Donor conditionality and public procurement: Causal evidence from Kenyan electrification

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Abstract

Multilateral organizations often impose conditions on procurement and construction procedures when financing public goods provision by low- and middle-income country governments. What do these do in practice? While this question has been fiercely debated by aid-receiving governments, multilateral organizations, and academics, it is difficult to answer causally due to the endogeneity of project choice and the relatively small sample size of projects funded via multilateral financing. To provide causal micro-evidence on this topic, we leverage an unusual feature of Kenya's nationwide electrification program: the quasi-random allocation of multilateral funding sources across nearby villages, with African Development Bank funded sites following turnkey contracting and World Bank sites following segregated contracting procedures and strengthened inspections. We collect detailed on-the-ground engineering assessments of conductors and poles, minute-by-minute household-level outage and voltage data, and household surveys on connection quality and usage, and analyze a rich set of procurement contracts and inspection reports. We find that segregated contracting delayed construction completion at the average site by 9.6 months relative to turnkey contracting, but these procedures improved on-the-ground construction quality by 0.6 standard deviations, indicating a trade-off between the different approaches. To disentangle the roles of two key dimensions of donor conditionality—contracting versus audits—we implement a randomized audits scheme mimicking the latter, and find that this improves household connectivity and electricity usage. In this context, streamlining contracting procedures that generate delays—such as contract segregation—while strengthening those that improve quality with minimal cost—such as ex post inspections—could improve project outcomes. Given the current regime, the net impacts of short-term delays and long-term grid resilience could reasonably be argued to favor either segregated or turnkey contracting procedures, depending on time preferences and technical assumptions.

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1 Introduction

Between 2009 and 2019, multilateral agencies provided on average USD 32.9 billion per year in loans to low- and middle-income countries (LMICs), with a large share of this funding used to contract private sector companies to provide public goods.[1] Agencies often seek to improve accountability by conditioning such financing on the use of specific procedures when administering procurement auctions, evaluating and awarding contracts, and overseeing implementation. The nature of donor conditionality has changed substantially since its well-publicized use in the 1980s, but the question of its impacts continues to be widely debated by governments, multilateral agencies, and academics. Proponents argue it can improve policy and economic growth (Archibong, Coulibaly, and Okonjo-Iweala, 2021) and reduce corruption (World Bank 2016). Others question its effectiveness or criticize the scope for political interference.

Negative efficiency impacts of public procurement restrictions and contracting regulations have been documented outside multilateral context (Tadelis, 2012). In the context of donor conditionality however, this debate has suffered from a dearth of causal evidence (Easterly, 2019). The infrequent, endogenous, often politicized, and often bundled allocation of financing to countries and sectors complicates causal identification. In addition, much existing research focuses on the policy conditionality of the 1980s, whereas the primary form of conditionality today—applicable to billions of dollars of investments annually—is procedural conditionality, which aims to strengthen contracting procedures and enforce institutional processes. The specific conditions tend to vary across major funders, such as the two we focus on in this study—the World Bank (WB) and the African Development Bank (AfDB)—as well as among increasingly important Chinese lending agencies, which are seen as applying relatively little policy or procedural conditionality.

This paper exploits natural policy variation to generate some of the first causally identified evidence on the benefits and costs of procedural donor conditionality and its mechanisms. We do so in the context of the USD 600 million nationwide Last Mile Connectivity Project (LMCP), one of Kenya's largest public infrastructure construction projects, with work contracted out to dozens of private sector firms. The LMCP was launched in 2015 with the aim of connecting all Kenyan households to electricity by 2020. The Government of Kenya and Kenya Power (Kenya's electric utility) first jointly selected thousands of villages to be LMCP sites, where all unconnected households near an existing transformer—usually between 20 and 100—would be connected to the grid. The identification strategy leverages a useful program feature: LMCP sites were assigned to be funded either by the WB or the AfDB without obvious regard to factors that would impact the project outcomes this paper studies. Key program features—eligibility, pricing, and network specifications—were identical across all LMCP villages, as was Kenya Power's eventual ownership and operation of electricity networks.

Here we have a case where two multilateral organizations are funding sites within the same government program—often with different funders supporting literally neighboring villages— but

[1] Total loans minus principal and interest payments. Includes some country-year observations for which this is negative. Agencies include the World Bank, regional banks, and other multilateral and intergovernmental agencies.

with each funder imposing its own set of procedural conditions. For both funders, Kenya Power outsourced construction to private contractors selected through international competitive bidding in accordance with each funder's processes. However, WB processes and regulations applied to the USD 135 million disbursed for construction at the 4,200 sites funded by the WB, and AfDB processes and regulations applied to the USD 154 million disbursed for construction at the 5,320 sites funded by the AfDB.[2] The AfDB opted to use 'turn-key' contracting, with 10 contracts awarded in a single bidding round, whereas the WB opted for a more segregated contracting approach, awarding 29 contracts across three staggered bidding rounds.[3] In addition, the WB imposed more stringent pole certification requirements, and WB sites required an additional inspection before being handed off to Kenya Power for perpetual management. To disentangle the role of these two major components of conditionality—contracting and audits—we implement a randomized auditing intervention (with the support of partners at the WB, the AfDB, and Kenya Power) designed to mimic existing audit structures. A random subset of sites was randomized into the monitoring intervention: through in-person meetings, contractors were informed that key aspects of the completed construction at these sites would be measured and reported to the WB and AfDB.

A key contribution of the paper is the collection of detailed construction and power quality outcomes, building on a small but growing literature emphasizing the importance of detailed infrastructure measurement (see Olken (2007) for an early example of this approach). We manually track construction progress for 380 LMCP villages, and then collect three types of on-the-ground outcomes. First, we measure construction quality for key infrastructure such as transformers, poles, and wires. Second, we deploy state-of-the-art sensors to measure minute-by-minute household-level power outages and voltage quality. Third, we conduct socioeconomic surveys to understand household connection experiences and energy usage. We complement on-the-ground data collection with detailed analyses of LMCP procurement contracts, inspection reports, and infrastructure data. Finally, we conduct in-depth informational interviews with management-level staff to understand each funder's contracting, construction, and audit procedures.[4]

To identify the causal impacts of conditionality, we use the ad-hoc assignment of sites to funders, which the evidence indicates was largely arbitrary and we argue below can reasonably be thought of as quasi-random. Sites are spatially interspersed: 95% of WB sites in our sample are within 10km (6mi) of an AfDB site, and there are often different funders in literally neighboring villages within a constituency. The econometric analyses include constituency fixed effects to account for geographic or socioeconomic differences. We conduct a battery of baseline balance tests using geographic, satellite, and census data to quantify the extent of imbalance between WB and AfDB sites across a range of covariates: they appear balanced along many attributes, and any selection appears uncorrelated with the outcomes of interest.

[2] AfDB funded two tranches, Phases I and II: this paper focuses on Phase I, launched concurrently with the WB tranche.

[3] These numbers exclude metering and consulting contracts, which we discuss in more detail below.

[4] These included conversations with senior personnel at Kenya Power, the AfDB, the WB, and the Consultant charged with supervising construction. Appendix C provides an anonymized list of individuals.

The analysis generates several key findings. First, the staggered approach to contracting employed by the WB caused significant construction delays. On average, construction at WB-funded sites was completed 9.6 months later than construction at AfDB-funded sites. Six years after LMCP construction began, 17% fewer WB sites than AfDB sites had seen any construction, and there were fewer poles and customer connections per site at surveyed WB sites. Second, and in terms of potential benefits, the WB requirements improved on-the-ground construction quality of 0.6 standard deviations: 74% of WB sites had higher quality construction than the median AfDB site, which could have meaningful implications for pole longevity and long-term maintenance costs. The net benefit of improved longevity but delayed construction depend on time preferences: under even a modest range of assumptions, the net benefit could range anywhere from a USD 5.6mn net benefit at AfDB sites to a USD 2.8mn net benefit at WB sites. The estimates of WB conditionality on other outcomes such as household installation quality, cost, and energy usage are positive but modest in size and not generally statistically significant, and there are no differences in the electricity reliability and voltage quality experienced by households. Finally, the randomized audit treatment generated moderate improvements in household connectivity and energy usage at relatively low cost.

These results suggest that, at least in contexts with relatively strong domestic institutions such as Kenya (relative to many of its East African neighbors), enhancing ex post monitoring while streamlining ex ante contracting procedures could reduce delays while achieving similar improvements in quality. Under the existing regime, the features of different procedural conditions create nuanced differences in outcomes. In some contexts, this creates a trade-off between short-term expediency and long-term resilience. For policymakers or individuals with a higher discount rate or a shorter time horizon, or for projects with compounding benefits, expediency might increase net benefits. In other situations, or in situations where maintenance costs are expected to rise more quickly with poor quality, a delayed start might be worth the improved long-term outcomes. In democracies with short-term electoral incentives, this framework can also explain political preferences for donors with higher expediency. This sheds light on the rapid growth of more rapidly dispersed Chinese aid, which has been the subject of concerns about poor quality resulting from limited oversight (Dreher et al., 2021; Mihalyi et al., 2022; The Economist, 2017; The Africa Report, 2022). That said, these results have noteworthy limitations: conditionality may generate additional positive benefits in ways that we were unable to measure, for example by strengthening institutional capacity in the Kenyan public sector. Finally, in settings where funders have repeat contracts with contracting firms, even when these span industries or countries, enhanced ex post audits can improve construction quality at relatively low cost and with less delay.

This paper contributes to a longstanding debate about the effectiveness of donor conditionality, whose nature has changed significantly since the 1980s. As domestic institutions in LMICs improved—arguably in part as a result of policy conditionality—by the late 1990s policy conditionality was often regarded as excessively heavy-handed. The changes in conditionality were in part due to changes in leaedership at international financial institutions. James Wolfensohn, as President of the WB from 1995-2005, relaxed policy conditionality related to major structural adjustment re-

forms (such as privatization of state assets), focusing instead on the goal of poverty reduction and streamlining WB and International Monetary Fund (IMF) procedures. Starting in 2005, his successor Paul Wolfowitz emphasized the anti-corruption goals of conditionality, which continue to drive much of the procedural conditionality that remains important in WB projects today, including in our study setting. Research on procedural conditionality suggests it can cause politically-motivated delays and incur costs that exceed the bene ts (Kersting and Kilby, 2016; Kilby, 2013). Concerns around political interference, which have also been raised for decades, remain relevant: Andersen, Johannesen, and Rijkers (2022) nd that signi cant portions roughly 5 to 10% on average of WB nancing are transferred to o shore nancial havens (and probably to some politicians' private bank accounts) in the months after a tranche transfer. In evaluating on-the-ground construction of WB projects we relate to Moscona (2020) and Marx (2018).

The debate about the impacts of donor conditionality date back to the `Washington Consensus' in the late 1980s (Rodrik, 2006; J. Williamson, 2009). Studying the more policy-focused conditionality of the 1980s, Mosley (1986), argued that the WB made it clear that penalties would attach to any failure by the Kenyan Government to comply with the conditions and that conditionality has genuine cost for the recipient. Easterly (2002) argues that misaligned incentives have caused much WB conditionality to be ine ective in increasing economic growth. Importantly, African scholars have had a range of di erent perspectives in this debate. In her provocatively titled book Dead Aid, Moyo (2009) argues how aid conditionality can distort markets and be abused for political gain. Archibong, Coulibaly, and Okonjo-Iweala (2021) acknowledge that market-oriented reforms based on Washington Consensus may have lead to short-term frictions, but argue that conditionality may have boosted long-term economic growth by strengthening institutions.

The rise of Chinese lending to LMICs after roughly 2000 has also shifted the debate. The Chinese government states its approach is one of non-interference in local policy-making and politics (State Council, 2011). A lending model with reduced oversight can enable expediency, which can be preferred by politicians operating under relatively short time horizons. On the other hand, this reduced oversight has generated concerns about quality and resilience of construction (Dreher et al., 2021; The Economist, 2017). There is recent evidence that Chinese aid projects increase reports of local corruption substantially in African settings (Isaksson and Kotsadam, 2018; Malik et al., 2021; Ping, Wang, and Chang, 2022), perhaps in part due to the laxity of contracting conditions or auditing, or high levels of project leakage.

In evaluating private sector procurement regulations set by public agencies, we build on an extensive literature studying government contracting and public contract administration (Hart, Shleifer, and Vishny, 1997; Levin and Tadelis, 2010; Tadelis, 2012; O. Williamson, 1999), including a small but growing literature in the context of energy and electricity infrastructure in LMICs (Ryan, 2020, 2021). Independent monitoring has furthermore been shown to improve state performance in LMICs (Du o et al., 2018; Ferraz and Finan, 2008; Finan, Olken, and Pande, 2017; Olken, 2007).

Finally, studying accountability in the context of rural electri cation per se is important because mass government electri cation programs in poor countries are widespread and ongoing.

Poor construction quality can harm reliability and voltage quality and undermine these programs' socioeconomic objectives. Blimpo and Cosgrove-Davies (2019) find that in some countries in Sub-Saharan Africa, most connected households reported receiving electricity less than 50 percent of the time in 2014, and that this may undermine the economic growth that household connections were designed to generate. These outages could be due to generation capacity constraints, local network quality, or the electric utility's operational constraints. In rural Kenya, Lee, Miguel, and Wolfram (2020), find that transformer outages frequently last for more than four months, and may therefore contribute to the low uptake and impacts of household electricity. This may explain why Lee, Miguel, and Wolfram (2020) and Kassem, Zane, and Uzor (2022) find limited impacts in rural Kenya. In India, Burlig and Preonas (2021) find that improved electricity reliability increases the impacts of rural electrification in larger villages. To the extent that low quality infrastructure exacerbates poor power quality and slows economic growth, identifying opportunities to improve construction quality may lead to meaningful improvements in economic outcomes.

2 Kenya's Last Mile Connectivity Project

In February 2014, Kenya's Ministry of Energy and Petroleum (MoE) published the Draft National Energy Policy, establishing a list of policies and strategies to "increase rural electrification connectivity to at least 40% by 2016 and 100% by 2020" and to "seek funding from development partners for specific programmes especially...in rural electrification projects." (MoE 2014). In May 2015, Kenya's President Uhuru Kenyatta announced the launch of the LMCP, with a goal of connecting one million new customers to electricity each year (Kenya Presidency, 2015). The program would primarily target households living near existing transformers, who could be connected to the existing local electricity network at relatively low cost. In a press conference two weeks after President Kenyatta's announcement, Kenya Power's then- Managing Director Ben Chumo added that the program was designed to facilitate the government's objective of providing 70% households with electricity by 2017 and universal access by 2020 (Kenya Power, 2015b).[5] While not quite reaching these ambitious targets, the program has generally been effective: nationwide household electricity access was reported to have increased from 25% in 2009 to approximately 70% in 2019 (KNBS 2009, 2019).

The LMCP's cost, totalling over USD 600 million, was financed through loans and guarantees from the AfDB and the WB, the European Investment Bank, and the Agence Française de Développement; a grant from the European Union; and funding from the Government of Kenya (GoK) (Kenya Power, 2016a). In Kenya Power's 2014-2015 annual report, they note that "The KShs 4 Billion receivable from the GoK is part of a larger commitment by the GoK, to be financed partly through support from the World Bank and the African Development Bank to enhance universal access to electricity." This paper focuses on transformer sites funded by the WB and by Phase I of the AfDB, which we refer to jointly as Phase I of the LMCP.

[5] This target date was later extended to 2022.

While the LMCP was nanced through various channels, it was a single nationwide project implemented by Kenya Power under a single set of implementation speci cations. As of 2019, there were around 60,000 transformers across Kenya, which convert high- and medium voltage power lines (33kV or 11kV respectively) down to low voltage lines (usually 0.415kV) that can be connected to households. Many rural transformers had been constructed between 2005 and 2013 as part of a nationwide push by Kenya's then- Rural Electri cation Authority (REA) [6] to connect all public facilities such as markets, schools, health centers, and water points to electricity (REA 2008, Berkouwer, Lee, and Walker, 2018). Kenya Power and the GoK jointly selected which transformers would be included in the LMCP, targeting an equitable distribution of LMCP sites across Kenya's 47 counties.

The LMCP's objective was to connect all unconnected households located within 600 meters of the existing transformers selected for the program usually between 20 and 100 households by extending the low voltage network, a process referred to as `maximization.'[7] Kenya Power developed a uniform set of LMCP procedures that were implemented homogeneously across all LMCP transformers. Eligible households bene t from a reduced electricity connection price, from USD 350 down to USD 150, and from the ability to pay in monthly instalments rather than upfront. The program was also touted as reducing the red tape frequently associated with new electricity connections: the long and laborious process of applying for electricity, which can take months and often requires signi cant paperwork, would be replaced by a system where Kenya Power contractors proactively visit households to initiate the connection process, with minimal e ort for households.

The process of determining exactly how many and which transformers in each constituency would be maximized involved extensive back-and-forth written communications between Kenya Power and each constituency's Member of Parliament (MP) that factored in cost and human development considerations. This process yielded a single nationwide list of approximately 8,520 LMCP transformers for Phase I of the LMCP, with AfDB Phase I nancing the maximization of 5,320 transformers and the WB nancing the maximization of an additional 3,200 transformers (Kenya Power, 2016a, 2017).[8] LMCP transformers were assigned to be funded by either the WB or the AfDB in a seemingly arbitrary and ad hoc manner. Section 3 discusses this process in more detail.

2.1 Corruption concerns

There is widespread concern that political interference and corruption within Kenya Power could jeopardize the quality, cost-e ciency, timeliness, and equity of the construction process (ESI Africa, 2020; Kenya Power, 2018b, 2020; Lee, Miguel, and Wolfram, 2020; The Star, 2018; Wolfram et al., 2022). In 2019, for example, bidding collusion led to the supply of substandard wooden poles

[6] Since renamed Rural Electri cation and Renewable Energy Corporation (REREC).

[7] Households could choose not to get connected, but in practice this was rare. Statistics are not available nationwide, but Lee, Miguel, and Wolfram (2020) found that at most four percent of participants in a rural sample in western Kenya randomly selected to receive a free electricity connection chose not to receive one.

[8] The WB provided additional funding to install 1,000 new transformers. For comparability those projects are excluded from this paper's analyses.

for [USD 8 million] (The Nation, 2021). Kenya Power's CEO Ken Tarus and his immediate predecessor Ben Chumo were arrested in July 2018 (Reuters, 2018) and alongside several other senior Kenya Power o cials faced various charges relating to corrupt procurement practices that resulted in signi cant losses of public funds. As of mid-2022, the case is ongoing (The Nation, 2022). Tarus furthermore faced additional charges relating to failure to comply with the law relating to management of public funds (Business Daily, 2018).

These types of events are not unique to Kenya, and not unique to the electricity sector. The WB de nes corruption as the abuse of public funds and/or o ce for private or political gain (WB 2015). The WB's extensive regulations designed to curtail these abuses detailing the procurement, nancial management, and disbursal of funds apply well beyond Kenya and across a range of industries:

> Borrowers using the Regulations spend billions each year procuring works, services, or goods from third-party suppliers, contractors and consultants. Procurements under these Regulations happen in over 170 countries across the globe [and] range from highly complex infrastructure, cutting edge consultancy, major pieces of plant/equipment, and high tech information technology.
>
> World Bank Procurement Regulations for Borrowers (2020)

Over the past 20 years international donors have increased their e orts to combat corruption at all levels while also moderating the complexity of complying with these regulations. These e orts have generated progress in streamlining and harmonizing procurement policies for donor- nanced projects in recent years (WB 2014). The result is that WB and AfDB regulations have signi cant overlap that lower the costs of complying with both simultaneously.

One policy lever at the disposal of the WB and AfDB is the `debarment' of a private contractor with egregious performance. This has happened several times to LMCP contractors (Kenya Power, 2018b; Spotlight East Africa, 2020), which we discuss in more detail in Subsection 2.3. Being debarred in this manner generally applies globally: under-performance in a sector in one country under a contract with one donor can lead to disquali cation from contracts in other countries by other donors in di erent sectors. Independent monitoring in a sector that frequently provides large contracts across multiple countries can therefore be a meaningful economic threat for contractors.

2.2 Procedural conditions

The implementation of the LMCP was segregated into contracts that domestic and international private sector contractors could bid on. The WB nanced USD 135 million in contracts and the AfDB nanced USD 154 million in contracts, through procedures that were similar in some respects. Each contract speci ed a portion of the construction process for all sites assigned to a speci c funder, usually for a speci c geographic cluster of Kenya's 47 counties, each consisting of several hundred transformers that were to be maximized. Both funders nanced contracts with external consultants

who were to oversee project implementation and manage the relationships with the remaining private contractors. Each funder also nanced independent contracts for the procurement of meters with the same company, to facilitate integration with Kenya Power's operational systems[9].

Still, di erences in procurement guidelines, and in the ways donors interpret them, were meaningful. Compared to other development banks, WB policies have been described as more prescriptive, with some concerns that this in exibility of such policies may make them more time-consuming without necessarily limiting fraud and improving outcomes (AfDB 2014, WB 2014). This is re ected in the fact that the WB opted to use a segregated contracting approach while the AfDB imposed a more hands-o contracting approach that the AfDB and the WB both refer to as `turn-key', which provides for full design, supply, erection and commissioning of the works by a single contractor at a xed lump sum price (AfDB 2018). The WB decision to use segregated contracts for the LMCP was made subjectively after internal discussions. The WB Procurement Regulations for Borrowers (2020) states that the selection of contract types and arrangements takes into account the nature, risk, and complexity of the procurement, and VfM considerations . The AfDB Operations Procurement Manual (2018) similarly states that, In complex cases, a `turnkey' or `design-and-build' approach may be more appropriate. Neither funder speci es a strict rule on how this decision is to be taken.

The 10 AfDB turn-key contracts corresponded to 10 geographical clusters of counties. Whichever contractor won a particular contract would be responsible for the entire construction process associated with the maximization of all transformers located in that contract's counties. This process included identifying all eligible unconnected households at each transformer site, developing engineering designs for an e cient extension of the low-voltage network to reach those households, procuring the materials required to complete those designs, and implementing construction using these materials. Each contractor therefore had full ownership over the entire construction process in a speci c set of sites, allowing them to potentially leverage any associated synergies. Together with a single metering contract and a single consulting contract, Kenya Power awarded in total 12 LMCP contracts under the AfDB component.

Rather than providing turn-key contracts, the WB segregated contracts across construction phases. Eight contracts were rst issued for contractors to complete designs for sets of sites, detailing the proposed local low-voltage networks and also specifying the materials required to complete the designed construction. Once the design contracts had been awarded and completed, a series of procurement contracts were issued to procure the relevant materials. The procurement of materials was separated into 15 separate contracts: six contracts for the supply of wooden poles, three for concrete poles, three for conductors, and three for cables. The WB then issued 6 contracts for the construction of the proposed designs using the procured materials, with each contract containing a geographically clustered set of sites. The WB component also included two metering contracts (one for the meters themselves and one for metering accessories such as boxes and circuit breakers) as

[9] The WB signed two contracts one for the meters themselves and one for meter accessories but they were with the same company and signed on the same day and thus constituted a single relationship.

well as four consulting contracts (one for inspections, one for procurement, and two for supervision). Kenya Power awarded a total of 35 contracts under the WB component.[10]

There are a number of ways in which the WB contracting structure for the LMCP creates additional work for the local implementing agency, in this case Kenya Power, relative to the AfDB structure. First, a larger absolute number of contracts to be signed will require more dedicated time by Kenya Power sta : when factoring in bid writing, bid elicitation, bid review, and actual contracting, the contracting process for any single stage can take months, and Kenya Power sta time availability was equal across the WB and AfDB components. Second, the staggered nature meant that the request for proposals for procurement contracts could not be published until the engineering designs are nalized, as this determines the procurement requirements, and construction cannot commence until the procurement contracts and activities are nalized. Third, while the 10 turn-key contracts were all identical in nature, the segregated design, procurement, and construction contracts all contained di erent language: these were thus more complicated for an individual Kenya Power manager to oversee.[11] Finally, these delays compound: a lag between the design phase and the construction phase means that the designs may be out of date by the time construction begins, requiring costly adjustments to the as-built designs or a change in the required materials. Similarly, a lag between procurement of materials and installation means that storage arrangements must be adjusted.

Importantly, these two separate contracting styles turn-key versus segregated contracting did not fundamentally a ect the detailed set of technical project requirements, which were streamlined signi cantly in the past decade (WB 2014). Kenya Power is expected to strictly comply with the procedures set forth in each donor's international guidelines (see Subsection 2.5 for more detail).

Figure 1 compares the construction timeline for each lending institution. Initial funding approvals from the AfDB and WB were nalized at a similar time the AfDB in November 2014, and the WB in March 2015. Project appraisal reports released in October 2014 for the AfDB and March 2015 for the WB indicate that contracts for both sets of activities were planned to be signed by early 2016 (The African Development Bank, 2014b; The World Bank Group, 2015). In December 2015, Kenya Power and the AfDB signed all 12 contracts needed to launch the LMCP (Kenya Power, 2015a). The WB initially followed a similar timeline, with design contracts signed by March 2016, however the contracting process proceeded more slowly after this. Materials contracts were signed starting in February 2017. In November 2017, the WB signed the nal six contracts required to commence construction, a substantial delay relative to the project timeline at the time of approval (Kenya Power, 2017). Incidentally, right around the same time in November 2017 the AfDB also

[10] A 16th procurement contract was signed for the procurement of transformers which were installed in a small number of villages, for a total of 36 contracts, but we exclude these from our analysis since the `maximization' of existing transformers was the component that was most consistent across WB and AfDB and applied at most WB locations.

[11] Kenya Power employed one sta member to manage the WB contracting procedures and one sta member to manage the AfDB contracting procedures. The employees who held these positions were all certi ed electrical engineers with at least a bachelor's degree in electrical engineering. An anonymized list of individuals that our research team interviewed for the purposes of this research is included in Appendix C.

Figure 1: Dates of contract signing, construction, and research activities by multilateral

Timeline of the experimental components and the contracting process for the WB's 35 contracts and the AfDB's 12 contracts. Discussions with both parties started after the release of the Draft National Energy Policy in 2014. Each funder had independent contracts for meters and consulting. The AfDB used turn-key contracting, allowing construction to begin as soon as the remaining 10 contracts had been signed. The WB separated the remaining 29 contracts into three distinct tasks design; the procurement of concrete poles, wooden poles, conductors, cables; and construction causing signi cant delays in when construction could begin. AfDB sites that had been completed prior to the implementation of the monitoring treatment in late 2017 were excluded from randomization. Surveys were conducted after construction completion.

signed 15 additional turn-key contracts to begin maximization of an additional 5,200 sites as part of its Phase II.

2.3 Contractors

The contractors that bid on LMCP contracts are generally medium-to-large construction rms with an international track record of completed projects. Contractors that won the AfDB- and WB-funded LMCP contracts were a mix of Kenyan rms and international rms, with some joint ventures comprised of two or more rms. For both AfDB and WB, contractors were chosen via a competitive bidding process. In addition selection on the basis of bid amounts, bidders must satisfy certain requirements related to nancial capacity, prior experience including with similarly sized jobs, and any record of sanctioning and litigation. The 12 AfDB contracts were awarded to 10 unique contractors, with two contractors winning two turn-key contracts each. The 35 WB contracts were awarded to 31 unique contractors with four contractors winning two contracts each.[12] All three contracts for meters and metering accessories were awarded to Shenzhen Clou Electronics Co. (China) for the purposes of harmonization with Kenya Power's management and billing systems. Other than Shenzhen, there was no overlap between AfDB and WB contractors.

[12] One contractor was awarded both meters contracts, one was awarded two cables contracts, one was awarded two wooden poles contracts, and one was awarded two construction contracts.

The winners of the 12 AfDB contracts had been selected from among a combined 110 bidders. Six of the 10 materials and works contracts winners were Kenyan while four were foreign (Capital Business 2015). The set of contractors awarded WB contracts also included a mix of Kenyan and International rms, with Kenyan rms primarily awarded bids for the supply of wooden and concrete poles.

There is no blanket provision preventing rms from submitting or being awarded bids with both donors simultaneously. Indeed, many of the AfDB contractors named above have in the past bid on and in many cases been awarded WB contracts. International procurement and construction bidding can be thought of as a repeated game among a small set of actors, and poor contract performance can have serious rami cations on long-term performance. As an example, in October 2018 the WB Sanctions Board imposed a sanction of debarment on the Indian company Angelique International for fraudulent practices as de ned in Paragraph 1.16(a)(ii) of the January 2011 Procurement Guidelines. (WB 2017; WB 2011). The WB appears to have stricter standards, leading to a higher frequency of sanctions against private contractors. We do not see this as a concern around selection bias from an identi cation perspective, but rather we view this as a mechanism through which conditionality may operate. We exploit the threat of debarment in our randomized audits treatment, discussed in Subsection 3.2.

2.4 Subcontractors

Many of the 40 companies that were awarded at least one LMCP contract hired subcontractors for components of the work they had been contracted for. For example, since AfDB contractors were responsible for the design, procurement, and construction of sites, it was standard for these contractors to subcontract some of these components out to smaller, often Kenyan, rms. Given the specialty nature of electricity networks, these smaller rms often already had well-established supplier relations with Kenya Power even prior to the start of the LMCP. As an example, public minutes from a pre-bid meeting for wooden pole procurement organized by Kenya Power in 2014 indicate that eight of the wooden pole supply companies that won WB contracts or AfDB sub-contracts for the LMCP in 2016-2017 were already engaging with Kenya Power as early as 2014, well before the launch of the LMCP (Kenya Power, 2016b), and in many cases well before that (Business Daily, 2007).

Evaluating these pole suppliers reveals that there was signi cant overlap between winners of WB procurement contracts and subcontractors from which AfDB turnkey contractors procured materials. All three contractors that were awarded contracts for the procurement of concrete poles under WB contracts were also approved by Kenya Power to act as subcontractors to AfDB turnkey contractors.[13] Similarly, one of the WB contractors awarded a contract for the procurement of wooden poles was also approved by Kenya Power to act as a subcontractor for at least one AfDB

[13] As donors provide relatively little oversight into subcontracting (The African Development Bank, 2014a) we are unable to con rm how many poles were actually procured from these contractors, however the fact that they were explicitly listed in AfDB turnkey contracts suggests there is likely to have been signi cant overlap.

turnkey contractor. This degree of overlap suggests that while there were signi cant di erences in the contracting structure, in many cases the manufacturing of concrete and wooden poles for AfDB- and WB-funded sites happened at the same facilities.

2.5 Quality assurance and oversight

The tender documentation for both the WB and the AfDB contained detailed speci cations for the materials and installation procedures of poles, wiring, conductors, fuses, and meters. The quality assurance and oversight procedures can be broadly split into four mechanisms. Across all four mechanisms, the similarities generally outweigh the di erences between the two donors. This harmonization facilitated lower cost compliance by Kenya Power sta responsible for implementation, however there remain important di erences, as we discuss below.

First, when implementing the above-described contracting process, each donor had to provide a no objection approval at critical stages. The donors required these recurring reviews of the documentation and Kenya Power's proposed plans to ensure that they were in compliance with the detailed technical guidelines and requirements set forth by each funder. That said, anecdotally, the WB's no objection process was on average more involved, consisting of more steps, than that of the AfDB.

Second, each donor required a similar set of materials inspections processes. A team representing Kenya Power (including members from Kenya Power's LMCP management team, supply chain department, and operations & management department) would visit the factories of private contractors located in India, China, Kenya, or elsewhere prior to procurement to inspect the materials.[14] Both funders required detailed mechanical and chemical inspections of 10 poles out of each batch of 500 poles. The WB furthermore required every single pole that passed inspection be marked physically such that these can be easily veri ed upon arrival at Kenya Power storage facilities.

Third, each donor required the contracting of a `consultant', led by a project manager who was responsible for project coordination, monitoring, and supervision for all contractors. Their oversight structures were similar: the WB's project manager managed 22 cluster and site supervisors across six o ces nationwide, while the AfDB's project manager managed 19 cluster and site supervisors across four o ces nationwide. The consultants' primary activities during the construction process included conducting site-level spot checks, collecting monthly progress reports from contractors, and hosting (at least) monthly meetings with Kenya Power and each respective contractor. Once construction at a particular site was complete, the consultant, the contractor, and Kenya Power would do a joint inspection and sign a Joint Measurement Certi cate (JMC) to certify that a contractor completed construction at a site and that the site can be handed over to Kenya Power for activation.

The inspection procedures set by AfDB and WB consultants contained one notable di erence. Prior to the joint inspection that would produce the JMC, the WB consultant often did an on-site

[14] A number of factory assessments between 2020-2022 had to be conducted via Zoom for public health reasons.

inspection together with the contractor (but without a Kenya Power representative) to produce an Inspection Report (IR). The IR would list any construction errors or oversights identified in the materials or installation. Comments from the IRs include, for example, pole caps are poorly installed and the strut pole bolt is not secured with nut and washers. Many comments were accompanied by photographs of the issues in question. One of the goals of the IR was to provide the contractor with an opportunity to fix the error before the JMC inspection visit. The goal was to conduct an IR in advance of the JMC at every site, and it appears that this was largely adhered to, however in some cases (particularly in remote areas, where travel is costly) the JMC and the IR were conducted concurrently. Since the IR was not required at AfDB sites, it was common for a JMC to be issued even when no new meters had been installed yet.

Fourth, each funder engaged in direct monitoring. Kenya Power would combine and summarize the contractors' monthly summary progress reports and share these with funders. At least twice per year, each funder conducted a week-long `supervision mission' consisting of meetings with senior Kenya Power and Ministry of Energy officials in Nairobi as well as 1-2 days of site visits in nearby regions. The information collected in each mission was recorded in a Supervision Mission Report, which was generally similar between the two donors.

2.6 Household involvement

A correctly installed electricity connection with a functioning meter is of little benefit to a household without power sockets or light switches. The final household connection is thus crucial. During LMCP, households were responsible for installing or hiring a local handyman to install internal wiring, defined as anything between the meter and the appliances a household consumes. The field surveys indicate that households who were connected prior to the LMCP spent on average USD 125 on internal wiring.

For most households, the internal wiring posed a significant financial and logistical barrier, on top of Kenya Power's connection fees. To address this issue, Kenya Power decided to provide low-income households who could not afford internal wiring with a `ready board': an electrical panel that would satisfy the wiring requirements of a connection. In a May 2015 address, President Kenyatta described this policy as follows: The Ministry of Energy has also come up with designs that will enable households that do not have internal wiring in their houses to use electricity by providing a `ready board'... [it] has switches, sockets and bulb holders and those who do not have wiring in their houses will be able to use electricity as soon as they are connected (Kenya Presidency, 2015).

Beneficiaries under the LMCP are connected via `pre-paid' meters, meaning they must buy electricity credits in advance of using electricity. Once they consume their prepaid electricity, they lose access to electricity, and only regain access only after they buy more credits. Households usually prevent this by purchasing additional credits before their credits run out.

To recover the USD 150 connection fee, Kenya Power initially enrolled households into a payment plan consisting of 36 monthly installments of around USD 4 per month. The charge was automatically added to households' accounts on a monthly basis, and any electricity payments the

household made were directed towards paying o this debt prior to being directed towards electricity credits. However, this generated a signi cant barrier for households: as an example, if a household runs out of electricity credit in January, and then does not consume any electricity in February or March, they would have to pay at least USD 16.01 4 months worth of connection fees to be able to consume any electricity in April. The contribution was thus later capped at 50% of any topup amount (Kassem, Zane, and Uzor, 2022).

This barrier was not only a signi cant nancial hurdle, but one that was unanticipated and poorly understood. According to Kenya Power, households should have been informed of the payment structure as part of the consent process, which was the very rst step in the construction process, but it is unclear whether this consent process was regularly implemented in practice. To verify whether this process was correctly implemented, and to test whether donor conditionality and monitoring can improve adherence to these guidelines, the household survey (described in Subsection 4.2) measures respondent understanding of the aggregate costs of an electricity connection under the LMCP. 58% of households do not recall ever having been told that they would have to pay Kenya Power for the connection; 44% thought they would not have to pay.

The LMCP's objective was to connect all unconnected households to electricity, however, in practice connectivity was not universal. At the average site at least 7% of compounds were not connected to the grid, and at the 90th percentile site at least 25% of households were not connected.[15] The most common reason (given by 31% of respondents) is that they were not present or available during the days on which construction or sign-up were administered. Second, even though the LMCP program speci cations indicate there were to be no upfront connection fees, 23% of respondents still report having been unable to pay, often because they were not able to a ord the internal wiring required by Kenya Power to be connected: 16% of unconnected households report this to be the reason. This suggests that despite e orts to provide free readyboards to low-income households, the cost of household wiring remained a barrier that prevented some households from getting connected.

Households also report numerous instances of bribery. In our household survey data, 8% of households connected under LMCP had been explicitly asked for money by the contractor, with amounts generally ranging from USD 5 to USD 50. Tragically, a small number of households report having paid an individual claiming to be a contractor, only to never hear from them again. 5% of unconnected households report not wanting a connection, for example because they are simply not interested in having electricity or because they think electricity is unsafe (this is similar to the rate reported in Lee, Miguel, and Wolfram (2020)).

3 Research Design

To estimate the causal impact of conditionality on construction outcomes we exploit the quasi-random assignment of construction sites to two di erent international donors that implemented

[15] Enumerators only counted unconnected compounds that were within connection distance of the existing electricity network, so this may be an underestimate. Subsection 4.1 provides more details on surveying methodology.