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Introduction

At one o'clock as the sweltering sun beat down on India, a load protection circuit tripped on a transmission line near Agra, not far from the Taj Mahal. Instantly, all the power on that line rushed to neighboring lines that quickly overheated, triggering other parts of the network to shut down. As current surged across the crippled grid, load protection circuits flipped like dominoes, cascading across the vast state of Uttar Pradesh, into the Delhi capital region, and soon across all of northern India. Just three minutes later, a final circuit breaker tripped along the Kankroli–Debari corridor in Rajasthan and most of India went dark. On that day, July 31, 2012, some 620 million people lost power. It would be the largest blackout in history.

The outage stretched across nearly 2,000 miles, from India's western border with Pakistan to the Naga Hills it shares with Myanmar. India's vaunted rail system ground to a halt, stranding hundreds of thousands of passengers. In Delhi, traffic signals went out, leading to traffic jams stretching as far as the eye could see.

Indians fumed in frustration as government officials scrambled to restore power and resolve the massive breakdown. The catastrophic failure highlighted an uneasy reality in India. Electricity is a critical public good, undergirding economic production and social welfare. Yet access to the benefits of electricity is anything but universal or assured. Its distribution is an uneven patchwork, connecting fortunate areas to the grid but also passing over millions, leaving more people without power than in any other country in the world. For those with electrical connections, service can be irregular, gone in a moment because of rolling blackouts whose incidence and timing are controlled by bureaucrats and public officials. In ways large and small, access to electricity depends on the state and is shaped by the preferences, strategies, and interactions of a moving cast of political actors. The official explanation for that day's massive power failure was mundane, if paradoxical. Everyone *lost* power because

everyone *wanted* power. With demand swelling to perilously high levels, no state wanted to be the first to turn off the power to its residents. In India, the "grid" is composed of interconnected regional power networks, allowing states to borrow from areas with surplus capacity as necessary. Yet even as demand mounted, individual state utilities continued to allow their users to draw on the stressed grid, betting that others would reduce their demand first.

To many observers, the catastrophic failure was an inevitable outcome of a system governed by political actors beholden to political interests. As in much of the developing world, India's power sector is publicly owned and managed. Its 600,000 public servants are overseen by senior political appointees who serve at the pleasure of elected political leaders. For India's politicians and their agents, the drive to keep the power flowing to their constituents can be irresistible. Blackouts antagonize farmers who cannot pump water, frustrate teachers trying to get through lesson plans, anger business owners in darkened shops, and annoy families unable to turn on their lights and fans. Indians frequently rank electricity problems as one of the most important challenges facing the country, and vexation over outages is a prominent issue at election time. On that July day, India's battered grid simply could not sustain the relentless pressure to keep electricity flowing.

Electricity is the lifeblood of the modern economy. It enables production, keeps factories humming, illuminates streets, and lights up homes. In every corner of the globe, people rely on electricity to power fans, mobile phones, and televisions. It enables refrigeration of food and medicines. More than simply a modern convenience, access to electricity is a life-altering transformation that improves welfare and promotes economic development. Electric light extends a day's hours, enabling workers to continue producing into the night, allowing children to study after the sun has set, and enhancing public safety in the darkness. Electric stoves save cooking time and eliminate the labor and time needed to gather wood and other biomass fuels. Electricity improves agricultural productivity by powering water pumps and encourages industrial development and the use of more efficient power tools and machinery.

Yet more than a century after the introduction of electric power transmission, some 1.3 billion people – a fifth of the world's population – still live without electricity (International Energy Agency 2013). Predictably, most of those lacking access reside in poorer countries. Yet even in these states, access to electricity is uneven, marking a bright line separating those on the road to modernity from those mired in persistent poverty. In India, nine in ten city homes have electric power. Yet in the villages where most Indians live, half the population still have no electricity at home. In rural Mali, access to electricity is almost nonexistent. In Indonesia, one in four people lack electricity while electrification is nearly universal in neighboring Malaysia.

The unevenness of electricity access in many countries indicates the severity of the challenge facing governments. Across most of the world, governments are the primary purveyors of electricity because public goods such as power

grids, roads, education, and public health are so important to social welfare and because markets often fail to provide them, especially in the poorest parts of a country.

Who gets electricity and why? How do governments decide who gets vital public goods such as access to electricity, clean drinking water, and education? These are important questions anywhere but absolutely critical ones in the developing world, where such services are key building blocks of development. For the poor who can afford few other alternatives, access to electricity and other basic services provided by the state can mean the difference between opportunity and destitution, and sometimes even life and death.

This book seeks to explain how political institutions shape access to public goods, particularly among the poor. Put simply, do democracies provide greater access to electricity than nondemocracies? And if so, do these benefits flow to the rural poor? Prevailing theory expects that democracies will deliver more public goods because of pressures induced by electoral competition under the gaze of a free press (Sen 1999), an institutional apparatus that privileges the interests of the poorer median voter (Meltzer and Richard 1981), the efficiency by which public goods can secure the support of a large coalition (Bueno de Mesquita et al. 2003), or a normative preference toward equality. But a growing body of empirical evidence has cast doubt on this expectation. International development experts Keefer and Khemani (2005, 2) observe that "policymakers in poor democracies regularly divert spending away from areas that most benefit the poor or fail to implement policies that improve the services that are known to disproportionately benefit poor people." Others have argued that electoral democracies are vulnerable to several types of "political failures" since candidates are motivated more by the pursuit of reelection than the welfare of their citizens (Besley and Coate 1998). Besley and Burgess (2002, 1415) also suggest that because of lower voter participation rates, "the poor and vulnerable may not obtain the full attention of politicians even in a democracy where they have numerical strength." Moreover, a vast literature shows the ways in which ethnic identities, clientelism, special interest groups, and corruption can reduce the incentives to provide public goods by vote-seeking politicians who prefer goods that can be more easily targeted and withdrawn (for reviews, see Hicken 2011 and Golden and Min 2013).

When it comes to electricity, anecdotal evidence suggests that democracies may be no better at providing access to this critical service than nondemocracies. According to official estimates in 2001, 57 percent of Indian citizens lacked basic household electricity compared to fewer than 2 percent in China, despite similarly massive populations, large territories, and expanding but impoverished rural economies (International Energy Agency 2002). These statistics are notable given India's history of vibrant democratic rule and China's long surviving single-party government. For theories that expect democracies to provide more public goods (Lake and Baum 2001; Bueno de Mesquita et al. 2003) and to distribute them more efficiently (Wittman 1989; Gradstein 1993)

and equitably (Weingast, Shepsle, and Johnsen 1981; Collie 1988), the track records of the world's most populous democracy and autocracy indicate a limitation of our theories, represent an exceptional anomaly, or suggest that the data underlying this paradox are unreliable.

Each of these explanations represents strands of the story I weave in this book. By relying on new and objective data measures derived from satellite imagery, this book presents new theory and evidence from across the developing world to show that democracies systematically favor the provision of public goods because of their unique political properties.

The Argument

This book argues that democratic governments provide greater access to public goods, particularly among the rural poor, than do nondemocratic rulers.[1] Building on prominent theories of democracy, I argue that public goods are valuable to democratic leaders not only because they reach many voters and are valued by the masses, but also because of the *political externalities* they generate for electorally minded politicians. Since the seminal work of Samuelson (1954), scholars have understood that many public goods will be underprovided by markets that do not appropriately value the *economic externalities* that accrue beyond the individuals who directly benefit from a good. As a result of these economic spillovers, firms lack the incentive to provide even those goods that are in high demand and of great social benefit. Thus it is often argued that valuable societal goods such as national defense and power grids require collective provision by the state.

But although economic externalities legitimize government provision, they do not explain the varying efforts by which states seek to provide public goods. Political externalities motivate state leaders to deliver public goods. By political externalities, I mean the political benefits and costs that accrue in the political arena to politicians beyond the citizens who benefit from public goods and the state that funds them. Under democracy, political externalities are of great value, mapping tightly onto the reelection incentives of incumbents and spurring strategic efforts to deliver the benefits of public goods to pivotal areas at critical times. As a result of electoral incentives, democratic leaders will provide public goods in ways that maximize political benefits that are markedly different than the distributional strategies adopted under autocratic rule. If free market capitalism devotes itself to the capture of economic profits, democracy is a system that prioritizes the capture of political profits.

The argument, described more fully in Chapter 2, is built on two pillars. First, I argue that seemingly universal public goods can be distributed and

[1] Following Przeworski et al. (2000), I conceive of democracies as regimes in which electoral competition can result in turnover. That is, election outcomes are characterized by both ex ante uncertainty (anyone can win) and by ex post irreversibility (results cannot be reversed by losers).

targeted in ways that are intricately shaped by political priorities. At first blush, this statement seems self-contradictory: How can the benefits of public goods be targetable if, by definition, public goods are nonrival and nonexcludable? The answer lies in the mixed nature of many government schemes. Public goods schemes may offer universal benefits to a country as a whole, but in their implementation and delivery, the individual fragments that make up these schemes have many of the characteristics of private goods.

Because public goods are so highly valued by citizens and come wrapped in a veneer of universalism, they are easy for political leaders to champion and promote. But beneath that veneer, public goods schemes are rife with opportunities for political influence and manipulation. Any effort to deliver public goods entails a set of discrete actions, siting decisions, and locally concentrated expenditures. When it comes to electricity, the presence of a power grid and the promise of electrical power may appear as a public good for the country as a whole, but in the way it is delivered, electricity is also a private good that can be targeted, rationed, and withdrawn. The coexistence of these public facing universal benefits with the presence of finely targetable benefits under the umbrella of the same "public goods" scheme generates political externalities of great value to political leaders.

Second, because of the influence political actors have over the provision of public goods, political incentives will shape the distribution of public goods and the benefits that flow from them. For democratically elected leaders, public goods projects are highly appealing because of the opportunities they provide for legislators to shape their delivery and oversee their implementation. Each of these opportunities results in political externalities that are of great value to election-minded incumbents. As a result, democratic leaders will have a stronger preference for public goods provision than nondemocratic rulers who cannot directly capitalize on these political externalities in the absence of elections.

Although both selectorate theory (Bueno de Mesquita et al. 2003) and theories of redistribution (Meltzer and Richard 1981; Boix 2003; Acemoglu and Robinson 2006b) agree that democracies will have larger governments and higher levels of spending on public goods, they do not explicitly model the geographic distribution of these benefits. It is the political externalities of public goods, far more than their economic externalities, that shape their distribution. Under democracy, the need to win a large base of support leads to broader competition, encompassing a more expansive set of communities than in settings without elections. As democratic politicians seek to maximize the political benefits that flow from public goods projects, their catchment area will encompass spaces that would not be targeted on purely economic and technical grounds – rural regions and villages whose geographic remoteness, economic frailty, and historical exclusion make them otherwise improbable project sites. Indeed, these weaknesses make them particularly attractive opportunities for political targeting because it is here where the effort of legislators is most obvious to voters. Meanwhile, in autocratic settings, there are no electoral incentives for

leaders to direct public goods to the rural periphery, though they may do so for other reasons. Because of the political consequences that flow from the provision of public goods, the spatial configuration of these public goods will differ markedly across regime types, with especially important repercussions among the rural poor.

Why Electricity Matters

Electricity provision is not a widely studied topic in political science.[2] Yet the flow and distribution of electrical power provides an unusually clear window into how political institutions work. Consider a national village electrification program in a developing country. Owing to budget constraints, only a small portion of unelectrified villages can be electrified at a time. Which villages should be selected? Imagine two scenarios. In the first, the selection of villages is based on a technical evaluation of project costs and benefits. Such a process might prioritize villages with the largest number of potential residential and business customers. A more sophisticated assessment could even take into account potential network and scale externalities – it may be more cost-effective to electrify villages that are proximate to preexisting supply lines, or where the new connected load would be particularly beneficial in balancing load to a nearby power station.

Now imagine that an elected leader can influence the choice of which villages will be electrified. The political opportunities tied to this undertaking are lucrative.[3] A successful electrification project is highly visible, with ribbon-cutting ceremonies, project plaques, and lights that turn on every night to remind voters of who helped bring power to the village. By negotiating with village leaders, promises of loyalty and support can be sought. Perhaps village chiefs can even be pitted against one another as they compete for the legislator's attention. The ability to influence the rollout of the electrification program is thus a lucrative opportunity for electorally minded leaders.

Under democracy, public goods have valuable political externalities that politicians can capture and benefit from at the polling station. Promises to bring the benefits of public goods to individual communities are an especially powerful campaign tactic in the developing world because such goods are

[2] There are some notable exceptions, especially Brown and Mobarak (2009), who examine the effect of democracy on the sectoral distribution of electrical power. Briggs (2012) is among the few studies to explicitly consider political motivations to target electrification projects, in this case in Ghana. Kale (2014) provides a detailed political history of electrification across three Indian states with divergent outcomes. Another broader literature has focused on the politics of regulatory reform and privatization in the power sector (Levi-Faur 2003; Murillo 2009; Wengle 2015).

[3] In fact, such a scenario is not farfetched. In India, village electrification initiatives provide a wide range of opportunities for elected leaders to intervene in the selection of villages. Some programs explicitly enumerate the number of villages a legislator can select in each period.

highly valued by the poor, provide broad benefits to large numbers of voters at once, and serve as a visible accomplishment for which politicians can claim credit in campaigns (Mani and Mukand 2007; Harding and Stasavage 2014). As Kale (2014, 4) describes, "the process of electrification, while highly technical, is never neutral. In every instance, social and political contexts shape the way that electricity becomes embedded in a given place."

As mentioned previously, electricity is important because it is critical to social welfare and economic prosperity. It is also important because governments remain the primary providers of electricity in much of the developing world. This combination makes electricity a highly salient political issue in many countries. In 2011 alone, citizens engaged in protests and riots in fifty countries in response to power outages, fuel shortages, and price spikes. In 2008, unprecedented blackouts in South Africa weakened the legitimacy of President Thabo Mbeki, who eventually resigned. In the winter of 2010, power and fuel shortages in Kyrgyzstan sparked riots and the eventual ouster of President Kurmanbek Bakiyev. In 2011, violent protests over protracted outages shook once tranquil streets in Senegal, culminating in the electoral defeat of President Abdoulaye Wade. And in India, the state of the nation's power grid is a dominant theme in state and national-level elections.

Electricity is a common campaign issue because so many rely on it for their well-being and no one prefers fewer hours of electricity, less reliable supply, or higher rates. These valence-like qualities are characteristic of electoral discourse around many public goods. Their high value to citizens makes them easy to champion from the campaign podium, even when states lack the capacity to provide them uniformly or universally. As states are often the only providers of many public services, politicians serve as influential middlemen, securing funds for their delivery while also influencing how those funds are spent and directed. When it comes to electrical power, its provision requires both an initial investment in electrical infrastructure "stock" as well as an ongoing commitment to maintain the "flow" of electricity. As electricity is distributed through centralized power grids, politicians can influence access to power by manipulating the incidence and severity of power cuts and even withdraw its provision to maintain oversight over voters. These characteristics make electricity provision an especially attractive target for political manipulation in the developing world.

In the developing world, where limited budgets are a perpetual constraint, political actors must prioritize who, what, and where to focus on first. The key political reality is that public services must be delivered in a sequence of practical steps, and each step is shaped by opportunities for political influence. To borrow a phrase from Scott (1969), "Between the passage of legislation and its actual implementation lies an entirely different political arena" (1142). Within the gap between policy goals and policy implementation lie lucrative political externalities that are contested, exploited, and captured by political actors, driven not only by policy goals but also by their own political incentives. This drama of political arbitrage, in which the benefits of public goods schemes are

sundered, repackaged, and strategically disbursed to maximize political profits, results in patterns of provision that differ sharply around the world.

Implications

Given the political externalities associated with public goods provision, I argue that electoral competition will shape the incentives of governments regarding the level of public goods to provide, where to provide them, and when. This proposition results in three empirical implications that are tested in this book.

Hypothesis One: Electricity Is Provided More Broadly by Democratic Governments

Democratic leaders must court and win the support of large numbers of voters, resulting in an institutional incentive to invest heavily in services that deliver wide-ranging impacts to large groups of voters. Provision of public goods is an appealing policy option because they efficiently deliver benefits at a low per capita cost, they are valued by voters, and because they result in clearly visible manifestations of political effort.

To the nation, the promise of better schools, roads, and electricity is widely appealing. Such universalistic commitments are the core of many stump speeches and campaign platforms. Yet the process of implementing such broad policies yields wide opportunities for crafty politicians to target, favor, and manipulate resources. To local communities, the commitment of better education is transformed into promises of teaching jobs, the construction of school buildings, and the provision of supplies. Similarly, commitments to provide better electricity in the countryside become an exercise in selectively doling out contracts and prioritizing the electrification of favored villages. For democratic politicians, the presence of these valuable political externalities associated with public goods provision increase their value and salience. Because of the way competitive elections enhance the political value of public goods provision, electricity should be more broadly distributed and reach a greater proportion of citizens in democratic countries than in their nondemocratic counterparts.

Hypothesis Two: Democracies Will Deliver More Electricity to the Rural Periphery than Will Nondemocracies

While competitive elections make public goods especially important to democratic politicians, where should the benefits of these public goods be targeted? In democratic settings, the *political* benefits of public goods provision are often highest in areas where the *nonpolitical* justification for them is least obvious. Compared to cities, rural areas have fewer beneficiaries spread out over larger distances, have fewer profit-generating customers, and are physically more challenging and financially expensive to connect to services. Thus reaching out to the rural poor is difficult for cash-strapped governments to

justify on economic grounds. But in electoral democracies, the rural poor make up a large part of the citizenry and are difficult to ignore from a political perspective. Moreover, public goods are especially valued by the rural poor who can afford few alternatives. Thus, democratic leaders can win large numbers of votes among the rural poor through the promise and delivery of public goods. Meanwhile, autocrats have no electoral incentives to invest in their rural hinterlands, though they are clearly motivated by other concerns. Ultimately, the expectation is that repeated electoral competition should induce higher levels of electricity provision to the rural poor in democracies than in nondemocratic settings.

Hypothesis Three: Efforts to Target Electricity Will Be Heightened during Election Periods

If public goods provision generates political externalities of higher value to democratic leaders, then evidence of these efforts should be most evident in electorally critical periods. This is because voter attention to the efforts of their political leaders is naturally limited. At the same time, politicians are constrained in how meaningfully they can influence policy and outcomes, both because of their own finite political influence, as well as systemic constraints on capacity. In the context of limited political and fiscal capacity (Chhibber and Nooruddin 2004; Wibbels 2008), efforts to manage public goods provision are thus most valuable when they have the highest opportunity to influence voters. Thus targeting of electricity provision should be highest in election periods when voter attention is highest and where the political opportunity and capacity for change is highest.

To be clear, these propositions do not imply that democracy is necessarily *better* for the poor or that service provision is of *higher quality* in democratic settings. Indeed, newspapers and journals are filled with accounts of corruption, inefficiency, and dysfunction in many democratic settings. There is no doubt that the benefits of many public services and goods seem to pass over the poor, even in countries with elections. What this book seeks to contribute is theory and evidence that describe how public goods provision is shaped by political institutions in the real world. In so doing, it offers some help in explaining the paradox of why democracies face such strong incentives to deliver public goods and yet fail so regularly at improving the welfare of their citizens. Elections generate political incentives that privilege the *delivery* of public goods projects, more so than improving the *quality* of such projects. One reason is that improving quality is hard and expensive. For politicians, the impact of such investments is more difficult to observe at the polls. Increased spending on educational curricula is less compelling to local voters than construction of a new school building. Extensions of the electrical grid into dark villages are more dramatic than sober maintenance budgets that promise regular inspection and replacement of burned out streetlights. And thus election-minded politicians

prioritize the visible components of public goods projects over the less visible efforts required to maintain and improve the quality of services.

Empirical Approach

The study of distributional questions in public service provision has long been hampered by an absence of reliable subnational data. Collecting data on the welfare of citizens in poor countries is arduous, time consuming, and expensive, making it difficult to record data and collect the repeated measurements necessary to monitor temporal trends. Even data on important indicators such as gross domestic product are subject to quality concerns, such as the long-standing debate on estimating the true size of the Chinese economy (Maddison 1998; Holz 2006). An article in *The Economist* once quipped, "Africa's GDP data are notoriously bad … According to the latest version of the [Penn World Table], Equatorial Guinea grew by 4% a year over 1975–99. But the data in the 2002 version suggest an annual rate of –2.7%. So Equatorial Guinea may therefore have had the second-fastest growing economy in Africa. Or the slowest."[4]

Due to the lack of good data, we know "surprisingly little about what types of governments tend to improve the welfare of the poor" (Ross 2006, 871). Without reliable indicators that track the well-being of the poorest citizens, scholars tend to rely on indirect measures such as country-level averages or on survey samples that are often limited in size or frequency of observation. Thus scholars resort to asking whether democracy raises average income levels, lengthens life expectancy, increases calorie consumption, improves literacy, or reduces infant mortality. No doubt improvements on these indicators indicate some benefit to the poor, but the link leans heavily on assumption and extrapolation and not on direct data.

This book will not overcome all of these challenges. But by focusing closely on a single type of public good and studying it at multiple scales from the global level down to the local, it will show how a new empirical approach can illuminate the importance of political institutions in shaping access to public goods across the developing world. The data underlying this book do not rely on human agents or survey collectors. Rather, it exploits technologies of earth observation from space, which for decades have enabled monitoring of weather patterns, ice formations, fire onsets, and other terrestrial and atmospheric phenomena. In the 1970s, the US Air Force deployed a series of weather satellites to track cloud patterns at night, using visible and thermal band sensors to record the brightness and temperature of moonlit cloudtops during the evening hours. While it was not the original operational goal of the instrument, analysts realized that on clear nights, the pictures that came back

[4] "How Is Africa actually doing?" *The Economist*, March 12, 2010.