A Better Life for All? Democratization and Electrification in Post-Apartheid South Africa

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Does democracy affect basic service delivery? If yes, who benefits, and which elements of democracy matter—enfranchisement, the liberalization of political organization, or both? In 1994, 19 million South Africans gained the right to vote. The previously banned African National Congress was elected promising "a better life for all." Using a difference-in-differences approach, we exploit heterogeneity in the share of newly enfranchised voters across municipalities to evaluate how franchise extension affected household electrification. Our unique data set combines night-light satellite imagery, geo-referenced census data, and municipal election results from the 1990s. We include covariates, run placebo regressions, and examine contiguous census tracts. We find that enfranchisement increased electrification. In parts of the country where municipalities lacked distribution capacity, the national electricity company prioritized core constituencies of the ANC. The effect of democratization on basic services depends on the national government's ability to influence distribution at the local level.

Does democracy affect the delivery of essential basic services? If yes, who benefits, and which elements of democracy trigger changes in implemented policies—enfranchisement, the liberalization of political organization, or both? Several studies find that democracies are better at providing public services than autocratic regimes (e.g., Bueno de Mesquita et al. 2003; Lake and Baum 2001; Min 2015). Franchise extension can shift the median voter in a way that affects the size of government and redistribution toward the poor (e.g., Aidt and Eterovic 2011; Aidt and Jensen 2013; Boix 2003; Husted and Kenny 1997; Meltzer and Richard 1981) and the delivery of services benefiting the newly enfranchised (Aidt and Dallal 2008; Fujiwara 2013; Miller 2008; Vernby 2013).

However, it is difficult to quantify the direct effect of democratization on the lives of the poor. Cross-country comparisons may suffer from omitted variable bias, reverse causality, and sample selection bias (Hollyer, Rosendorf, and Vreeland 2011; Ross 2006). Reliance on cross-national data of uneven quality gives rise to concerns about measurement error. Other studies examine the impact of democracy on resource allocation rather than services delivered (Stasavage 2005). Yet, especially in poor countries, funds are often not spent as intended (Reinikka and Svensson 2004; Stasavage and Moyo 2000). An additional challenge is that the process of democratization typically entails a bundle of different changes, including franchise extension as well as the lifting of barriers to political activity and organization. Yet, empirical work based on standard indices of democracy (Munck and Verkuilen 2002) leaves unresolved what precisely it is about democracy that accounts for the effect of interest. Tackling such "compound treatment" problems requires separating the effects of franchise extension and political parties on service delivery.

This article examines electrification in South Africa during the first period of democratic local government, which pro-

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vides a particularly good opportunity to evaluate the effect of democracy on service delivery. We examine a case of contemporary democratization with unique scale: in 1994 suffrage was extended to about 19 million nonwhite South Africans, representing 84% of the estimated 22.7 million adult citizens and permanent residents who had the right to vote (Southall 1994, 639). Restrictions on political activity were lifted and all parties were free to compete in elections, including the previously banned African National Congress (ANC) led by Nelson Mandela. At the same time, backlogs in basic services reflected the apartheid era's political inequality. Two-thirds of households were estimated to lack access to electricity (African National Congress 1994, para. 2.7.1). Our identification strategy exploits heterogeneity in the share of the newly enfranchised population across municipalities. This subnational approach helps mitigate several concerns raised above. In particular, municipalities within a country are more comparable than countries with different historical, cultural, and institutional circumstances, which reduces the risk of omitted variable bias.[1] We use an innovative method to combine two sets of census data, the most reliable data available to directly measure actual service delivery outcomes, which in turn we corroborate with nightlight satellite imagery.

Our study extends prior work on the politics of electrification. Brown and Mobarak (2009) document a relative shift in the distribution of electricity from industry toward households that is associated with democratization, but this cross-national work suffers from shortcomings including standard identification and compound treatment problems discussed above. Closely related is the pathbreaking work by Min (2015) with nighttime lights data. His cross-national results link democratic rule to electrification that benefits the poor, while in village-level data from India he finds that politicians and parties manipulate electricity supply at crucial moments such as elections. Our subnational results on franchise extension are consistent with Min's cross-national work, and we add robustness by using different data sources. However, in contrast to Baskaran, Min, and Uppal (2015) and Min (2015, 149), we uncover strong evidence for the targeting of core constituencies under particular institutional settings. As we discuss in the conclusion, this contributes to a growing debate about context conditionality in distributive politics.

Our estimates show that municipalities with larger shares of newly enfranchised voters and thus a clear change in the identity of the median voter experienced larger improvements in household access to electricity in the period 1996–2001. We also show that political alignment plays an important mediating role. In areas where the state-owned electricity company Eskom carried out electrification, ANC core constituencies were prioritized. On the other hand, partisan effects are absent in areas where municipalities undertook electrification, suggesting that, at the local level, parties converged on the median voter. What matters is not only the ideology of the party in power but its control over the levers of supply.

ENFRANCHISEMENT, POLITICAL PARTIES, AND ELECTRIFICATION

South Africa's "negotiated revolution" (Sparks 1995) culminated in democratic elections in April 1994, when for the first time all adult South Africans had the right to vote (Mattes 1995). The country's mass electrification campaign was inherently linked to the transition to democracy, which had fundamental implications for the composition of the electorate and the party political landscape. In this section, we develop our expectations as to how these events affected electrification patterns at the local level.

Enfranchisement

Under apartheid, the policy of racial segregation implemented by the National Party (NP) during its time in government between 1948 and 1994, meaningful political representation was reserved for the white population. Out of 22.7 million eligible voters in 1994, only 16% belonged to the previously enfranchised "white" population, while the remaining 72% "black African," 9% "colored,"[2] and 3% "Indian or Asian" adults enjoyed full voting rights for the first time (Southall 1994, 637). This population classification remains in use for census purposes and in public policy debates today and forms the basis of our analysis.

Our expectations are grounded in standard median voter theory. While under apartheid the median local voter was white and had access to electricity, franchise extension meant that the median voter became nonwhite in most municipalities and was less likely to have access to electricity. According to the 1996 census, 99% of white (and Indian) households were already electrified as opposed to 44% of black and 84% of colored households (Statistics South Africa 2005, 145). At the local level, the likelihood that the post-apartheid median voter has no electricity is therefore increasing in the share of the nonwhite population. Given apartheid's legacy of racial

1. Moreover, our data set covers the entire territory of the country, so we have no sample selection problems.

2. Under apartheid, people regarded to be of mixed descent were classified as "colored" and distinguished from other groups, often with arbitrary rules. The continued use of the classification is not uncontroversial.

segregation (Christopher 1994, 103–40), nonwhite households that were already electrified also benefited from further connections in their community because of positive externalities such as improvements in air quality and reduced fire risk from paraffin lamps and candles (Department of Minerals and Energy 2001, 30). Since it is reasonable to assume that all voters desire for themselves and their community to have access to electricity, we expect a positive effect of enfranchisement, in particular, of black and colored voters, on electrification.

H1. *Median voter*. Following the end of apartheid and the extension of voting rights to the nonwhite population, ceteris paribus, municipalities with higher rates of enfranchisement experience bigger increases in household access to electricity.

Party politics

In a pure median voter framework, enfranchisement would cause an increase in electrification regardless of which political party is in power, as parties compete to please the median voter and eventually converge on the same platform (Downs 1957). Alternative theories give more careful consideration to the role of political parties and, more generally, to the identity of policy makers (Besley and Coate 1997; Wittman 1983). A growing body of empirical work investigates whether the identity of the party in power does affect public policy, with mixed results. Some studies identify significant impacts (Pettersson-Lidbom 2008), while others find weaker (Blais, Blake, and Dion 1993) or no effects (Ferreira and Gyourko 2009).

South Africa's transition to democracy brought fundamental changes in party political control. The NP was challenged by the previously banned ANC led by Nelson Mandela, who had been released from prison. In addition, a range of smaller parties competed for electoral support. Among these were the Democratic Party (DP), the official opposition to the NP during apartheid, as well as the Zulu-nationalist Inkatha Freedom Party (IFP) led by Mangosuthu Buthelezi, a former chief minister of KwaZulu, a pseudo-independent "homeland" for Zulu people.[3] In 1994, the ANC won 63% of the national vote in the first general election after its unbanning, giving it 252 out of 400 seats in the National Assembly and a majority of seats in six out of nine provincial legislatures (Southall 1994). In 1995 and 1996, municipal councils elected under universal suffrage became responsible for delivering essential services (Cameron 1996). The ANC won about 53% of municipal seats, 6,032 out of 11,368 (Elections Task Group 1996, 230–32). While the party attracted the majority of black voters, these elections were not purely determined along racial lines (Mattes 1995). In several provinces, dominant population groups divided across parties, notably colored voters in the Western Cape and the Northern Cape, as well as the Zulu-speaking population in KwaZulu-Natal. Moreover, 40% of councilors were elected using proportional representation and the remainder on a ward basis that favored local minorities and reduced proportionality (Cameron 1996, 30–31). It is important to assess whether or not these changes influenced electrification patterns independently of the changes in the identity of local median voters.

Shortly after its unbanning in 1990, the ANC adopted mass electrification as a central political goal. Eskom, the country's state-owned electricity company, and the ANC agreed to a set of electrification targets (Bekker et al. 2008, 3128). These became part of a National Electrification Program (NEP) and the ANC's manifesto for the 1994 elections, the Reconstruction and Development Program. The ANC promised "electricity for all" and pledged "access to electricity for an additional 2.5 million households by the year 2000" (ANC 1994, para. 2.7.7). This high-level commitment meant that the ANC's performance would be measured in no small part by whether it would be able to achieve this ambitious target.[4] Since the 1996 constitution left responsibility for electricity reticulation with local authorities, as had been the case prior to democracy, the party's manifesto for the municipal elections ("A Better Life: Let's Make It Happen Where We Live") highlighted that democratic local councils have a crucial role in deciding "where new electricity supplies . . . will be put in" (ANC 1995). In contrast, the DP and NP campaigns emphasized crime (Lodge 1999, 44). The IFP had other priorities still, in particular, the future role of traditional authorities, which provided an important power base in its rural strongholds in KwaZulu-Natal (Beall, Mkhize, and Vawda 2005). Given the ANC's high-level commitment to electrification, the party had the strongest incentives to connect more households to the grid. This leads us to the following alternative hypotheses:

H2a. *Programmatic parties*. Municipalities with stronger ANC representation experience larger increases in electrification rates, ceteris paribus.

3. "Homelands" or *bantustans* had been reserved for different segments of the black population under apartheid and became synonymous with poverty and underdevelopment (Christopher 1994, 65–101). In 1994, they were dissolved and reintegrated into the territory of the Republic of South Africa.

4. Progress with electrification is also highly visible and hence verifiable (Harding and Stasavage 2014).

H2b. *Converging parties*. All political parties converge on the preference of the median voter; hence partisan representation on local councils does not matter for electrification, ceteris paribus.

National and local politics

Hypotheses 2a and 2b are derived under the assumption that local authorities are entirely responsible for electrification and can freely allocate resources. Eskom, which had responsibility for generation and transmission, had substantial excess capacity during this period: Bekker et al. (2008, 3126) report a 55% reserve margin in 1990. However, not all municipalities had the capacity to connect households to the grid. Only about a third of municipalities had their own electricity distributors, established between 1888 and 1980, which mainly served urban and adjacent rural areas (Department of Minerals and Energy 2001, 5). The NEP thus envisaged municipalities delivering one-third of new connections and Eskom the others (Gaunt 2005, 1310). In the mid-1990s, the regulatory authorities issued temporary licenses to the preexisting municipal distributors (National Electricity Regulator 2000, 93). Municipal distributors were directly controlled by local governments and subject to their political direction: councils identified priorities and needs, while municipal electricity departments had to clarify technical requirements, seek funding from the council, and plan implementation (Qase et al. 2001). This facilitated local accountability, as "elected councillors who are part of the local authority structure provide a channel whereby user needs are communicated to the municipalities' electricity departments, and municipal issues are communicated to households" (Department of Minerals and Energy 2001, 10).

In parts of the country without effective municipal distribution, Eskom took on the task of electrification and direct distribution to households, especially in former homelands and rural areas. The company had to rely on internal financing, so it had incentives to prioritize areas where potential consumption was high and that could be electrified cheaply, which depends on factors such as distance from the grid, settlement density, as well as topographical conditions (Dinkelman 2011, 3084). In addition, Eskom faced political pressures. Its senior managers had incentives to please the ANC in order to delay a restructuring of the electricity industry and increased competition (Department of Minerals and Energy 1998; Gaunt 2005, 1315). Moreover, successive governments had used their role in the appointment of senior management to ensure that Eskom's key policies and objectives served "the interests of key constituencies behind the political party in power" (Davis and Steyn 1998, 68). Although formally the selection of electrification projects was internal to Eskom, the company's main accountability relationship was thus with the national government, led by the ANC, and it was likely to have to deliver to the party's "key constituencies." Unlike municipal distributors, Eskom was "not directly accountable to customers" and put less emphasis on community involvement (Department of Minerals and Energy 2001, 14).

The distributive politics literature offers theoretical reasons to expect central government interference with the geographical allocation of resources. For example, Cox and McCubbins (1986) argue that ideological similarities induce incumbent governments to allocate more resources to core support groups and therefore to areas where they have greater electoral support. Targeting copartisan voters can increase chances of reelection also because parties may have better knowledge of their supporters' preferences (Dixit and Londregan 1996). National leaders may favor areas controlled by members of the same party also to increase the chances of reelection of copartisan local politicians (McCarty 2000). These theories stand in contrast with the "swing voter" hypothesis, which predicts that public resources are disproportionately allocated to centrist voters since all parties try to capture the center of the political spectrum.[5]

This discussion leads us to anticipate different partisan effects on electrification depending on whether distribution was in the hands of Eskom or local authorities. In the latter case, the link to the political alignment of the local council and its administration is through representation. We examine such representation effects, reflected in hypotheses 2a and 2b, in the municipal distribution subsample. However, partisan effects in Eskom distribution areas could be rather different. Since Eskom was at least indirectly subject to pressure from the dominant party at the central government level, its selection of electrification projects could be used to target specific municipalities and voters. The ANC had been elected on an ambitious program of electrification, so we have reason to assume that Eskom would prioritize the party's core constituencies, disrupting local accountability channels:

H3. *Core constituencies*. In municipalities where Eskom distributes electricity directly, the positive effect of en-

5. The swing voter hypothesis is derived from probabilistic voting models (see Lindbeck and Weibull 1987, 1993). Although in these models platform convergence may not happen exactly at the median, the swing voter hypothesis implies a centrist tendency similar to the median voter theorem. Evidence in support of the "core voters" model includes Case (2001) on Albania, Miguel and Zaidi (2003) on Ghana, and Larcinese, Rizzo, and Testa (2006) on the United States. Other empirical work (e.g., Banful 2010; Casey 2013; Dahlberg and Johansson 2002; Kwon 2005) is consistent with competing models in which "swing voters" get priority.

franchisement on household electrification is amplified if a municipality is a core constituency of the ANC, ceteris paribus.

VARIABLES AND DATA

The empirical analysis is based on a data set of 799 municipalities located in nine provinces (see fig. B1 in the appendix, available online). We used Statistics South Africa's Community Profiles and geographical information system databases to generate a unique data set that aligns 2001 census results with 1996 municipal data for the first time. Prior studies of service delivery in South Africa have often resorted to coarser data on just nine provinces, since their boundaries have been more stable (Statistics South Africa 2005). Shortly before the 2001 census, a new local government structure with 262 municipalities replaced the one that existed at the time of the 1996 census. To make data from 1996 and 2001 comparable, we took advantage of their spatial attributes and aggregated information on 21,243 enumeration units or census tracts from the 2001 census up to the level of 1996 municipal boundaries.[6] Further details are in the data appendix. One contribution of this article is the resulting longitudinal data set, covering South Africa's entire geographic extent over two census waves, which creates new opportunities to study electoral and sociodemographic outcomes at the municipal level during this crucial period in the country's history.

Dependent variables

Our main dependent variable Electricity_{it} is based on census information and measures the percentage share of households with access to electricity in municipality i at time t. A full description is in the data appendix. Most municipalities had substantial numbers of households that were not connected to the grid. According to the 1996 census, merely seven municipalities had universal access, while half had household electrification rates of 70% or lower. Sizable improvements were possible in the vast majority of municipalities. Map A in figure 1 visualizes changes in Electricity between 1996 and 2001.

We use Night-Light_{it} as an alternative dependent variable, which is calculated using satellite images of the earth at night for the years 1992, 1996, and 2001. Figure 2 visualizes how we transform these data: we first use the raw nighttime lights images (map A) to classify each of the over 1 million pixels as either "lit" or "unlit" (map B). This binary classification ensures that nonlinearity of luminosity in the images is "no longer a concern" (Michalopoulos and Papaioannou 2013, 135) and addresses problems with comparability over time (Chen and Nordhaus 2010; Elvidge et al. 2013). We then calculate the percentage share of lit pixels within the 1996 municipal boundaries to yield information on local electrification levels (map C) as well as the change between 1996 and 2001 (map D). The data appendix contains a full discussion and explains why alternative population-adjusted methodologies (see Elvidge et al. 2010) are unsuitable in our case.

The correlation between Night-Light and Electricity (in levels) for the years 1996 and 2001 is .47. This is broadly consistent with other comparisons of nighttime lights to national electricity data (e.g., Elvidge et al. 2001; Min et al. 2013).[7] In the absence of stable outdoor lighting, pixels appear unlit even where households have access to electricity. This matters in our context, since street lighting was "often not provided" when households were connected to the grid (Department of Minerals and Energy 2001, viii). Outdoor lighting can also be too dim to be detected (Elvidge et al. 2009). Moreover, Night-Light captures light from uninhabited industrial sites and highways. South Africa's mines and main highways are clearly visible from outer space. In areas around Johannesburg and Cape Town we also observe the overglow effect, due to the tendency of light "to travel to pixels outside of those in which it originates, and light tends to be magnified over certain terrain types such as water and snow cover" (Pinkovskiy 2011, 9). The quality of South Africa's official statistics is recognized as uniquely high on the continent (Jerven 2013, 101). Hence, for our purposes, the census is the ideal data source, as it directly and reliably captures household access to electricity. We use the satellite data to assess the robustness of our results and to analyze years without census data.

Independent variable

The main independent variable Enfranchised_i refers to newly (post-apartheid) enfranchised voters: it is the percentage of citizens of voting age who are nonwhite in municipality i in

6. Our 2001 municipal boundaries are thus "virtual boundaries" that enable us to measure local progress with electrification by 2001. Political decisions made by councils elected in 1995/96 directly affected areas belonging to a municipality defined according to 1996 boundaries. Hence, reporting 2001 outcomes within 1996 boundaries is the correct procedure if we want to evaluate the impact of the 1995/96 elections.

7. Nighttime lights have been used to study electoral effects on electricity provision (Min 2015) and as a proxy for economic activity (Henderson, Storeygard, and Weil 2012; Pinkovskiy 2011; Storeygard 2012), regional development (Michalopoulos and Papaioannou 2013), and spatial inequality (Alesina, Michalopoulos, and Papaioannou 2012).

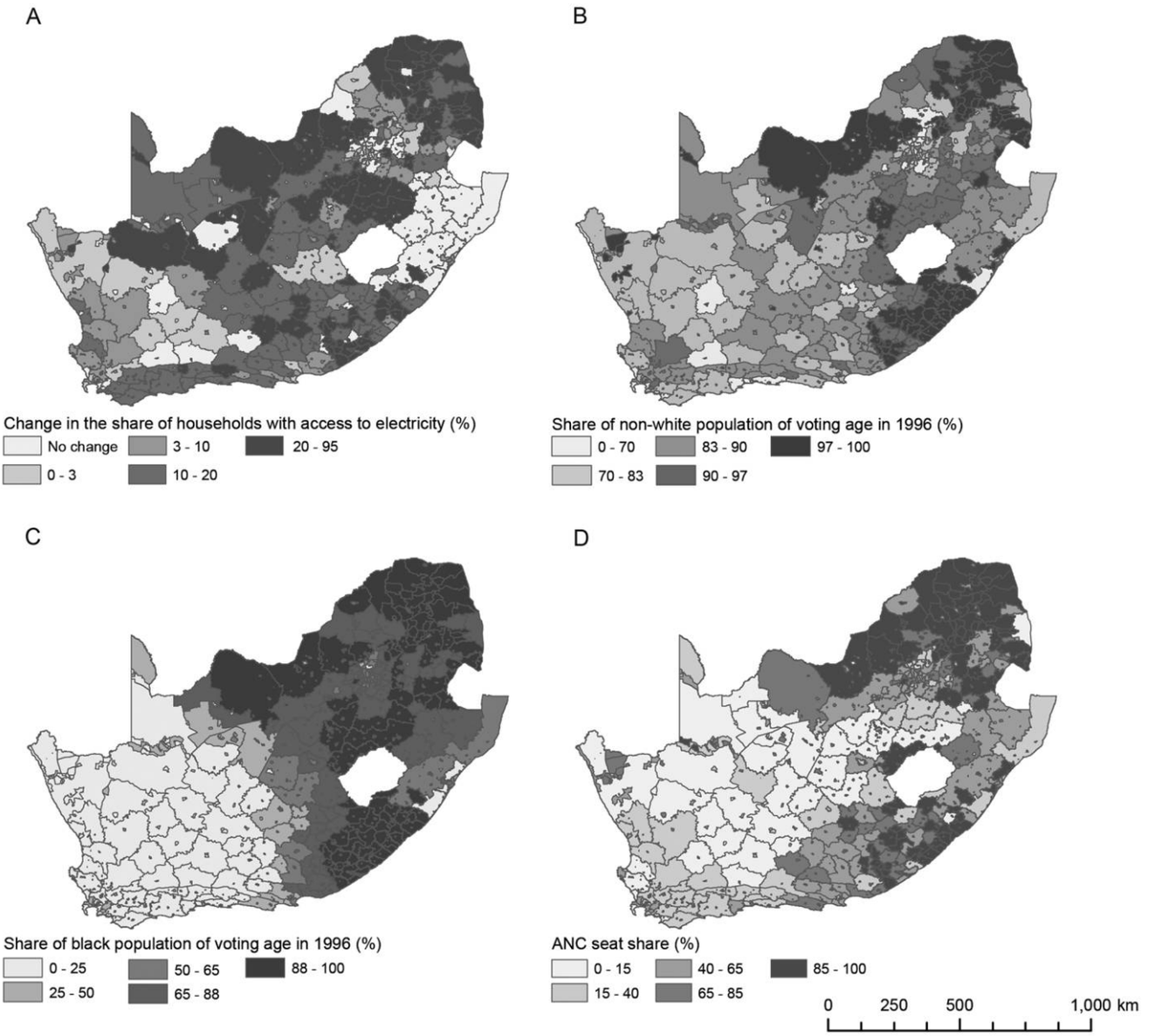

Figure 1. Geographic distribution of key variables. Map A: change in household access to electricity (1996–2001). Map B: share of nonwhite enfranchisement (1996). Map C: share of black enfranchisement (1996). Map D: ANC share on local councils (1996).

1996. The census also allows us to break down this variable into separate groups of newly enfranchised voters categorized as black, colored, and Indian (or Asian). Map B in figure 1 shows the share of all newly enfranchised voters across municipalities. As noted in the discussion of hypothesis 1, black voters constitute the most deprived subset of the nonwhite population, and their share of the electorate is depicted in map C.

Control variables

To address concerns that Enfranchised is correlated with other variables that are in turn correlated with trends in Electricity, we include several control variables.[8] As discussed in the previous section, we include geographic covariates that affect the supply of electricity: the distance to the electricity grid in 1996, the distance to the closest main road in 1996, the average slope, and elevation. We control for the demand for electricity with socioeconomic variables relating to education and income, demographic variables such as population density and the total number of households, as well as the number of

8. To avoid "posttreatment bias" (King 2010), we do not include "bad controls" (Angrist and Pischke 2009, 64) that are themselves potential outcomes of Enfranchised, such as changes in other public services.

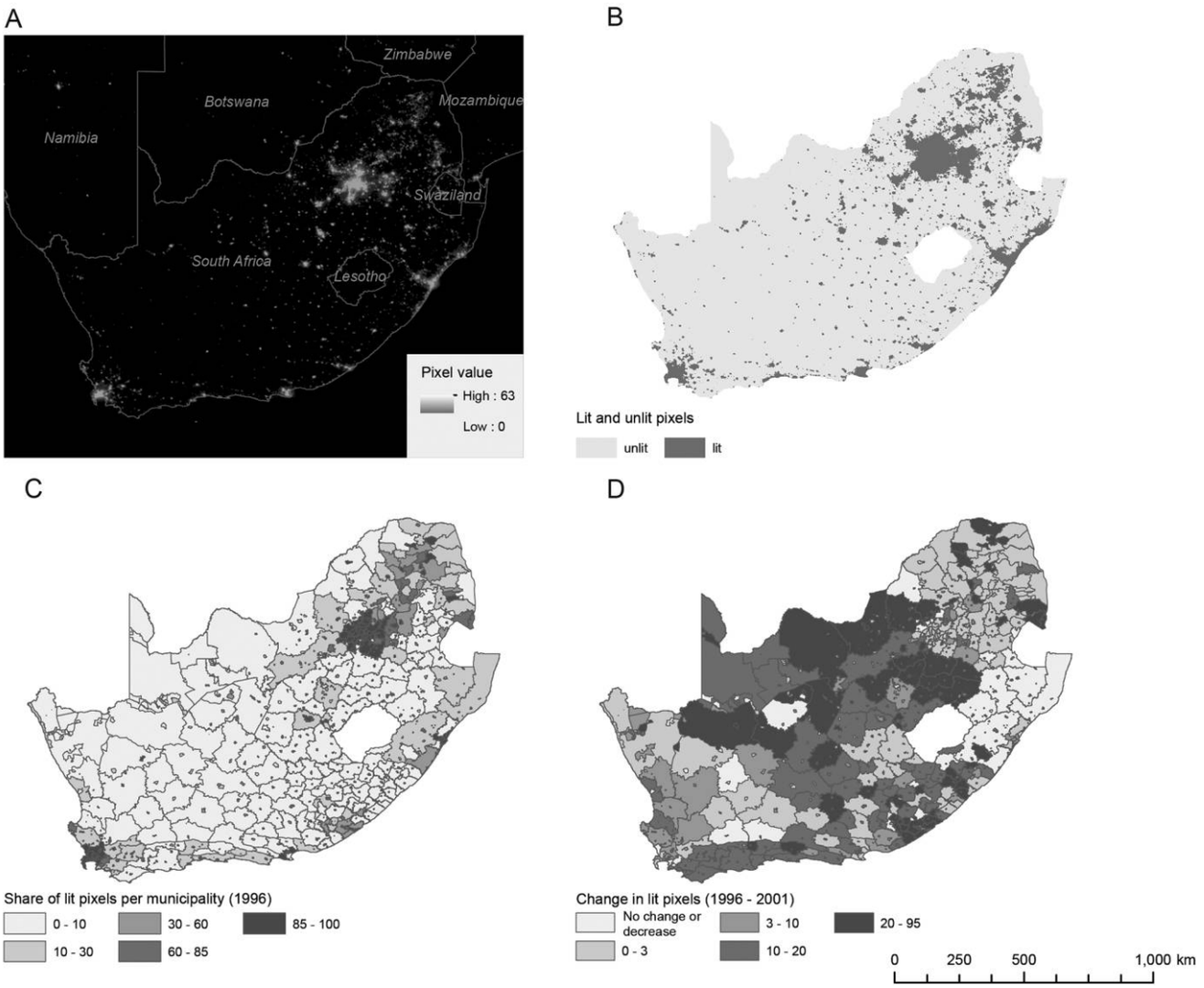

Figure 2. Nighttime lights as a proxy for municipal household electrification rates. Map A: raw nighttime lights raster image (1996). Map B: Reclassified nighttime lights raster image (1996). Map C: share of lit pixels per municipality (1996). Map D: change in the share of lit pixels (1996–2001).

nonelectrified households in 1996.[9] Finally, our regressions also include province fixed effects. As the dependent variable is a difference, they capture province-specific shocks and absorb fixed spatial autocorrelation. Given space constraints, we report summary statistics in the appendix (tables B1, B2).

EMPIRICAL STRATEGY

In an ideal setting, we would like to compare our data with a counterfactual scenario in which democratization did not occur. Since we cannot observe this counterfactual, we exploit the heterogeneity in enfranchisement in the first democratic elections across South African municipalities.[10] We determine the effect of enfranchisement on electrification by using a difference-in-differences specification, where the shares of newly enfranchised represent the intensity of treatment across municipalities. Using the variables defined in the previous section, our model can be expressed as follows, with i indexing a given municipality:

$$\Delta\text{Electricity}_{i1996\text{–}2001} = \alpha + \beta\text{Enfranchised}_{i1996} + \gamma\text{Controls}_{i1996} + \Delta\varepsilon_{i1996\text{–}2001}. \quad (1)$$

Using a specification in changes rather than levels purges our regressions of omitted unobservables that are fixed over time.

9. Recall that the NEP stated targets in terms of the number of households to be electrified. Moreover, we include the number of nonelectrified households in a specification that already controls for total population levels, which helps to purge our results from the electrification needs of the various municipalities.

10. This is a well-established methodology; see, e.g., Berlinski and Dewan (2011) and Vernby (2013).

However, we remain concerned about changing characteristics of municipalities that could be correlated with changes in electrification via Enfranchised. Our main identifying assumption is that, conditional on the observables we control for, Enfranchised is uncorrelated with the error term.

A paramount concern is that electrification in areas with high enfranchisement could be due to some underlying growth in electrification that occurs regardless of regime type. First, municipalities with high electrification rates in 1996 have little margins for further electrification, and this could mechanically generate a correlation between enfranchisement and electrification since low-electrification areas are also predominantly inhabited by nonwhites. Second, our estimates could reflect pre-democratization trends in electrification if predominantly nonwhite municipalities are electrifying faster and "catching up" already in the pre-democracy era. Our empirical analysis considers these confounding hypotheses. In particular, we analyze preexisting trends with placebo regressions to rule out as far as possible that our results are driven by a violation of the parallel trends assumption (Angrist and Pischke 2009, 227–43). Placebo regressions check whether our main explanatory variable accounts for electrification in the pre-democratization era. If enfranchisement has no explanatory power before it actually occurs, this would provide evidence against a catching-up effect that is unrelated to democratization, since it is not obvious that such an effect should emerge only after the first democratic elections. We further corroborate our findings by examining contiguous census tracts and carry out other robustness checks, which we discuss in the following section.

MAIN RESULTS

Baseline estimates

Table 1 reports our baseline estimates, using the census-based measure of access to electricity as the dependent variable and the share of newly enfranchised voters as the main explanatory variable. We report results from several specifications, starting with a simple regression (col. 1) and progressively including province-specific shocks (col. 2), geographic controls (col. 3), population and socioeconomic controls at their 1996 levels (col. 4), and the number of nonelectrified households in 1996 (col. 5).[11] We then include 1996–2001 differences in population and socioeconomic controls (col. 6).[12]

The coefficient of interest is positive and statistically significant throughout. We can safely conclude that the share of newly enfranchised (nonwhite) voters has a positive and statistically significant effect on household electrification rates, as stated in hypothesis 1. The magnitude of the coefficients ranges from .19 to .34. These represent the effect of an increase in the share of newly enfranchised voters by 1 percentage point. The lower bound suggests that one standard deviation in enfranchisement led to an increase in electrification of at least 3.5 percentage points, more than one-third of the sample mean: a substantively large effect.

In column 7 we distinguish between newly enfranchised black, colored, and Indian voters. The effect is particularly strong for black voters, positive but less strong for colored voters, and statistically insignificant for Indian voters. The coefficients indicate that an increase of one standard deviation in the share of black voters led to an increase of 12 percentage points in the household electrification rate and about half that size for colored voters.

Placebo regressions

The most important identification concern is that our estimates could capture a preexisting trend associated with Enfranchised that occurs regardless of regime type. To rule this out, we follow the standard procedure and check whether enfranchisement can explain electrification before democratization (when it should not). Comparable information for the period prior to 1996 does not exist, as apartheid-era census data from the early 1990s are incomplete.[13] For this reason we use Night-Light as an alternative dependent variable. This has two important advantages. First, Night-Light is based on an entirely independent data source with complete records covering all of South Africa. As such, the images function as an additional source of data that we use to corroborate our findings. Second, the satellite images are publicly available as annual composites from 1992, so they provide information about electrification in the years prior to democracy.

Panel A in table 2 replicates the models in table 1 using changes in the share of lit pixels during 1996–2001 as the dependent variable. The coefficients of interest are statistically significant and stable across specifications, but magnitudes are smaller than with census data: the estimated effect of an increase in the share of newly enfranchised voters by 1 percentage point ranges from .06 to .09. One standard deviation in the share of nonwhite voters leads to a maximum 1.7 per-

11. We report the coefficients on the province fixed effects from col. 5 in the appendix (fig. B2). Three of these are negative and significant: KwaZulu-Natal, Northern Cape, and Western Cape—the three regions in which the ANC faced its strongest electoral challenges from opposition parties. This presages the party political story that we unpack in the following section.

12. This introduces the possibility of posttreatment bias (Angrist and Pischke 2009, 64; King 2010), but failing to control for these differences may also result in bias. The fact that these controls do not alter the pattern of results is reassuring.

13. The 1991 census excludes some homeland areas and lacks information on household access to electricity.

Table 1. The Impact of Enfranchisement on Electrification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Enfranchised	.343***	.280***	.293***	.232***	.191***	.277***	
	(.032)	(.032)	(.033)	(.041)	(.040)	(.040)	
Enfranchised black							.327***
							(.041)
Enfranchised colored							.204***
							(.047)
Enfranchised Indian							−.022
							(.059)
Constant	−19.058***	−11.056***	−6.992*	−5.269	−2.204	−12.815***	−13.817***
	(2.534)	(3.001)	(3.619)	(4.399)	(4.328)	(4.757)	(4.565)
Province fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	No	No	Yes	Yes	Yes	Yes	Yes
Population and socioeconomic controls (1996)	No	No	No	Yes	Yes	Yes	Yes
Households without electricity (1996)	No	No	No	No	Yes	Yes	Yes
Population and socioeconomic controls (1996–2001 diff.)	No	No	No	No	No	Yes	Yes
R^2	.111	.161	.173	.192	.245	.307	.325

Note. The dependent variable is the percentage share of households with electricity for lighting (difference 1996–2001) calculated from census data. Geographic controls are (1) distance from electricity grid, (2) distance from main road, (3) elevation, and (4) slope. Population controls are (1) population density and (2) number of households. Socioeconomic controls are (1) share of population with no schooling, (2) median income, and (3) share of labor force with low income (because of differences in the underlying variables in the 2001 census, this variable is included only as a 1996 level control and not as a 1996–2001 difference). Refer to the data appendix for full details. $N = 799$. Ordinary least squares estimates with robust standard errors in parentheses.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

centage point increase in Night-Light. It is reassuring that the estimated effects of enfranchisement relative to mean changes in electrification are similar across models using census and satellite data.

In panel B of table 2 we report our placebo regressions. Here, we replace the dependent variable with changes in the share of lit pixels during 1992–96. All coefficients on Enfranchised are far from acceptable significance levels. We also experimented with a range of alternative night-light-based variables used in the literature, notably population-adjusted measures discussed in the data appendix. The overall pattern is highly robust, with significant enfranchisement effects for the period 1996–2001 and insignificant effects for 1992–96. Despite the limitations of the satellite data, these results strongly suggest that what we capture with our estimates is unlikely to be due to preexisting electrification trends.

Examining contiguous census tracts from different municipalities

The need for electrification at the municipal level is highly correlated with enfranchisement, both being correlated with the nonwhite population share at the time of democratization. In this section we further corroborate our results by using an alternative empirical strategy based on spatial discontinuity. We use more fine-grained data at the census tract (CT) level and match adjacent CTs that lie on different sides of a municipal boundary, thus restricting the sample to CTs that lie on municipal borders only.[14] Including a fixed effect for each pair of neighboring CTs means that identification is obtained by matching CTs that belong to different municipalities (hence treated with differential levels of enfranchisement) but that are adjacent (hence generally similar in other respects).[15]

14. This strategy draws on Holmes (1998), as extended by Dube, Lester, and Reich (2010) and Duranton, Gobillon, and Overman (2011). Our census tract data set combines 1996 "place name" level data with 2001 "subplace" level data following the same approach as for our municipality data set, as explained in detail in the data appendix.

15. A CT bordering more than one CT of an adjacent municipality enters multiple times into the sample, each time with a separate pair fixed effect. To correct for the resulting correlations across pairs on the same municipality boundary, we use two-way clustering (Cameron, Gelbach,

Table 2. Replication with Satellite Data and Test for Preexisting Trends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Dependent variable: ΔNight-Light, 1996–2001:							
Enfranchised	.064***	.063***	.066***	.092***	.088**	.080**	
	(.023)	(.024)	(.025)	(.034)	(.035)	(.037)	
Enfranchised black							.109***
							(.038)
Enfranchised colored							.041
							(.044)
Enfranchised Indian							.015
							(.049)
B. Dependent variable: ΔNight-Light, 1992–96:							
Enfranchised	.068	.029	.037	.047	.059	−.006	
	(.052)	(.059)	(.056)	(.063)	(.064)	(.070)	
Enfranchised black							.007
							(.072)
Enfranchised colored							−.026
							(.078)
Enfranchised Indian							−.078
							(.082)
Province fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	No	No	Yes	Yes	Yes	Yes	Yes
Population and socioeconomic controls (1996)	No	No	No	Yes	Yes	Yes	Yes
Households without electricity (1996)	No	No	No	No	Yes	Yes	Yes
Population and socioeconomic controls (1996–2001 diff.)	No	No	No	No	No	Yes	Yes

Note. The dependent variable is the percentage share of lit pixels (difference 1996–2001 and 1992–96, respectively) calculated from satellite data. All regressions also include a constant. Refer to table 1 for a description of control variables and the data appendix for full details. $N = 799$. Ordinary least squares estimates with robust standard errors in parentheses.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

By using this strategy we take into account several confounding factors. First, it is less likely that economic and social conditions vary discontinuously along municipal borders, which makes comparisons more reliable. Second, electricity needs and socioeconomic conditions may be specific to a CT, especially with segregated communities that are typical for South African municipalities (Christopher 1994, 103–40). The relevant decision-making unit, however, is not the CT but the municipality. As a result, municipal-level enfranchisement should now better capture the effect of democratization, since we can separate its impact on the decision-making unit (via the overall share of newly enfranchised in a municipality) from a "catching-up" effect that is unrelated to it (as reflected in the electrification need of a specific CT). By differentiating census tract and municipality, we thus break a correlation that can represent an important confounding factor. We estimate the following equation, which omits the years from subscripts:

$$\Delta\text{Electricity}_{cpi} = \alpha_p + \beta\text{Enfranchised}_i + \gamma\text{Controls}_c + \Delta\varepsilon_{cpi}. \quad (2)$$

As before, i indicates a municipality, while c indicates a CT and p indicates a pair of adjacent CTs that lie across a municipal boundary. Controls are now at the CT level, but Enfranchised remains at the municipal level. Results are reported in table 3 and are in line with those obtained with our main specification. The coefficient on Enfranchised is always statistically significant at the 1% level and ranges from .16 to .26, slightly lower than what we obtained previously.[16] When we distinguish different nonwhite groups, the effect of black enfranchisement remains positive, statistically significant,

and Miller 2011) by municipality and by each border between municipalities.

16. This is not surprising given that the sample is also different.

Table 3. Matching Contiguous Census Tracts from Different Municipalities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Enfranchised	.264***	.254***	.248***	.181***	.160***	.184***	
	(.052)	(.057)	(.056)	(.056)	(.055)	(.056)	
Enfranchised black							.250***
							(.064)
Enfranchised colored							−.023
							(.081)
Enfranchised Indian							.187**
							(.075)
Contiguous CT pair fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	No	No	Yes	Yes	Yes	Yes	Yes
Population and socioeconomic controls (1996)	No	No	No	Yes	Yes	Yes	Yes
Households without electricity (1996)	No	No	No	No	Yes	Yes	Yes
Population and socioeconomic controls (1996–2001 diff.)	No	No	No	No	No	Yes	Yes
R^2 (overall)	.083	.060	.034	.071	.080	.086	.100
R^2 (within)	.015	.017	.024	.066	.080	.087	.093

Note. The dependent variable is the percentage share of households with electricity for lighting (difference 1996–2001) calculated from census data. Refer to table 1 for a description of control variables and the data appendix for full details. All variables are calculated at the CT level, except Enfranchised and Enfranchised black/colored/Indian, which are calculated at the municipality level. $N = 7{,}530$. Ordinary least squares estimates with standard errors in parentheses, double clustered (see Cameron et al. 2011) at the municipality and border levels. There are 688 clusters for municipalities and 1,171 for borders.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

and with a magnitude close to that in table 1. The effects for colored and Indian voters become statistically insignificant and significant, respectively: these are the only relevant differences compared to our main specification. Overall, our results are robust to this demanding specification.

Other robustness checks

As noted earlier, another concern is that our dependent variable has an upper bound of 100. Areas that were highly electrified in the pretreatment period have lower margins to improve, and since pretreatment electrification levels are not orthogonal to enfranchisement, this may bias the coefficients of interest. We repeated our exercise with a restricted sample, excluding municipalities where more than 90% of the population had access to electricity in 1996, using the same specification as in column 5 of table 1. The coefficient on Enfranchised is twice as large as in the full sample, and it gets larger as we further reduce this threshold. Electrification gains were lower in areas with very high levels of household access to electricity in 1996, but the basic pattern is robust. These results appear in appendix table B3, panel (a). Further robustness checks reported in appendix table B4, panel (a), show that our main results go through when we exclude, in turn, the municipalities that fall into any one of the nine provinces: the relationship we document is not limited to any particular region of the country.

THE ROLE OF POLITICAL PARTIES

We now return to the important question of how party politics affected electrification during this period. In principle, municipal distributors should be responsive to changes in the local median voter. In discussing our hypotheses, we noted that party politics can display its effects at two levels. First, local ANC politicians could have particular incentives to electrify households, as stated in hypothesis 2a. Second, electricity distribution could be part of a national strategy. As stated in hypothesis 3, we expect that in municipalities where Eskom distributes electricity directly, the positive effect of enfranchisement on household electrification is amplified if the municipality is a core constituency of the ANC.

We use 1996 membership data from the Association of Municipal Electricity Undertakings to distinguish municipalities served by Eskom from municipalities served by a local distributor. The data appendix contains a detailed description. Our statistical analysis relies on the variable ANC seat share$_i$, the share of total seats on local council i won by the ANC in the 1995/96 elections (Elections Task Group 1996). This was the first time following its unbanning that

the ANC was able to freely contest municipal elections.[17] Hence, the share of seats obtained in those elections at the same time represents the change in the share of ANC seats from zero prior to democracy. Map D in figure 1 shows the geographic distribution, with spatial clusters of councils dominated by the ANC in the Eastern Cape, Northwest, Mpumalanga, and Limpopo (initially called Northern Transvaal and then Northern Province). These provinces contain ANC core constituencies and coincide with areas that experienced large changes in electrification as depicted in map A.

To test our hypotheses, we first check whether enfranchisement is merely a proxy for the changed landscape in municipal representation or, put differently, if the impact of democratization on electrification is channeled via municipal representation of the ANC. We augment our model with the ANC seat share variable, which has a correlation of .49 with our measure of enfranchisement. Column 1 of table 4 shows that the ANC's seat share had no direct effect on electrification, while the coefficient on Enfranchised remains positive and statically significant. This suggests that the latter is not merely a proxy for ANC representation. Only when we exclude Enfranchised is the effect of ANC representation statistically significant (col. 2). We also find no evidence of a direct effect of ANC seat share in either Eskom (col. 3) or municipal distribution (col. 4) areas.[18] This evidence is compatible with hypothesis 2b (converging parties) and suggests that we should reject hypothesis 2a (programmatic parties).

If not via municipal representation, another possibility is that the impact of enfranchisement itself differed as a function of ANC strength. To test this, we augment our model with an interaction between Enfranchised and ANC seat share. We report results for the full sample (col. 5) and separately for municipalities supplied by Eskom (col. 6) and municipal distributors (col. 7).[19] The coefficient on the interaction term is positive and significant only in the full sample and the Eskom subsample. The magnitude of the coefficient is larger in the latter case. In sum, we find support for hypothesis 3 (core constituencies).

To probe the precise nature of the partisan effect, we construct separate dummies for each quarter of ANC seat share. We then use these dummies and their interactions with enfranchisement in our regressions (the first quarter, 0%–25%, is the reference category), replacing the continuous seat share measure and its interaction. The results in columns 8–10 and summarized in figure 3 reveal important nuances. First, the 50% threshold does not matter; the conditional coefficients for the second and third quarters are not statistically distinguishable. Second, *F*-tests indicate that in Eskom-served municipalities the marginal effect of franchise extension when the party controls 75% or more of seats is statistically different from the other conditional coefficients. If it simply were the case that the coordination between a non-ANC council and Eskom was more difficult, then it should matter whether the ANC had a majority or not, irrespective of its size, but this is not the pattern we detect. For councils with municipal distributors, the effect of enfranchisement is larger in the three highest quarters of ANC representation than in the reference category, but the differences are small and statistically insignificant.

We also conduct a formal test of whether the corresponding coefficients depicted in panels b and c of figure 3 are statistically different. Using the full sample, we estimate a model with a three-way interaction of enfranchisement, the seat share quarter dummies, and an indicator of whether a municipality is supplied directly by Eskom. The coefficient on the interaction between Enfranchised, ANC seat share Q4, and the Eskom indicator is .801 (the difference between .967 and .166 in cols. 9 and 10 of table 4), with a standard error of .248 ($p = .001$).[20] For all other seat share quarters, the corresponding differences between the two subsamples are not statistically distinguishable. In other words, Eskom delivered a significant top-up to core constituencies of the ANC, as predicted by hypothesis 3. Panels b of tables B3 and B4 in the appendix repeat earlier supplementary robustness checks that yield consistent results.

In sum, we detect two distinct patterns of service delivery, depending on institutional responsibility for electrification. In municipal distribution areas, the partisan composition of local councils does not condition the effect of enfranchisement. Local decision making appears consistent with party convergence predicted by standard models of electoral competition (Downs 1957). The results for Eskom distribution areas, on the other hand, point to a strong role for partisan influences compatible with core-voter models of distributive politics (e.g., Cox and McCubbins 1986). Here, the pattern of results is in line with our expectation that the dominant party

17. This fact reduces concerns about the endogeneity of voting returns (Larcinese, Snyder, and Testa 2013).

18. The coefficient on Enfranchised in col. 4 falls just short of significance at standard levels, but the pattern of results is as in col. 3. Sample size is smaller than for the Eskom subsample.

19. When we replaced the ANC's seat share with NP or IFP seat shares, the results convey the story inversely. See fig. B3 in the appendix.

20. To recover the precise coefficients reported in cols. 9 and 10 of table 4, we follow Kam and Franzese (2007, 103–11) and estimate a "fully dummy-interactive" model that also includes interactions of all other covariates, including the constant, with the Eskom indicator. The results reported here are substantively the same whether we do this or not.

Table 4. The Role of the ANC's Seat Share on Local Councils

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Enfranchised	.194***		.210***	.133	.053	.046	.080	.080*	.070	.017
	(.043)		(.050)	(.092)	(.044)	(.048)	(.138)	(.044)	(.048)	(.162)
ANC seat share	−.005	.050**	−.005	−.014	−.370***	−.547***	−.096			
	(.026)	(.025)	(.032)	(.049)	(.086)	(.111)	(.143)			
Enfranchised × ANC seat share					.004***	.006***	.001			
					(.001)	(.001)	(.002)			
Enfranchised × ANC seat share Q2								.125	.150	.152
								(.083)	(.106)	(.188)
Enfranchised × ANC seat share Q3								.165*	.270**	.007
								(.087)	(.105)	(.195)
Enfranchised × ANC seat share Q4								.511***	.967***	.166
								(.159)	(.167)	(.185)
ANC seat share Q2								−12.401**	−15.432*	−11.528
								(6.211)	(8.080)	(13.713)
ANC seat share Q3								−12.898*	−22.083***	1.621
								(6.836)	(8.528)	(14.132)
ANC seat share Q4								−44.830***	−87.491***	−12.857
								(14.614)	(15.294)	(13.716)
Observations	799	799	539	260	799	539	260	799	539	260
Distribution areas in the sample	All	All	Eskom	Local	All	Eskom	Local	All	Eskom	Local
R^2	.245	.227	.237	.316	.262	.266	.317	.266	.278	.321

Note. The dependent variable is the percentage share of households with electricity for lighting (difference 1996–2001) calculated from census data. All regressions include a constant, province fixed effects, geographic controls, population and socioeconomic controls (1996), and households without electricity (1996). Refer to table 1 for a description of control variables and the data appendix for full details. The pattern of results is not affected when we vary the combination of controls. Ordinary least squares estimates with robust standard errors in parentheses.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

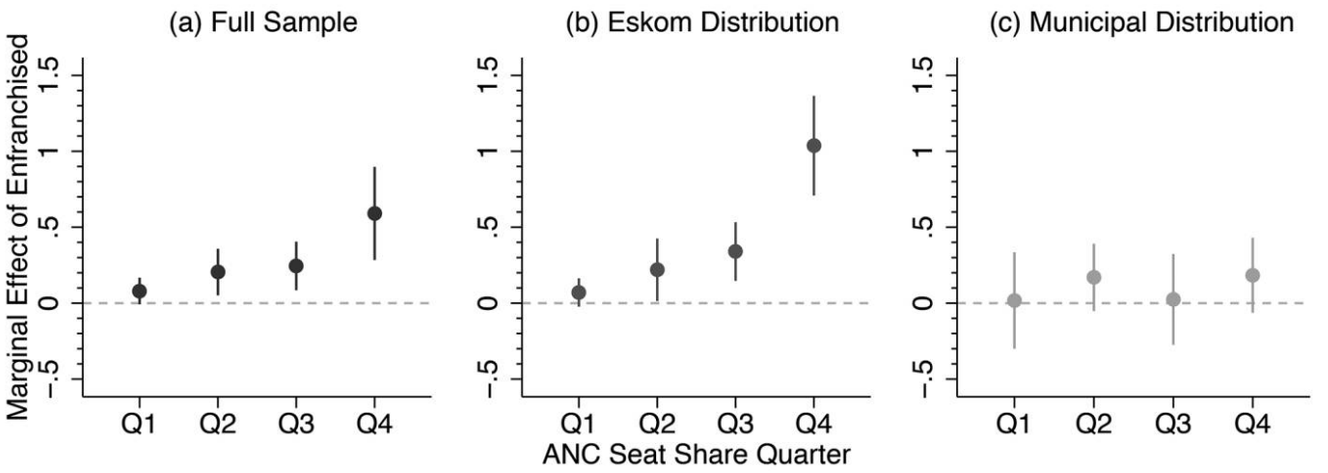

Figure 3. Enfranchisement conditional on ANC seat share quarter. Graphs a, b, and c are based on the results in columns 8, 9, and 10 of table 4, respectively, plotted with 95% confidence intervals. Q1 indicates an ANC seat share between 0% and 25%, Q2 above 25% and up to 50%, Q3 above 50% and up to 75%, and Q4 above 75% and up to 100%.

in the national government, via Eskom, rewarded its "key constituencies," as predicted by Davis and Steyn (1998, 68). Since Eskom was responsible for two-thirds of the electrification target under the NEP, this effect dominates in the full sample.

CONCLUSIONS

Enfranchisement shifted the median voter and led to increased household electrification rates during the first period of democratic local government in South Africa. For the years 1996–2001, we estimate an average increase in the share of municipal households with electricity access of between 3 and 6 percentage points per standard deviation of enfranchisement. Taking the most conservative lower-bound estimate from our main results, the average share of newly enfranchised voters in the municipal electorate, 82%, implies an increase in the share of electrified households by 16 percentage points. The effect is largest in municipalities with higher shares of black voters, who had the greatest electrification backlog. Our analysis also shows how party politics mediated the effect of enfranchisement. ANC core constituencies supplied by Eskom saw the largest gains. However, the partisan composition of the local council made no difference in areas with municipal distributors. This suggests that the median voter logic is strong enough to drive even a party such as the NP—which had previously denied voting rights to the nonwhite population—to expand services to the newly enfranchised. Hence, the effect of democratization on basic services depends on the national government's ability to influence distribution at the local level.

These results extend the literature on democracy and public service delivery.[21] Compared with existing literature, our analysis establishes analytically separate effects of franchise extension and changes in partisan representation: not only does it matter that more people receive the right to vote but, depending on institutional responsibility for delivery, it also matters which party they vote for. This is a valuable first step in addressing the "compound treatment" problem in cross-national work on this topic, although we acknowledge that there are other dimensions of democratization that we leave unexplored.[22] Moreover, by directly measuring service delivery outcomes (using two independent data sources), our analysis focuses on the ultimate outcome of interest: whether people's lives were actually affected. This is essential for assessing the implications of democracy for the poor in contexts in which resource allocation is

21. In addition to work cited earlier, Martinez-Bravo et al. (2012) and Zhang et al. (2004) show that the introduction of local elections in Chinese municipalities led to an increase in public good provision. Skoufias et al. (2014) study the impact of direct elections in Indonesian municipalities. Olken (2010) provides experimental evidence that participatory, rather than representative, democracy in Indonesian villages led to higher voter satisfaction with development projects. The responsiveness of elected leaders also depends on the circulation of newspapers and, more generally, an informed electorate (Besley and Burgess 2002).

22. One important dimension is the protection of individual rights. After 1994, and especially after the adoption of a new constitution in 1996, the nonwhite population could use new freedoms and increased protection of their personal rights to form interest groups and put pressure on administrations and providers. Nonelectoral channels are outside the scope of our work, but we acknowledge that they might have played a role in shaping patterns of electrification.

a limited indicator for actual service delivery, as in many developing countries.

We also add to prior work on the politics of electricity. Consistent with Min (2015), we find that democracy improves access to electricity, and our data allow us to pinpoint impacts on households directly. However, our evidence in favor of the core voter hypothesis contrasts with findings by Baskaran et al. (2015) and Min (2015) on India. It is likely that partisan effects in established democracies are different from those in new ones (Keefer 2007). Our focus is on a large-scale and sustained electrification effort immediately after democratization, whereas the short-term cycles that Min documents occur in a more settled political context. While the ANC's dominance during this period made its immediate electoral outlook fairly certain (Southall 1994), the party was challenged to demonstrate to its supporters that it was capable of delivering "a better life for all" including the concrete improvements it had promised. Follow-up work could examine more recent electricity supply patterns in South Africa, which might be more comparable to the Indian experience also in other respects.[23] More broadly, these contrasting results add to a growing debate about the contextual conditions under which different voters or constituencies are targeted (e.g., Diaz-Cayeros, Estevez, and Magaloni 2016; Weitz-Shapiro 2012).

Our results also contribute to a debate on South African politics about whether the ANC "punished" voters who did not vote for it. Ferree (2011, 15) cites delivery patterns for housing and social grants across the nine provinces to argue that there is "no evidence of a punishment scheme" but cautions that "more careful examination of less aggregated data could produce different conclusions." Indeed, the electrification patterns we document at the municipal level show precisely such a politicization of service delivery. While we do not find that the ANC "punished" voters who supported other parties, we show that parts of the country with newly enfranchised voters who overwhelmingly voted for the ANC benefited more than others, but depending on municipal capacity for electrification. This also implies that opposition support tended to be more costly in rural areas and former homelands, which were less likely to have municipal distribution capacity. These subtle differences are revealed only by a disaggregated analysis that we provide, which contributes an important piece of new evidence that helps to clarify this debate.

How generalizable are our results? On the one hand, the South African context is unusual in that the conditions for a rapid rollout of electricity existed at the time of the transition to democracy. Electricity generation was initially not an obstacle to expansion. Post-democratization electrification gains might be less impressive in countries with low reserve margins. Nonetheless, we have reasons to believe that the patterns we document are not peculiar to the case we study. Recent work on enfranchisement in very different geographic and historical contexts (e.g., Miller 2008; Vernby 2013) yields compatible results. Related work on how democracy affects health outcomes in sub-Saharan Africa also suggests that the basic pattern we document applies to other services (Kudamatsu 2012).[24] There is scope to expand both the set of countries and the type of policies that are investigated, and with a greater focus on the role of partisan politics and the degree of decentralization in service delivery that we identify as central in our study.

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23. Electricity access in South Africa continued to improve in later years, but disconnections due to nonpayment also increased (Fjeldstad 2004). More recent electricity blackouts reflect underinvestment in generation capacity and poor planning (Johnson 2009, 473–81).

24. Kramon and Posner (2013) argue for more systematic comparisons across different goods. We plan further work on housing and water to enable us to explore trade-offs across several outcomes.

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