natural resources and quality of democracy

In this section I briefly review the resource curse literature, arguing that the mechanisms underlying the negative relationship between resource extraction and democratic quality operate at the national or regional level rather than the local level. In this study of the local dynamics of mining operations, I do not test for any of the most plausible effects of natural resource wealth on democracy.

The study of the negative effects of natural resource wealth is a large offshoot from the modernization theory literature that argues that increases in development are not associated with increases in democracy when the wealth comes from natural resource extraction. The term “resource curse” has been used to describe a wide range of phenomena from the purely economic Dutch disease [Corden, 1984, Sachs and Warner, 1995] to civil war and authoritarianism. A large body of research has focused on a more political conception of “rentier states” in which the social contract is eroded by the replacement of direct taxes on the citizenry with the unearned cuts of resource rents [Karl, 1997, Mahdavy, 1970, Beblawi, 1987].

In a seminal article, Ross [2001] argues that there are three potential mechanisms through which resource rents could be linked to authoritarianism: a rentier effect, a repression effect, and a modernization effect. Proponents of the rentier effect contend that governments use resource rents to relieve pressures for democracy. Lower taxes may lead to fewer expectations of the government [Crystal, 1990], enable additional spending on patronage, or undercut the creation of social capital [Bellin, 1994]. Alternatively, resource wealth could enable higher levels of spending on the military to suppress popular mobilization for democracy [Clark, 1997], or it could simply not set off the social transformation that is necessary for a country to modernize [Inglehart, 1997].

Recent work has pushed back against this large literature, arguing either that the anti-democratic effects of resource wealth are conditional on the presence of some third factor, or that they are spurious. Dunning [2008] argues that the effect of resources is conditional on the level of inequality: surprisingly, at high levels of inequality, natural resource wealth alleviates the fears of the rich that the poor will redistribute their wealth under democracy, while at low levels of inequality, resource rents are funnelled into patronage or coercion to perpetuate authoritarian rule. Others argue that the level of political competition matters [Luong and Weinthal, 2006]. Others have made theoretical or empirical arguments that the relationship is spurious. The most convincing theoretical arguments center on the processes that lead to discovery of and dependence on resource wealth. Others argue that the correlation between resource dependence and authoritarianism may be driven by dictator’s choice of strategies if authoritarian regimes who engage in terrorism to perpetuate their regimes are

more likely to invest in high-expertise, capital-intensive industries like natural resource extraction and thus become resource dependent [Haber, 2007, Gandhi and Przeworski]. Still others have made methodological arguments about the way that cross-national tests of this relationship have been conducted, suggesting that there is no effect or even a positive effect of natural resources once these errors have been corrected [Haber and Menaldo, 2011, Herb, 2005].

In this study, I examine the short-term, local effects of natural resource extraction. All of the resource curse mechanisms reviewed here operate at the country level and therefore have no observable implications at the local level. To the extent that areas near the mines receive more rents, increased patronage spending could decrease the competitiveness of the vote. However, campaign budgets are fungible, and thus there is no reason that areas around the mines should necessarily receive more patronage spending just because of their geographic proximity to the source of the rents. Nevertheless, although I do not directly test any of the hypotheses related to the natural resource curse, by emphasizing the potential positive effects of natural resource extraction, this study adds evidence to a more optimistic view of natural resource wealth and democratic quality.

1.4 Conclusion

In this section I have argued that modernization theory predicts that the competitiveness of local elections should be increased by the opening of new mines that bring jobs and spending into local communities. Electoral competition is an important, indeed definitional, measure of the quality of democracy. Particularly in Africa it is important to measure electoral competition at the local level because of the observational equivalence of competition within ethnic or village blocks and competition across them, or between groups. Modernization theory suggests that increases in wealth and exposure to outsiders should be associated with increases in tolerance, information, and participation in civil society. Finally, I have outlined some of the arguments linking natural resource extraction and democracy. I argued that most of the mechanisms by which resources affect democracy are held constant in this study due to the fungibility of patronage spending between areas and the macro-level nature of the rentier effect. Ultimately, my argument provides evidence of some positive effects of resource wealth, although it does not take on the resource curse literature head-on.

2 Background: the Liberian case

Liberia is a case in which we would expect considerable identity- and patronage-based voting, and one that has hovered in the grey zone between democracy and autocracy for the past few decades. It is also a difficult test for a theory about economic development and democratic quality after being devastated by a 14-year series of civil wars that destroyed its economy and kept Liberia's political system in a tumultuous cycle of elections and violence at a time when many of its African neighbors were democratizing.

Identity politics has played a significant role in Liberia's history and civil war. The spark that set off the first civil war in 1989 can be found in President Samuel Doe's harsh treatment of the Nimba-based Mano and Gio ethnic groups during the 1980s. Doe began cracking down on this group in Nimba County after a coup attempt in the mid-1980s. These groups' support for Charles Taylor's invasion and insurgency in 1989, and Doe's brutal response, set off several years of conflict. The implementation of a military intervention and peace agreement in the 1990s resulted in Taylor's democratic election in 1997, but he soon faced his own insurgent challengers from Lofa County and the south [Ellis, 2001]. The war ended in 2003 with Taylor controlling less than a third of the country's territory and facing a threat of rebel incursion into the capital of Monrovia. Taylor resigned on August 11, 2003, and was eventually replaced by a transitional government.

Since the end of the war, Liberia has become something of a darling of the donor community and has enjoyed a swift reconstruction. The country has held two national elections, in 2005 and 2011, both of which returned the mixed Gola, Kru, and German former World Bank executive Ellen Johnson-Sirleaf as the winning presidential candidate. In both elections, the candidate choices were dominated by individuals who had played some role in the regimes or insurrections of Doe and Taylor.² During the 2005 election, the major candidates included Ellen Johnson-Sirleaf, former senator under Taylor Charles Brumskine, representative of Taylor's party Varney Sherman, and former president's son Winston Tubman. George Weah, football star and political outsider, was also a major contender. The 2011 race included many of the same candidates: Brumskine, Johnson-Sirleaf, Tubman, Sherman, and Weah, who together took 60% of the first-round vote in 2005, all ran again in 2011 (Korto took another 20% in Nimba but did not run again in 2011; Weah ran for vice-president on Tubman's ticket).

According to the International Crisis Group, "voting in 2005 was primarily along ethnic lines except in Montserrado county (the district of the capital, Monrovia)" [International Crisis Group, 2011, p. 10]. Other reports have pointed out the prevalence of patronage in Liberian politics during this period [?]. Brumskine got the highest votes in Grand Bassa, River Cess and Margibi Counties, while Tubman took Maryland and Johnson-Sirleaf won Bhopolu, Bomi, and Lofa. The following chart shows the distribution of the votes by candidate in both elections across the counties included in this study in 2005 and 2011.

During the 2005 election, we see that votes in the first round were fairly evenly split in these eight counties across a number of competitive candidates, including Johnson-Sirleaf, Brumskine, Tubman, Sherman, Korto, and Weah, with Weah taking the most. In 2011, although the other three competitive candidates from 2005 ran, they were unable to attract significant numbers of votes. In 2011 first-round votes in the counties under study were quite concentrated around two candidates, namely Ellen Johnson-Sirleaf, who received a much larger percentage of the overall vote than she had in 2005, and Prince Johnson, who had run

²In fact, the amount of support that Ellen Johnson-Sirleaf provided to Charles Taylor during the waning days of the Doe regime is a hotly debated quantity. In her memoir Johnson-Sirleaf contends that she met with Taylor three times and gave him a small amount of money once. Others question the veracity of this account.

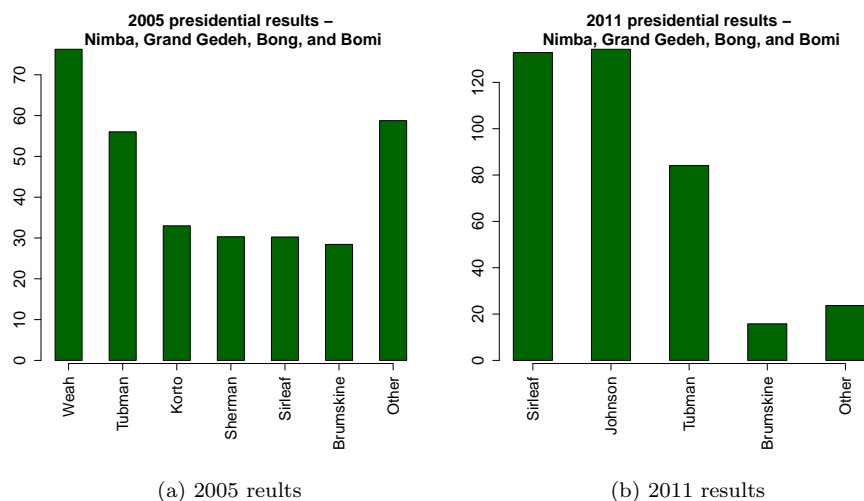


Figure 1: Average votes in the first round presidential election by polling station for each candidate in Bomi, Bong, Grand Bassa, Grand Cape Mount, Grand Gedeh, Margibi, Nimba, and Rivercess Counties.

successfully for a Senate seat in 2005.

Mining also plays a role in Liberia’s political history. One of the most important effects of the mines on Liberia’s politics during this period is the Community Social Development Funds created by ArcelorMittal, one of the biggest mining operations in Liberia. ArcelorMittal donates between \$1 and \$1.5 million per county to each of the three counties where it has major operations—Bong, Nimba, and Grand Bassa. These funds have been criticized by the Liberian governments own auditors, Liberian civil society organizations, and international NGOs for mismanagement of funds by government appointed stewards of the funds [Siakor, 2012, *gac*, 2009a,b,c, *Natural Resource Watch*, 2012]. The central Liberian government received some \$40 million from mining companies in 2009-2010, including these community development funds [Natural Resource Watch, 2012]. To the extent that these funds increase corruption and funds for patronage spending in Liberia, the overall impact of the mining sector on the Liberian political system is potentially quite negative. The impact of these funds, however, is not measured in this study, as they are not necessarily targeted on the communities around the mines. Indeed, one of the major complaints about the county funds is that they are unjustly benefiting individuals in the county capitals rather than those who are actually affected by the mines. Thus, within-county comparisons between polling stations control for the effect of these county- and nation-wide dynamics.

In the next section, I describe how I leverage the peculiarities of the Liberian case to study the relationship between economic development and the competitiveness of elections.

3 Empirical strategy

In this paper I use the case of post-conflict Liberia to test my hypothesis about the impact of economic development on voting behavior. My empirical strategy uses the fact that new mines opened up in some low-income areas of Liberia and not others during the six-year period between the 2005 and 2011 elections. The mines brought a number of changes to the communities, but their primary impact was arguably the provision of low-skilled jobs that increased the incomes of individuals in the neighboring communities. ArcelorMittal, for example, which operates an iron mine on Mount Nimba, employed 5,000 people during the construction phase of its mine and, upon opening in early 2011 began employing 500 regularly [Kramer, 2011]. After its Mineral Development Agreement was signed and ratified by the Senate, BHP Billiton hired 300 individuals in Nimba and announced plans to hire up to 3,500 [Perry, 2010, The New Dawn, 2010]. Amlib Ltd gained a Mineral Development Agreement in 2004 and began production, primarily in the county just to the southwest of Nimba (www.amlibgroup.com). These operations, which either opened or scaled up during the period between the 2005 and 2011 elections, introduced a shock to the local level of economic development, and primarily to the incomes of local residents.

In this paper, I show results from both difference-in-difference and instrumental variables specifications. First, I use difference-in-difference estimation to look at differential changes between the 2005 and 2011 elections in the concentration of votes in areas where a new mine that provides jobs to local residents opened up, and those that did not receive a mine. Difference-in-difference controls for all time-invariant characteristics that could determine which areas receive mines and which do not, but could still be biased by time-variant characteristics. Second, I use mineral deposits as an instrument for where mines open. In this section I describe the empirical strategy and specifications that I use, discuss my measure of electoral competition, and then address a few potential concerns to the identification and interpretation of my estimates.

3.1 Difference-in-differences

The first specification that I use is difference-in-differences. This strategy uses fixed effects for each polling station to control for all time-invariant characteristics of voting patterns. The primary dependent variable of interest is the change in the concentration of votes by polling station between the 2005 and 2011 elections. Thus, I estimate the following specification using linear regression:

$$y_{jt} = \alpha_j + \beta_t + (mine \times 2011)\lambda + \mu_{jt} \quad (1)$$

where y_{jt} is the concentration of votes at polling station j in year t , α_j is a fixed effect for each polling station, β_t is the fixed effect for each year, and μ_{jt} is the error term. The variable *mine* is a dummy variable that takes the value of 1 if a new mine began operations in your area between the two elections, and 2011 is a dummy variable that takes the value of 1 during the 2011 election. The coefficient λ is therefore my estimate of the treatment effect of being in an area

with a mine during the 2011 election.³

Using difference-in-differences in this case means that my specification is essentially comparing the change in electoral outcomes in areas that received new mines to the change in electoral outcomes in areas that did not. The unit (in this case, polling station) fixed effects control for any time-invariant differences between the areas that got mines and those that did not. For example, if mines are targeted on areas that are always stronghold areas for the incumbent, this empirical strategy controls for that potential source of bias. Time fixed effects control for any differences over time that affect the entire country, such as the general economic recovery of the country as a result of the war ending.

One threat to the identification of a causal effect using this strategy is the possibility that the timing of new mines opening is driven by a factor that is related to their potential outcomes. If, for example, new mines are targeted on areas that have ongoing increases or decreases in the concentration of votes, this strategy will return a biased estimate of the effect of a mine on voting. This kind of targeting would require both fine-grained information about public opinion, and bargaining power with the mining companies to be able to influence where they open their development sites. Nevertheless, it remains a concern.

3.2 Instrumental variables

To eliminate the potential that some time-variant omitted variable might bias my results, I run a second set of analyses using instrumental variables. Specifically, I use the presence of mineral deposits as an instrument for the opening of a new mine. The following specification shows my instrumental variables strategy in two stage least squares:

$$mine = \beta deposits + \epsilon \quad (2)$$

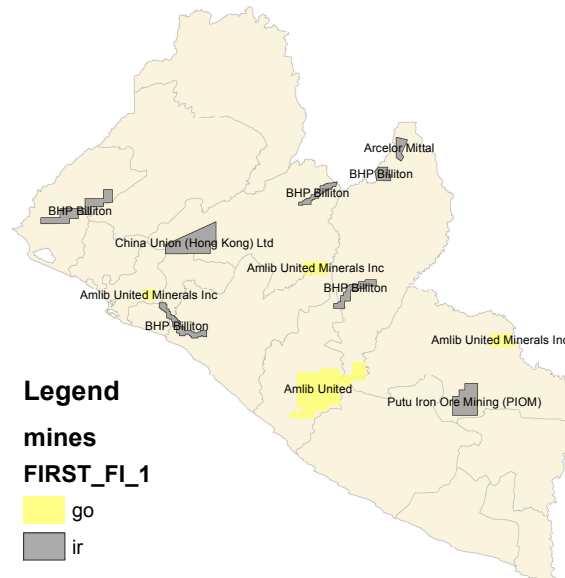
$$y = \alpha + \beta \hat{mine} + \mu \quad (3)$$

Because I have data on the location of mineral deposits by type of mineral (primarily gold and iron, and diamonds), I have many options as instruments. Because weak instruments can introduce bias into instrumental variables models, and this bias is magnified by the over-identification of the model [Angrist and Pishke, 2008, Angrist and Kreuger, 2001], I do not use all types of mineral deposits as instruments. For most of my results, I use the count of the number of mineral deposits within an 8-km radius as the instrument predicting proximity to a mine.

Other studies of the effect of natural resource wealth have also exploited the apparently orthogonal nature of resource deposits to estimate the impact of minerals, oil, or other endowments [Brunnschweiler and Bulte, 2009]. Indeed, one of the very mechanisms that seems to drive the purported negative effects

³In later results I examine the effects of different types of treatment, including creating different treatments for different types of minerals and different treatments for each individual mine.

Figure 2: This map displays the 12 mineral development agreements signed by the Liberian government between 2005 and 2011. It does not include licenses for exploration and reconnaissance.



of the “resource curse” are that it appears as a kind of “manna from heaven” [Karl, 1997]. Nevertheless, recent research showing that the discovery of resource deposits is deeply endogenous to the resources, effort, and technology that a country invests in the exploration process [Stijns, 2006, David and Wright, 1996, Brooks and Kurtz, 2012].

While natural resource discoveries are certainly not random across countries, the rate of investment and level of human capital that drive them are held constant within a single country. Therefore, I argue that the locations of mineral discoveries within Liberia is indeed orthogonal to all characteristics that may be correlated with voting patterns.

3.3 Unpacking the treatment

As previously mentioned, opening a new mine has many different potential impacts on local areas. Indeed, the fact that the treatment is multifaceted makes it easier to interpret as part of a scalable package of changes that could plausibly affect political behavior in a poor country. Rarely do poor countries develop through precise and targeted infusions of income that are uncorrelated with any other changes. I argue that the opening of a mine is a micro-level version of the basket of treatments that we would consider to be part of “economic development”: increases in income, industrialization, exposure to outsiders, and increases in education. The mine treatment also enable us to get at an interesting

consequence of scaling up the treatment, which is the distributional consequences of development. These fall into several categories.

- **Increases in income:** Primarily through the provision of hundreds to thousands of jobs for low-skilled workers in the mining communities. Income could also be increased by increased demand for agricultural or other products from local producers.
- **Exposure to outsiders:** Foreigners and Liberians from the capital also migrate to the counties to work for the mining companies. This could change residents attitudes towards foreigners in either a positive or negative direction. However, it seems unlikely that this exposure would have a large effect on voting behavior because professional staff and local staff with low skills are largely segregated in these operations.
- **Increased education:** Mining companies generally invest in community development projects to create a positive relationship with local communities. In the case of at least one of the mines in Nimba, this included investment in a local primary school. Nevertheless, these investments should not have any perceptible effect over a six-year period. Mining companies also provide job skills training to local employees.

It is important for interpretation of these results that the composition of voters at the mines does not change due to migration. This would be a violation of the “exclusion restriction” as defined in the experimental literature [[Green and Gerber, 2012](#)], which necessitates that no other factors can be correlated with assignment to treatment. Thus, if the mines attract new individuals to vote in the mine areas, my results would produce a biased estimate of the causal effect of the mines on voting behavior. There are a couple of reasons why I do not think that this is driving my results. First, voters were required to travel to their home districts where they are registered to vote, so their votes should not be included in my “treated” polling stations [[National Elections Commission, 2004](#)]. Second, according to the mine operators, the mines all hire locally rather than importing laborers from other areas. Third, the unemployment rates are so high and the jobs require so little technical knowledge that it is quite likely that the mine operators would be able to find sufficient labor supply in the local areas, and would have an interest in smoothing over relations with local villages by making truly local hires.

3.4 Measuring the competitiveness of the vote

My primary dependent variable is a measure of the concentration of votes at the level of the polling station. I use an adaptation of a Herfindahl index, which was originally developed to measure the level of competition between firms. In this case, the measure is calculated as $1 - \sum s_i^2$, where s_i is the share of votes won by candidate i . Values of 0 thus represent the situation in which a single candidate sweeps all the votes, and values closer to 1 represent more competitive races. The original Herfindahl index varies from 0 to 1, with 1 representing a complete lack of competition. For ease of interpretation, I have reversed the measure to represent competitiveness rather than concentration.

It is important to note that the Herfindahl index measures not just how widely the votes are distributed among candidates in the race, but also the number of candidates. Adding a candidate to a race always increases this measure of competitiveness, even if that candidate only takes a tiny portion of the vote. This does not matter for the presidential and senate races as all polling stations have the same number of candidates for those positions on the ballot. I will discuss its implications in the house race in section ??.

Particularly in sub-Saharan Africa, it is important to analyze competition at the local rather than national level because the national-level measures of electoral competitiveness mask the degree to which there is competition across ethnic or regional groups for votes. Specifically, situations in which there are very different levels of democratic accountability are observationally equivalent if we simply look at the closeness of the vote at the national level. In the first case, the population is evenly split between two groups, each group votes 100% for its coethnic candidate, and candidates do not feel pressure to perform because they know that their coethnic voters will not defect to another candidate. There is low accountability but a “close” outcome at the national level. In the second situation, two candidates compete for the votes of each groups’ members and must perform when in office because voters within each group may defect to the other candidate. These situations are observationally equivalent at the national level but imply vastly different levels of accountability.

At the local level of a village, or cluster of villages in a single rural area, voters tend to be ethnically homogenous relative to the rest of the country. Thus, we can isolate competition by candidates for voters within a single identity group by looking at competitiveness of electoral outcomes at the level of the polling station. I will describe this measure in more depth in my methodology section.

3.5 Data

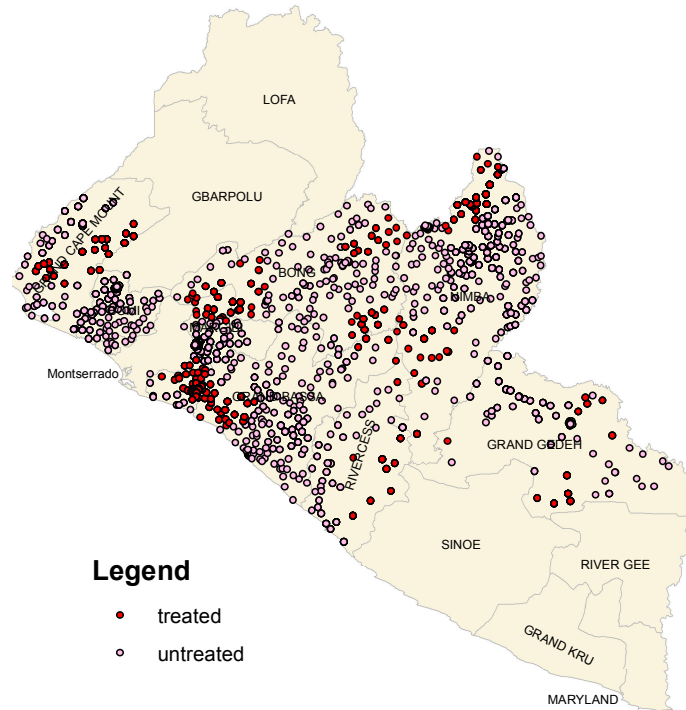
My data comes primarily from the Liberian government, which has been exceptionally transparent under the Johnson-Sirleaf administration. In this section I describe the datasets that I use for the election results and mineral concessions.

Both years of election results data is provided by the Liberia National Elections Commission (www.necliberia.org). Data is available at the level of the polling station for 2005 and 2011. Maps of polling station locations are also publicly available. The precise locations of many of the polling stations changed between the two elections, so I used nearest neighbor matching within a 5-kilometer radius to pair 2011 polls with polls from 2005 using the software ArcGis 10. I then exclude urban areas by eliminating polling stations that are within 5 kilometers of an urban center.

As a very rough check of the quality of this match, I regress 2011 turnout, support for Ellen Johnson-Sirleaf, concentration of the vote, and number of invalid ballots on their 2005 equivalents for each of the three races. If my technique produced an accurate match of 2005 and 2011 polls, I would expect that 2005 levels of these characteristics of the votes would be significant predictors of their 2011 levels. All are significant at the 1% level. My measures of the

competitiveness of the votes in 2005 and 2011 are also correlated across years and across races at the 1% level, excepting the measure of competitiveness in the senate races in 2005 and 2011, which is significant at the 5% level.

Figure 3: A map of the polling stations in counties where new mines opened with “untreated” polling stations in pink, and “treated” polling stations in red.



The data on mineral concessions is provided by the Liberian Ministry of Lands, Mines, and Energy (<http://www.molme.gov.lr/>). It is also publicly available and was processed in ArcGis 10. As of April 2011, there were 86 concession agreements signed and ratified by Congress. These include reconnaissance, exploration, and development agreements, but I am only using development agreements. In my main specification I have considered polling stations to be “treated” if they are within 10 kilometers of a mine. In ?? I show the robustness of my results to different distances away from the mines.

3.6 Summary statistics

The following table describes the summary statistics for the number of invalid votes, turnout, and the measure of the competitiveness of the vote for each polling station.

The first statistics that I show are on the number of invalid ballots. There

	2005			2011		
	min	mean	max	min	mean	max
pres invalid	0	27	235	0	45	618
senate invalid	0	40	286	0	20	175
house invalid	0	39	214	0	32	228
pres turnout	58	592	1971	62	598	2594
senate turnout	62	566	2594	68	1015	3483
house turnout	62	563	2568	49	587	1931
pres herfindahl	0.00	0.69	0.96	0.05	0.62	0.93
senate herfindahl	0.05	0.69	0.96	0.29	0.85	0.98
house herfindahl	0.03	0.68	0.96	0.09	0.74	0.97

is a wide range of rates of invalid ballots across polling stations, but generally the invalid rate is less than 5% in all years in all races. The invalid rate in the 2011 presidential race is slightly higher at 6.4%. Given this increase in invalidity, I checked for a correlation between support for the incumbent, Ellen Johnson Sirleaf, and the rate of invalid votes. Controlling for turnout, there is a significant negative relationship between the level of support for the incumbent and the rate of invalid votes. There is no such relationship in the 2005 election when Johnson-Sirleaf was not the incumbent. This is troubling, as it suggests that the incumbent may have disqualified more ballots in areas where her support was low. However, this correlation should be interpreted in light of the body of qualitative evidence collected by election observers, who ultimately concluded that the election was generally free of fraud. According to the official Carter Center post-election report, “While Carter Center observers reported a number of clerical mistakes, computational errors, and other procedural irregularities during the tally, they found no evidence of systematic fraud or manipulation of election results. The opposition was never able to substantiate its claims of fraud but nonetheless sought to delay or challenge the process” (2011, 9).

The summary statistics on turnout are also interesting. Specifically, we see that a significant number of individuals are only voting in some races and not others. In 2005, the mean number of votes cast for each of the three races is quite similar. In 2011, the mean number of votes cast in the Senate vote is much higher than that of the presidential or House races.

Last, we see that there is a good degree of variation in the competition indices measuring the concentration of votes by polling station.

4 Results

In this section I show results for a series of specifications measuring the effect of new mines on the competitiveness of the vote in counties that received new mines. The following table shows the results from the presidential, senate, and house elections, respectively. In Table 1, I display four columns of regressions for each level of the election.

Table 1: Estimates of the effect of mines on the concentration of votes

	presidential			senate			house		
	Lin	DiD	IV	Lin	DiD	IV	Lin	DiD	IV
intercept	0.61*** (0.01)	0.79*** (0.12)	-0.09*** (0.02)	0.85*** (0.00)	0.79*** (0.08)	-0.18*** (0.01)	0.74*** (0.01)	0.84*** (0.11)	-0.07*** (0.02)
2011		-0.08*** (0.01)			0.15*** (0.01)			0.04*** (0.01)	
treat:2011		0.06† (0.03)			0.01 (0.02)	0.23* (0.08)		-0.00 (0.03)	
treat	0.04* (0.02)		0.15 (0.10)	0.01 (0.01)			-0.02 (0.02)		0.21* (0.10)
poll FE		✓			✓			✓	
N	591	1062	471	471	1062	471	471	1062	471
R ²	0.01	0.67	-0.01	0.00	0.72	-0.24	0.00	0.65	-0.10
adj. R ²	0.01	0.26	-0.01	-0.00	0.38	-0.24	-0.00	0.20	-0.10
Resid. sd	0.16	0.17	0.24	0.10	0.12	0.19	0.17	0.16	0.239

Standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

For each level of the Liberian national elections, I show three different regressions. The first is a linear regression that shows the relationship between mines opening up and the competitiveness of the vote in 2011. Second is a difference-in-difference estimator that estimates the relationship between having a mine open within an 8-km vicinity of a polling station and the change the competitiveness of the vote. In the third regression for each race, I show estimates of the effect of the mines on the competitiveness of the vote using found deposits of minerals as instruments for the mines.

In the difference-in-difference specification, the estimator of the treatment effect is the coefficient on `mine:2011`. In the linear and IV results, the treatment effect is the coefficient on `mine`. The dependent variable in the IV specifications is the change from 2005 to 2011 in the concentration of votes, while in the linear regression it is the level of competitiveness in 2011. In all regressions, a positive coefficient represents an increase in the competitiveness of the race, or alternatively, a decrease in the concentration of votes on a small number of candidates.

The substantive interpretation of these results is that mines are associated with a reduction in the concentration of votes in the surrounding communities. The effects on the house and senate races are significant, while the presidential results are very close to significance at a p-value of .12. The positive signs on these coefficients are in line with the prediction that increased economic development leads to increased quality of democracy at the micro-level.

Because there are an infinite number of different ways to define treatment in this study, it is possible to cherry pick results that happen to be significant by random chance to support a claim. Thus, though my main table presents results when treatment is defined as being within 8 kilometers of a mine, the following graphs, 4, show that these results for the house and senate races are robust to different definitions of treatment.

We see in these graphs that the magnitude and significance of the results do not change much as we vary the treatment variable. In the case of the presidential race, the coefficients are always positive but insignificant. For the senate and house races, the coefficients are positive and significant. However, the effects do not seem to decrease as we increase the distance from the mines.

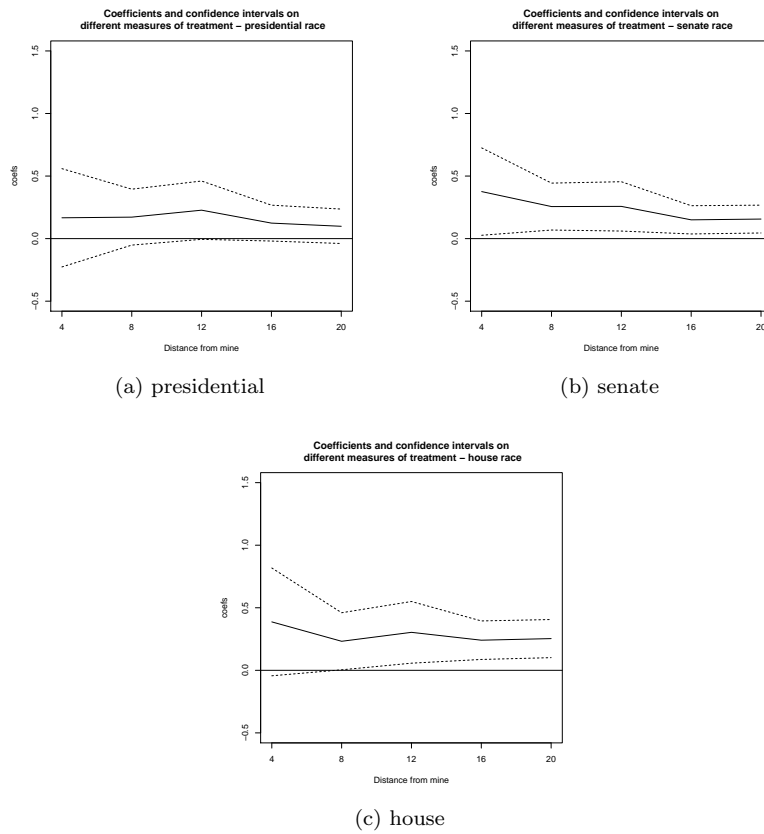


Figure 4: Estimated effects of being in the proximity of a mine on the competitiveness of the vote in the presidential, senate, and house races, with proximity defined as 4, 8, 12, 16, and 20 kilometers, respectively.

4.1 Support for incumbent president

One plausible explanation for these results is that competition in the vote around the mines may be increasing because voters around the mines are less satisfied with the incumbent’s performance. In this section I show two sets of regressions that provide partial support for that hypothesis.

Table 2: Estimates of the effect of mines on support for the president and her Unity Party

	Lin	DiD	IV	Lin	DiD	IV	Lin	DiD	IV
intercept	156.64*** (7.74)	361.29*** (83.43)	198.4*** (23.5)	90.17*** (6.51)	269.37*** (81.33)	-9.26 (27.00)	66.72*** (6.76)	228.64* (102.00)	156.69* (66.03)
2011		121.42*** (8.59)			2.26 (8.55)			-57.29*** (11.40)	
mine:2011		34.29† (19.13)			-75.60*** (19.87)			-16.28 (26.00)	
mine	46.26*** (17.04)		-347.3*** (104.4)	-8.09 (14.49)		113.40 (139.74)	-24.94† (14.74)		-500.35 (334.80)
N	591	1062	471	471	1028	443	423	980	395
R ²	0.01	0.71	-0.84	0.00	0.62	0.02	0.01	0.58	-1.00
adj. R ²	0.01	0.35	-0.84	-0.00	0.11	0.02	0.00	-0.06	-1.01
Resid. sd	167.70	117.83	226.5	126.20	114.85	163.1	123.58	144.03	288.4

Standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

The results in Table 2 show that the mines may have had a negative effect on support for President Ellen Johnson-Sirleaf in the 2011 race, but did not affect support for other members of her party at different levels of government. As in Table ??, there are three columns of results for each level of government. The first column is a simple linear regression of the number of votes won by the president and members of her Unity Party in the 2011 election on a dummy variable indicating whether or not the poll is within eight kilometers of a mine. The second is a difference-in-difference result, and the third uses the number of mineral deposits within an 8-km vicinity as an instrument for whether the poll is next to a mine. The third IV regression also uses the change from 2005 to 2011 rather than the level of support in 2011 as the dependent variable.

First, these results shed some light on the political effects of the mines. Being in the proximity of a mine causes support for the president to go down sharply, but does not affect support for other members of her party. However, these results should be taken with a grain of salt, particularly for the house race, because the sample size goes down in comparison to the presidential race as Unity Party did not field a candidate in every race.⁴ Nevertheless, changing those observations from NA to 0 does not change the significance or magnitude of the results.

Second, these results seem to justify the need for an instrumental variables approach. In the linear and diff-in-diff regressions, we find a positive and significant relationship between the 2011 level of support for the president and proximity to a mine. However, in the instrumental variables results this relationship is significant and has a large negative magnitude. This suggests that mines may indeed have been more likely to open in places where support for the president was already on the rise, perhaps because the executive branch was targeting mines on weak supporters.

Third, the loss of support for the president in areas surrounding the mines is interesting in light of economic voting hypotheses. Despite the new economic activity brought by the mines, individuals are less likely to vote for the incumbent president. This may be because of the communities' unmet expectations of benefits from the County Social Development Funds or other benefits of the mines, but it is impossible to determine what might explain this trend without further data collection.

4.2 Candidate behavior

Another possible political explanation for the changes in competitiveness of the races is through their effect on candidate behavior. This explanation is only plausible for contests for seats in the House of Representatives, as the number of candidates for the Senate and executive positions is fixed and equal across all counties. There are between 5 and 9 senate candidates competing in each race in 2011 and between 10 and 16 in 2005 (depending on the county), as well as 22 presidential candidates in 2005 and 17 in 2011. Table 3 shows the results of regressions of the number of candidates on proximity to a mine.

There is no significant relationship between polling stations that are close to

⁴In the next section, I show the results of an analysis of the number of candidates.

Table 3: Estimates of the effect of mines on the number of candidates in the House race

	Lin	DiD	IV
intercept	7.83*** (0.09)		11.81*** (1.44) 7.50*** (0.19)
2011			-2.62*** (0.15)
mine:2011			-0.01 (0.33)
mine	-0.30 (0.20)		1.37 (0.85)
N	471	1062	471
R^2	0.00	0.68	-0.14
adj. R^2	0.00	0.28	-0.14
Resid. sd	1.73	2.03	1.85

Standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

mines and the number of candidates running for the House of Representatives seats. This provides additional support for an explanation of the main results as evidence that voters are choosing to vote more independently due to their proximity to the mines.

5 Conclusion

This paper examines the relationship between the opening of gold and iron mines in rural Liberia and the competitiveness of elections. Modernization theory predicts a positive relationship between economic development and democracy, but little is known about how this relationship might work at a micro level. In this paper I test the impact of modernization—in this case, the opening of a mine that brings jobs, outsiders, and a small amount of education into a rural community—on vote choice during national elections. While this treatment does not test all of the possible mechanisms through which modernization theory predicts that development fosters democracy, it does show that economic development has an impact on the level of competition in democratic elections at an extremely local level in the near term. In addition, it adds some nuance to resource curse theories which argue that natural resources do not set off modernizing forces, suggesting that resource extraction has some positive effects at the micro level on the quality of democracy.

It is interesting that increases in the level of competitiveness are accompanied by decreases in support for the incumbent president. Importantly, the effect of competition does not seem to be driven by opinion of the president, as there are no decreases in support for other members of her party and there are significant changes in the level of competitiveness of the house and senate races. Nevertheless, the loss of support for the incumbent around the mines is in line with the hypothesis that economic development is associated with a breakdown in patronage networks.

It is important to note that these results present a very small subset of the total impact of natural resource extraction in Liberia and should not be interpreted as evidence against resource curse hypotheses. Indeed, civil society reports and audits in Liberia suggest that revenues from the mines studied here do seem to be mismanaged in ways consistent with a rentier state theory. Anecdotal evidence suggests that the County Social Development Funds in particular may be reinforcing patronage networks in Bong, Grand Bassa, and Nimba counties. I argue that these dynamics do not affect my analysis of the local effects of the mining companies' operations in Liberia.

This is quite an optimistic picture of the positive role that economic development can play in the establishment and improvements in the quality of democracy. It suggests a role for future field research to examine exactly how new economic opportunities may shape political attitudes and alter relationships between patrons and clients in patronage-dominated political systems.

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