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HOW CORRUPTION SHAPES THE RELATIONSHIP BETWEEN DEMOC- RACY AND ELECTRIFICATION

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ABSTRACT

One of the central questions in research on the drivers behind public good provision is how political regimes and institutions impact the provision of public goods. Previous research within this field has shown that democratic history is positively related to public good provision, including the universal provision of reliable electricity. In this paper, we elaborate on these findings by investigating how corruption interacts with democratic history in shaping electricity provision. It is argued that since corruption can shape the implementation process of public policies as well as the policy choices, high levels of corruption are likely to limit the positive effect of democratic experience. Following Min (2015), we measure electricity provision by the share of population living in unlit areas. We find that democratic history leads to higher electrification rates only when corruption is relatively low. In high-corrupt contexts, however, the positive effect of democratic history is absent.

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Introduction

Electricity is essential to social and economic development. For example, it has been described as the “lifeblood of the modern economy” (Min 2015, 2) as most of the economic activities that we see in the world today are dependent upon a steady supply of electricity and a stable system to distribute it. Hence, access to affordable, reliable and sustainable energy for all has been adopted as number seven of the United Nations’ “Sustainable Development Goals” (SDG) (UN 2015a, 2015b). However, despite its importance for both economic and social activities, and the high and steady demand, there are few incentives for the private sector to contribute to the realization of universal electricity access. Since the private sector will not sufficiently value the positive economic externalities of electrification, electricity is an example of a public good that will remain underprovided if solely left to the private sector (Abbott 2001; Samuelson 1954).¹ Moreover, the building of large-scale transmission and distribution infrastructure is both expensive and a truly long-term investment, thus typically the type of investment of little interest to commercial investors. Hence, the fulfilment of SDG 7, i.e. the undertaking of providing electricity to entire populations, is - and will remain - primarily politically driven (Baskaran et al. 2015).

One of the central questions in research on the drivers behind public good provision is how political institutions impact on the provision of public goods. More specifically, does it matter for successful public good provision whether a country’s political regime is democratic or autocratic? A strong argument can here be made for democratic institutions leading to more public good provision. When political leaders are held accountable to the citizens in fair and regular elections, this, it is assumed, creates strong incentives among political leaders to deliver broadly demanded public goods (Acemoglu and Robinson 2005; Sen 1999). As elections provide citizens with the power to replace political leaders that fail to fulfil these expectations and because provision of public goods is likely to be included in the evaluation of these political leaders, democracy is thus expected to produce more public goods, such as affordable and reliable electricity (Bueno de Mesquita 2003; Deacon 2009; Lake and Baum 2001; Gandhi and Przeworski 2006; McGuire and Olson 1996).

¹ In economics, it is common to define public goods as both non-rivalrous and non-excludable. Although electrification can be seen as a public service rather than a public good (something that is much needed, but tends to be underprovided by the market), political scientists often refer to electricity as a public good (e.g. Min 2015). To follow the convention of the literature that we build upon, we use the term “public good” in relation to electrification.

Despite the strong theoretical reasons to expect a positive effect of democracy on most public good provision, it has been questioned whether this link is actually so strong. There are several reasons why democratic institutions may fail to produce enough public good provision to satisfy the voters' demand. For example, clientelism may distort political attention away from public good provision toward the interests of narrower groups (Hicken 2011; Kitschelt 2000). Similarly, elected leaders often work with short time horizons (Haggard 1991; Keefer 2007), whereas public good provision – not least in the form of investments in electrical power infrastructure—is a much longer-term undertaking than governments' regular terms of office (Min 2015).

Research on the effects of political systems and institutions on public good provision (including energy provision), has often been hampered by a lack of adequate and reliable data. Recently, however, an innovative method has been used to measure electricity access: by using satellite imagery of night-time lights, together with data on population in specific areas, estimates of the share of countries' populations that live in unlit areas can be obtained (Min 2015). Using this objective data, Brian Min (2015) finds a significant positive impact of democratic experience on access to electricity.

Despite the novel contribution by Min (2015), we argue that an even better understanding of how political institutions impact on public good provision can be gained, if we take into account not only the political incentives to provide public goods, but we also pay attention to the institutions responsible for implementing public policies. Our argument is founded on the following line of reasoning: although there are strong reasons to expect that democratic institutions provide politicians with strong *incentives* to provide public goods – more specifically electricity – to its population, their actual *ability* to provide such goods is equally dependent on access to reasonably well-functioning administrative institutions. In this paper we therefore investigate how bureaucratic quality shapes and interacts with the effect of democratic institutions on public good provision in the form of large-scale electrification.

The rest of the paper is organised in the following way. First, we theorise and hypothesize on how and why democracy positively affects electricity provision and thereafter how this relationship may be moderated by the presence of corruption. This is followed by a presentation of data, econometrics and methodology. Thereafter we present our results, followed by a discussion and some concluding remarks.

Political institutions and large-scale electrification

In this paper, we study electrification within the framework of public good provision. When the goal of electrification is to provide access to the benefits of electricity to wide segments of the population—which demands, for example, long-term investment in distribution infrastructure—this goal is unlikely to be met in a private and unregulated market. Despite its importance for economic activity, and high and steady demand, there is little incentive for individuals or the private sector to contribute to the realization of universal electricity access. Since the private sector will not sufficiently value the positive economic externalities of electrification, electricity is thus an example of a public good that will be underprovided if left to the private sector exclusively (Abbott 2001; Samuelson 1954). Moreover, the building of large-scale transmission and distribution infrastructure is an utterly expensive long-term investment impaired with uncertain benefits, thus typically of little interest to commercial investors (Baskaran et al. 2015). This is true especially for rural electrification, which can seldom be motivated by economic calculations, in places with dispersed settlement and/or low population density. For these reasons, private electric utilities have historically been reluctant to extend electricity services to rural areas. Instead, rural electrification has been achieved in most countries through special national programs and funding arrangements, including the use of subsidies (Zomers 2003). This also points to how politicians determine patterns of electricity consumption not only through the building of infrastructure, but also through, for example, subsidies, price regulation, and other regulatory structures (Brown and Mobarak 2009). Hence, undertaking provision of electricity to the entire population is primarily politically driven, pointing to the importance of political institutions.

One of the central questions in research on the drivers behind public good provision is to what degree and how political regimes and institutions impact on the provision of public goods. In this regard, it is commonly asserted that democratic institutions tend to lead to more public good provision (Acemoglu and Robinson 2006; Sen 1999; Bueno de Mesquita 2003; Gandhi and Przeworski 2006; Lake and Baum 2001; McGuire and Olson 1996). While governments in authoritarian or semi-authoritarian states also face pressure to provide public goods such as electricity, they normally need support from narrower interest groups than democratically elected leaders typically do. There are strong theoretical expectations that democracy will benefit the interests of the median voter rather than the economic elites (Meltzer and Richard 1981). In the context of electrification, attention to the interests of the median voter in many cases would imply bringing electricity to rural

areas – something that, as argued above, is unlikely to happen unless the political will to do so is present.

Indeed, some empirical studies support the argument that electricity provision matters for citizens' evaluations of political leaders in democracies. For example, electricity tends to be among the top priorities of voters in India (Chhibber et al. 2004); something that political leaders are well aware of and use in their campaign strategies (Baskaran et al. 2015). Brown and Mobarak (2009) find that at least among the poorest countries in their data set, democratic governments tend to increase the residential sector's share of electricity consumption relative to industry's share, thus indicating a positive relationship between democracy and provision of electricity to the public. In addition, Ahlborg et al. (2015) present results linking level of democracy to household electricity consumption in African countries.

Simultaneously, there are a number of reasons why democratic institutions may fail to result in public good provision passable enough to satisfy the voters' demand. The strong focus on re-election on the part of politicians may not always work to the benefit of the welfare of voters (Besley and Coate 1998). Similarly, elected leaders often work with short time horizons (Haggard 1991; Keefer 2007) whereas public good provision—not least in the form of investments in electric power infrastructure—is a truly long-term undertaking (Min 2015). Moreover, democratic “illnesses” such as clientelism and vote buying (i.e. the exchange of goods and services for political support) may distort the political attention away from public good provision toward the interests of narrower groups (Bratton and Van de Walle 1994; Bratton and Van de Walle 1997; Chandra 2004; Kitschelt 2000; Hicken 2011). The empirical evidence for a positive correlation between democracy and public goods has also been mixed. For example, Ross (2006) argues that contrary to the strong theoretical expectation provided by the median voter theory, democracy does not serve the interests of the poorer segments of society. Moreover, a recent study on southern African democracies found the accountability mechanism to work in an unexpected way as citizens receiving public services were less likely to support the incumbent than others (Da Kadt and Lieberman 2015).

To highlight the limits of democracy in securing the welfare of its citizens, the world's most populous democracy, India, is often compared to the most populous autocracy, i.e., China (see, for example, Sen 2011). According to official statistics, China's entire population had access to electricity

in 2013, while the electrification rate in India was only 81 percent during that same year (IEA 2015).²

In the light of the mixed evidence of the link between democracy and public good provision, it has been suggested that democracy should be considered a *stock* variable rather than a level variable; that is, what counts is not so much the current level of democracy but the accumulated experience of democracy over a longer time period (Gerring et al. 2012).

The extent to which democracy leads to more public good provision has implications beyond the scope and quality of public services. It may also impact on the support for democracy itself. In many contexts, democracy is valued for its *performance* rather than for the political rights and freedoms that comes with it (Canache 2012; Crow 2010). Poor performance may therefore lead to negative consequences not only for incumbent politicians, but also for public support for the democratic political system as such (Magalhães 2014; Boräng et al. 2015).

Despite the high stakes, research on the effects of political institutions on public goods provision has often been hampered by a lack of adequate and reliable data. Recently, however, an innovative approach has been developed to measure electricity access using satellite imagery of night-time lights. Taken together with data on the number of people living in specific areas, satellite images enable to obtain estimates of the share of countries' populations that live in unlit areas (Min 2015). The results from using this measure – which is not dependent on self-reported government statistics on public good provision – is revealing: previously cited official statistics may be viewed in a new light. Official statistics showed that China outperforms India in terms of electricity access. However, while household electrification in China – according to the official statistics – had already exceeded 98.4 % in 2002 (Ying et al. 2006), satellite images reveal that the electrification rate, as observed by satellites, was 71.8 percent in 2003, with 367 million people in unlit areas (Min 2015, 172). On the other hand, India's electrification rate as observed by satellites is much closer to the official estimates, and in fact higher than China's. Using this objective data, and taking the approach

² As further discussed below, however, these official figures can be questioned today.

of democracy as a stock variable (Gerring et al. 2012), Brian Min (2015) finds a significant positive impact of democratic experience (years of democratic rule) on electricity access.

While Min's study is an important contribution to the debate on democracy and public goods provision – showing how political incentives shape the process all the way from high level decision making to implementation – it is strongly focused on political incentives and less on political capacities. This is in fact true for most of the literature on democratic accountability and public good provision: While it adds to our understanding of how the political decisions are shaped by democratic institutions, it has less to say about the ability of leaders to deliver the things they have decided upon. In other words, the focus on accountability and incentive structures for political leaders tends to overlook situations where political leaders *wish* to provide public goods (because they have strong electoral incentives to do so) but are simply *not able* to do so (Ahlborg et al. 2015; Boräng et al. 2016).

As we see it, to further our understanding of the processes through which a high-level political decision to increase electrification rates results – or does not result – in real electrification, we must partly shift our focus from democratic procedures towards the implementation apparatus within the polities. This is because the ability of political leaders to actually provide public goods is very much conditioned by access to reasonably well-functioning administrative institutions that effectively and (cost) efficiently implement the stipulated policies. One key characteristic of the administration that has been shown to have strong implications for public service provision is the level of corruption, conventionally defined as the abuse of public power for private gain (Mauro 1998; Gupta et al. 2000; Holmberg et al. 2009; Kaufmann and Kraay 2002; Nye 1967; North 1990). Democracies are by no means free from corruption. On the contrary, public sector corruption is often present also in democracies and is ascribed as an important part of so-called 'bad governance', which is a 'spectre haunting democracy in the world today' (Diamond 2007). In the following we therefore expand on how public sector corruption may shape the effect of democratic rule on public good provision in the form of large-scale electrification. There are several ways in which public sector corruption may impact on the link between democratic rule and public good provision.

First, corruption can distort the positive link between policymaking and policy implementation, as the intended policies do not become properly implemented due to inefficiencies and/or "vanished" resources. For example, the literature on rural electrification in developing countries has identified

poor organizational structures and corruption as important barriers to successful electrification (e.g. Ahlborg and Hammar 2014; Jones and Thompson 1996; Karekezi and Majoro 2002).

Second, to the extent that corruption is present also in the process of recruitment to the public sector, it is likely to undermine meritocratic recruitment. Consequently, it may lead to competence losses in the public sector, with consequences for the provision of electricity, which is a technically complicated task that requires highly experienced civil engineers.

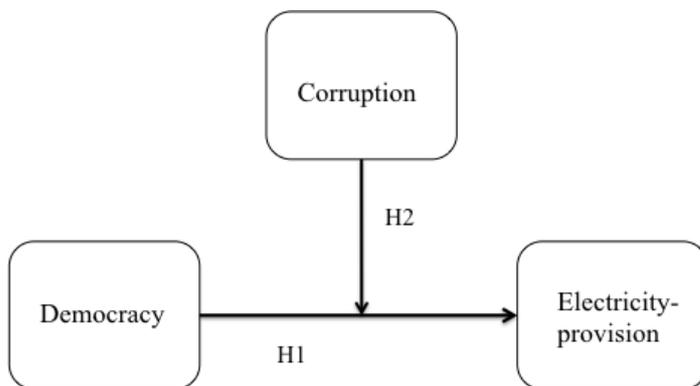
Third, the presence of dysfunctional institutions could negatively affect the link between democratic rule and public good provision by influencing the *policy choices* that are made in democracies. Any expectation that democratic rule will lead to more public good provision is based on the assumption that citizens' real demand for public goods – and thus public spending – is eventually also translated into demands on politicians to provide such goods. It is however far from given that citizens will turn to the state for large-scale solutions to their problems (see, for example, Rothstein et al. 2012). If citizens do not trust the public authorities to be able to deliver public goods – if for example they suspect that tax money will be lost to corruption – and/or do not trust their fellow citizens to contribute to the generation of the required tax revenues in the first place – they may not be willing to take the risk of demanding the higher public spending, and thus higher taxes, that are necessary. In this situation they might instead opt for a low-risk strategy, i.e., voting for politicians who provide private targeted goods in exchange for their votes.

As implied in the third argument as to why corruption may affect democracy's positive impact on public good provision, both the confidence that people have in the implementing agencies and levels of generalized trust in society are likely to matter (Rothstein 2011). Large-scale infrastructure projects – as well as many other public good projects – can be seen as “high-risk projects” that are dependent on both vertical and horizontal trust to succeed. Since public sector corruption tends to undermine both types of trust, it can increase the likelihood of low-risk choices among voters and politicians; the result being private, targeted spending rather than spending on public goods. Trustworthy public administration systems can instead be expected to influence positively the ability of agencies to provide public goods, not least through their impact on the ability to build consent regarding the collection of taxes and other contributions. Since we are studying the importance of democratic experience and not level of democracy, it is worth noting that it has been shown that

corruption can explain variation in policy choices also between long-standing democracies (Rothstein et al. 2012; Dahlström et al. 2013).

Let us summarize and also illustrate our driving argument. According to the seventh SDG (UN 2015b), governmentally initiated provision of affordable, reliable and sustainable energy is absolutely crucial for people to develop economically and socially. Furthermore, it has been suggested that democracy is an important determinant for how successful countries and governments are in providing this public good (Min 2015). As we have argued here, however, it is most likely that when a country's public sector is ridden with corruption, democratic experience can be expected to have a smaller, or even non-existent, effect on public good delivery. Therefore, the effect of democracy on public goods provision is conditional on a governments' ability to implement their tasks (Hanson 2015; Knutsen 2013). This line of reasoning is illustrated in Figure 1, where the effect of democracy on electricity provision is moderated by corruption.

FIGURE 1, THE EFFECT OF DEMOCRACY ON ELECTRICITY PROVISION AND THE INTERACTION EFFECT BETWEEN DEMOCRACY AND CORRUPTION.



First, to replicate Min (2015) finding we postulate the hypothesis that presence of democracy (made operational through experience of democracy) should have a positive effect on level of electricity provision. Thus:

H₁. *Democratic experience has a positive effect on a country's electricity provision.*

While the first hypothesis mirrors previous findings in the literature, our second hypothesis contributes to a further understanding of this relationship. Since presence of corruption has the poten-

tial to distort the positive relationship between democracy (democratic experience) and electricity provision, either because of inefficiencies and lost resources and/or because corruption may also influence what policy choices are being made, we hypothesize that:

H₂: *The effect of democratic experience on electricity provision depends on the level of corruption.*

Data and method

Our analysis follows the empirical strategy laid out by (Min 2015) to ensure that our results are compatible for comparison. We approximate our models to the models Min offers to achieve accurate replication and then proceed with our contribution. Our *dependent variable* is the percentage of population living in unlit areas Min (2015) based on satellite images from the Defense Meteorological Satellite Program's Operational Linescan System (DMSP-OLS). High-resolution images, taken by satellite from an altitude of 830 km each night between 20:00 and 21:30 local time, capture the concentration of outdoor lights around the globe. The data are smoothed to reflect only "stable lights", that is lights "from cities, towns and other sites with persistent lighting, including gas flares" and excluding short-term events such as fires and lightning. The indicator ranges from 0 to 100, where higher numbers imply a greater population living in the unlit areas. For a more detailed description on the calculation of the measure, see Min (2015).

Using satellite data offers a number of advantages over the alternative measures of electrification. It is objective and its accuracy does not depend on country-specific political and economic factors. Compared to data on access rates and electricity consumption, it avoids the problems of incorrect or inconsistent reporting. One of the main critiques of using nighttime light satellite data for measuring public good provision is that it is not possible to distinguish the source of the electricity provider, which can be both public and private. However, previous research states that most electricity provision tends to be arranged by the government (Lal 2005), while the quality of private electricity provision tends to be contingent on the efficiency of public-private sector partnerships, which in turn also depends on bureaucratic capacity (Dahlström et al. 2016). We can expect that the share of private providers will be small and is therefore likely to create additional noise in the data rather than affect the results in any substantial way.

When replicating the results by Min (2015) we use similar *independent variables* from the same data sources as in the original where possible. We gauge democracy with the dichotomous measure pro-

vided by Cheibub et al. (2010) and similarly construct a measure of democratic experience, capturing the number of years over the period 1946-2002 that a country has been coded as *democracy*. Similarly, we control for a natural logarithm of a country's GDP per capita to account for the level of industrialization in a country and the availability of financial resources for building the grid lines necessary to transmit electricity. We take the measure of GDP per capita from Gleditsch (2011). We control for population density, as it is easier to provide access to a densely living population, and for the percentage of rural population in a country, as it is more difficult to provide access to rural areas. Both indicators are taken from World Development Indicators (WB 2014). To account for the relationship between ethnic diversity and public good provision, we include a measure of ethno-linguistic fractionalization, taken from Fearon and Laitin (2003). Similarly to Min (2015), we control for the country's landscape using a measure for mountainous terrain from Fearon and Laitin (2003), as mountains make the building of electricity infrastructure more costly; and a measure of a country's latitude, to account for the difference in hours of darkness per year across the globe. Our measure of latitude comes from La Porta et al. (1999) and is available through (Teorell et al. 2016).³ We use the measure of oil production in metric tons per capita with data from Ross and Mahdavi (2015) to account for gas flares captured in the dependent variable and for countries' access to non-renewable electricity sources. We also include the number of civil armed conflicts a country has been through during the period 1946-2002 and multiply it by the number of years a country has been in each conflict to capture the accumulated damage that conflicts can bring.⁴ Ongoing conflicts may disrupt electricity supply, while previous conflicts could have contributed to the destruction of grids. The data are taken from PRIO Armed Conflict Dataset (Themnér and Wallensteen 2013). While the measure differs from the one used by Min (2015), it nevertheless captures the essence of Min's variable and comes from the same data source. Data for all independent variables are obtained from the Quality of Government Institute (QoG) database (Teorell et al. 2016). All independent variables are taken for the year 2002, one year prior to the year when our dependent variable is measured.

Our second main independent variable – corruption in public administration, which we introduce after replicating the results by Min (2015), is taken from the Varieties of Democracy dataset (Coppedge et al. 2016). The indicator measures to what extent public officials engage in corrupt

³ The missing values on latitude are collected from atlas data.

⁴ We do not use the measure used by Min (2015) in his study as it is rather problematic to construct it given the current data structure of PRIO dataset.

exchanges, that is, provide favours for bribes, and the extent to which they “steal, embezzle, or misappropriate public funds or other state resources for personal or family use.” The indicator ranges from 0 to 1 where higher values mean higher corruption. Summary statistics for all variables used in the study are presented in Appendix A.

To test our hypotheses we use fractional logistic regression suggested by Papke and Wooldridge Jeffrey (1996) and Wooldridge (2002, 661) and used by Min (2015) to estimate the relationship between democracy experience and the proportion of population living in unlit areas. This estimation is useful because, in contrast with OLS regression, it forces the predicted values to fall inside the 0-1 interval, which is defined by the variance range of the dependent variable. In fractional logit, the predicted values on the dependent variable are generated by the following logistic function:

$$E(y|x) = \frac{\exp(\mathbf{x}b)}{1 + \exp(\mathbf{x}b)} \quad (1)$$

The partial effects from equation 1 are roughly comparable to the coefficients from the OLS regression. We run all models with Huber-White robust standard errors to account for heteroscedasticity.

Results

Table 1 presents the results. Models 1 and 2 replicate Min’s (2015) results and show the relationship between democratic experience and proportion of population living in unlit areas. The direction of the relationship and size of the coefficients on all variables resemble the findings by Min, apart from the variable measuring the effect of conflicts on electrification, which is now positive and significant, implying that higher number of conflicts and longer duration of conflicts have a negative impact on electrification rates. The results similarly show that longer experience with democracy is associated with fewer people living without light. Model 3 introduces the variable measuring public sector corruption into the equation and shows that higher corruption is related to higher share of population living in unlit areas when controlling for the years of democratic history. The relationship disappears, however, when accounting for the rest of the factors identified as important predictors, as shown in Model 4. Model 5 provides a test for the interaction effect between democracy experience and the levels of corruption on electricity provision, as suggested by Hypothesis 2. The significant interaction term in Model 5 implies that democracy’s effect is indeed

conditional on the level of corruption. To study the nature of the interaction, we calculate the predicted probabilities at each level of corruption and plot them.

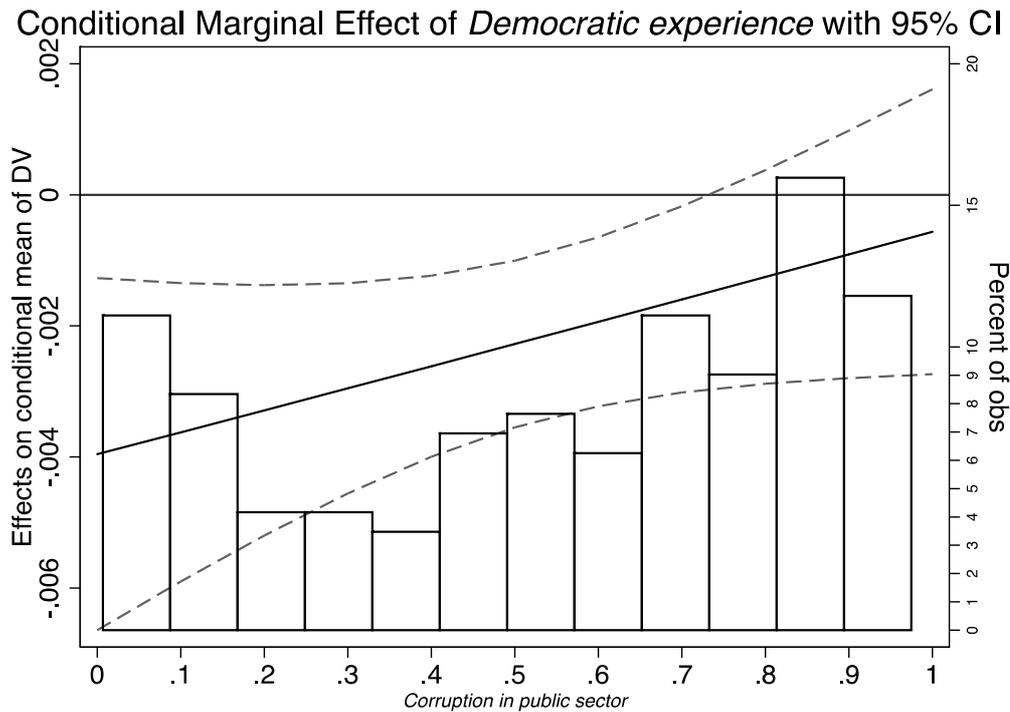
TABLE 1, RELATIONSHIP BETWEEN DEMOCRATIC EXPERIENCE, PUBLIC SECTOR CORRUPTION AND THE SHARE OF POPULATION LIVING IN UNLIT AREAS.

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Democracy experience	-0.038*** (0.005)	-0.016** (0.005)	-0.027*** (0.008)	-0.017*** (0.005)	-0.030*** (0.009)
Public sector corruption			1.363** (0.503)	-0.133 (0.368)	-0.423 (0.444)
Democracy*corruption					0.026† (0.014)
GDP per capita(logged)		-0.362** (0.121)		-0.376** (0.135)	-0.373** (0.135)
Latitude		-0.025*** (0.007)		-0.024*** (0.007)	-0.023** (0.007)
Population density(logged)		-0.156** (0.051)		-0.154** (0.051)	-0.159** (0.051)
Mountainous terrain (log)		0.033 (0.048)		0.032 (0.047)	0.024 (0.046)
Ethnic fractionalization		-0.417 (0.341)		-0.402 (0.344)	-0.409 (0.342)
Rural population(%)		0.023*** (0.006)		0.023*** (0.006)	0.023*** (0.006)
Conflicts		0.006*** (0.001)		0.006*** (0.001)	0.005*** (0.001)
Oil production per capita		-0.094* (0.043)		-0.085 (0.059)	-0.079 (0.058)
Constant	-0.756*** (0.122)	1.953† (1.158)	-1.694*** (0.427)	2.121 (1.352)	2.290† (1.374)
Observations	148	148	144	144	144

Robust standard errors in parentheses, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. The measure of democratic experience in this table is based on the measure by Cheibub et al. (2010). All independent variables are lagged 1 year.

The marginal effect plots in Figure 2 show the contingent effect of democratic experience on every value of public sector corruption with 95% confidence intervals based on Model 5 in Table 1.

FIGURE 2, EFFECT OF DEMOCRATIC EXPERIENCE ON THE PROPORTION OF POPULATION LIVING IN UNLIT AREAS CONDITIONAL ON PUBLIC SECTOR CORRUPTION.



The graph identifies that the effect of democratic experience on electrification rates is only significant when corruption levels are low. When corruption is higher than 0.7⁵ on the 0-1 scale, which is the level of Moldova, the effect of democracy disappears and no longer seems to play a role for electrification rates. The overlaid frequency distribution of country-cases specifies that the effect of democratic experience for electricity provision is insignificant in about 37% of the observations in the sample or, more specifically, 60 cases. By looking more closely at the data we find that this subsample of corrupt countries includes both those countries that had no democratic experience throughout 1946-2002, such as Afghanistan, Russia or Zimbabwe, and countries that have up to 47 years of democratic history, such as Venezuela and Guatemala. This implies that the relationship holds not only for countries which experienced relatively few years of democracy, but also for those

⁵ The threshold of 0.7 is taken from the calculation of marginal effects. According to the results, when corruption takes a value above this point, the effect of democracy on electricity provision becomes insignificant.

states that have been under democratic rule for a long period of time relative to the rest of the sample, but which, at the same time, have not managed to developed a strong well-performing public administration. Summary statistics for the cases where the effect of democratic experience on electricity provision is significant and cases where democracy does not have a significant effect is provided in Table 2.

TABLE 2. SUMMARY STATISTICS OF DEMOCRATIC EXPERIENCE IN SUB-SAMPLES WHERE THE EFFECT OF DEMOCRATIC EXPERIENCE IS SIGNIFICANT AND NOT SIGNIFICANT

Variable	Obs	Mean	Std. Dev.	Min	Max
Sample where the effect of democratic experience not significant	60	6.066667	11.12162	0	47
Sample where the effect of democratic experience is significant	88	24.69318	21.50721	0	58

We perform a number of alternative tests to check if the results hold for other specifications used by Min (2015). The results are presented in Table 3. In Model 1, we exclude OECD countries to eliminate the possibility that the interaction effect is driven by the group of Western democracies. In Model 2 we perform our analysis solely on the sample of countries with gross national income (GNI) lower than 11905 per capita, classified as developing nations by the World Bank. In Model 3 we use a continuous measure of democracy – a combined Freedom House/Polity score suggested by Hadenius and Teorell (2005) – to calculate countries’ democratic experience. The index is a calculated average of Freedom House and Polity IV democracy scores. For countries and years where data on Polity IV are missing, the index contains imputed values calculated by regressing Polity on the average Freedom House indicator. Hadenius and Teorell (2005) show that the average index performs better in terms of validity and reliability than each of the indices separately. The index ranges from 0 to 10, where 0 stands for totalitarian regimes, while 10 corresponds to the most democratic polities. We code countries’ democratic experience as number of years in which a country received a score above 6.67 on Freedom House/Polity IV index, which is a threshold of democracy suggested by Hadenius and Teorell (2005). The indicator captures democratic history starting from 1972.

TABLE 3, RELATIONSHIP BETWEEN DEMOCRATIC EXPERIENCE, PUBLIC SECTOR CORRUPTION AND THE SHARE OF POPULATION LIVING IN UNLIT AREAS. ALTERNATIVE SPECIFICATIONS

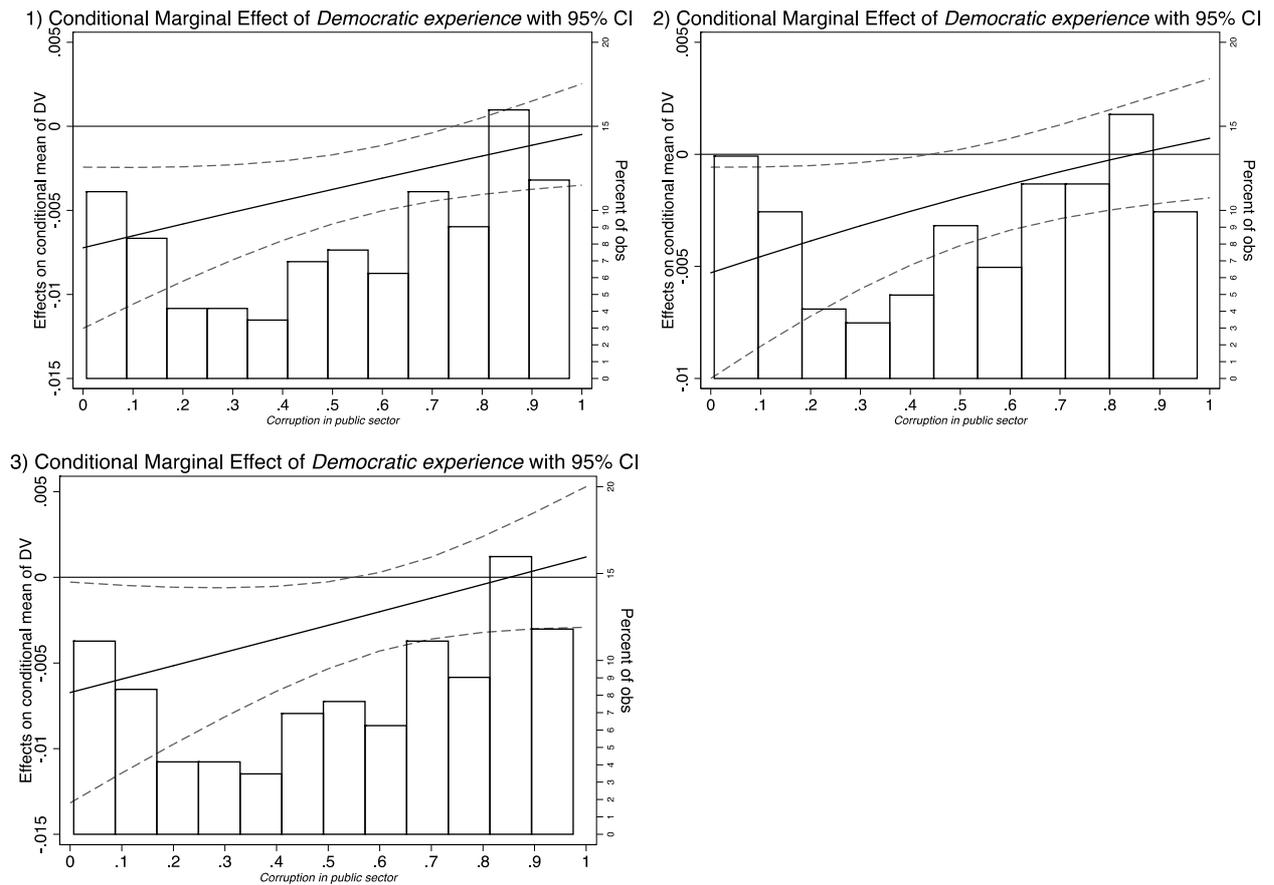
DV: share of population living in unlit areas	1 Excluding OECD	2 Developing countries GNI<11905	3 Freedom House/PolityIV index
Democracy experience	-0.038*** (0.011)	-0.026* (0.011)	-0.048* (0.020)
Public sector corruption	-0.539 (0.451)	-0.879† (0.483)	-0.565 (0.509)
Democracy*corruption	0.035* (0.016)	0.030* (0.015)	0.057† (0.031)
GDP per capita (log)	-0.320* (0.133)	-0.318* (0.135)	-0.388** (0.137)
Latitude	-0.024** (0.007)	-0.021** (0.008)	-0.020** (0.007)
Population density (log)	-0.140** (0.052)	-0.189** (0.059)	-0.201*** (0.060)
Mountainous terrain (log)	0.013 (0.047)	0.012 (0.052)	0.001 (0.048)
Ethnic fractionalization	-0.390 (0.341)	-0.295 (0.392)	-0.439 (0.355)
Rural population (%)	0.022*** (0.006)	0.027*** (0.006)	0.025*** (0.006)
Conflicts	0.005*** (0.001)	0.002 (0.003)	0.005** (0.001)
Oil production per capita	-0.116† (0.059)	-0.123 (0.089)	-0.077 (0.058)
Constant	2.006 (1.361)	1.984 (1.426)	2.545† (1.330)
Observations	116	98	144

*Huber-White robust standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. All independent variables are taken for the year 2002. Dependent variable is taken for the year 2003.*

The results are consistent across the models, showing that the conditional effect of democracy on corruption holds in all selected sub-samples. Figure 3 shows conditional marginal effect plots for each model and reveals a similar pattern to the one found in Figure 2: democratic experience seems to play a role for electrification rates only in countries where the level of corruption in public administration is low and where the state is capable of implementing such long-term projects as elec-

trification of the population. In countries with high corruption longer experience with democracy does not seem to influence electricity provision.

FIGURE 3, EFFECT OF DEMOCRATIC EXPERIENCE ON THE PROPORTION OF POPULATION LIVING IN UNLIT AREAS CONDITIONAL ON PUBLIC SECTOR CORRUPTION (MODELS 1-3 IN TABLE 2).



Longer democracy experience is associated with lower share of people living in unlit areas, but only in countries which have managed to curb corruption to at least some extent. In countries where corruption is high, longer democratic experience does not seem to help improve electrification rates.

We can now revisit our hypotheses in the light of the above findings. Our first hypothesis aimed to replicate the results by Min (2015) and suggested that longer experience with democratic rule is associated with higher levels of electrification. In our results, we find relationship patterns similar to

the ones identified in Min's study, confirming that democracy experience has a positive effect on people's access to electricity.

Our second hypothesis – and the one of principle interest in this study – suggested that the effect of democracy on electricity provision would depend on the level of corruption, and that the positive effect of democratic experience on electrification would be weaker in contexts in which there is widespread corruption in public administration. The interaction between democratic experience and public sector corruption has indeed been shown to matter for explaining the differences between countries. More specifically, experience with democracy is linked to a decrease in the share of population living in unlit areas *only* when the public sector, responsible for implementing public policies, is not corrupt. As corruption increases, the effect of democratic experience on the extent of electrification becomes weaker and finally disappears in countries with extensive and widespread corruption.

Conclusions

In this paper, we have investigated the interdependent effect of democratic experience and corruption in the public sector on electricity provision. The aim has been to contribute to our understanding of how experience with a certain regime type and the quality of implementing institutions in the political system affect the prerequisites for successful electrification.

Taking as a point of departure the work by Brian Min (2015), which investigates the association between democratic experience and the extent of electrification, we have suggested that focusing solely on democratic institutions gives an incomplete understanding of the role of democracy in public good provision. Instead we have put forward a claim that the extent to which democracies provide public goods depends on the quality of public administration, which is responsible for the implementation of public policies. The results from our tests, which complement the work by Min (2015), show that the effect of democratic experience on electrification is indeed conditional on the level of corruption in the public administration. Democratic history is associated with a lower share of population living in unlit areas only if a country has been able to reduce corruption to a certain level. In the contexts of widespread corruption, long experience with democracy has been shown to have no effect on the provision of electricity to the population. However, once a certain level of control over corruption is in place, democracy does have the expected desirable effect. These find-

ings add to our knowledge about the political determinants of electricity provision by emphasizing that taking the implementation process into account enhances our understanding of the role that democratic institutions play for the provision of electricity.

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Appendix 1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Proportion of population in unlit areas, 2003	148	0.222	0.221	0	0.880
Democracy experience (Cheibub), 1946-2002	191	17.225	19.379	0	58
Democracy experience (FH/PolityIV), 1972-2002	249	8.759	10.937	0	30
Public Sector Corruption, 2002	162	0.530	0.306	0.007	0.975
GDP per capita (log), 2002	192	8.498	1.300	5.293	11.238
Latitude	194	25.326	17.085	0	65
Population Density (log), 2002	191	4.145	1.441	0.453	9.700
Mountainous terrain (log)	168	2.138	1.424	0	4.557
Ethnic Fractionalization, 2002	165	0.474	0.260	0.002	1
Rural population, 2002	191	46.799	23.563	0	91.318
Conflicts, 1946-2002	249	5.486	19.170	0	234
Oil production per capita, 2002	171	1.936	7.090	0	54.152