

Web Appendix for Community Effects of Electrification:  
Evidence from Burkina Faso's grid extension

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## A Web Data Appendix

### A.1 Electrification

**Electrified Localities 1954-2017.** We built a database of electrified localities and their respective years of electrification from various government reports. Our main source was the *Annuaire Statistique 2017* (INSD, 2018). We found a few errors and discrepancies that we rectified. For example, for the year 2013 the reported total number and itemized localities differed (N=51 vs N=31). For the year 2015, INSD (2018) reported only 16 electrified localities, whereas the 2016 statistical yearbook of the *Ministère de l’Energie* reported 125 ones. For those years, we used *Ministère de l’Energie* (2017) as ultimate source. This yielded a list of 660 localities that were connected to the electricity grid between 1954 and 2017.

We then retrieved the geographic coordinates of those localities using i) GEONet data of populated places in Burkina Faso (NGA, 2017), ii) an online map of places and (planned) electrification points as of 2006 (*Ministère des Mines, des Carrières et de l’Energie*, 2020) and iii) the 2019 georeferenced locality census. We matched observations by place name. Identifying African places is challenging. Alternative spellings are common; several localities had the same name. We therefore added information on the region, province, and commune on a subset of electrified localities that we obtained from *Ministère de l’Energie* (2017) and SONABEL (2018). Remaining ambiguities were resolved by mapping localities onto a map of the Burkina Faso electricity grid as of March 2018 prepared by the state energy provider SONABEL and published in UCF (2018). 20 localities would not match any place in our place name databases and electrification maps. In a final step, we improved precision of the coordinates by assigning the point location of electrified locality to the pixel with maximum population as indicated by 2015 Population Settlement Layer with 120m x 120m resolution (Facebook and CIESIN, 2019). Overall, we work with a dataset of 640 georeferenced localities.

**Distribution Network.** The 33kV power lines are the main distribution network. We digitized

the 33kV transmission lines in 2007 from Ministère des Mines, des Carrières et de l'Énergie (2008), the one in 2014 from Moner-Girona et al. (2016, Figure 5) and the one in 2016 from UCF (2018).

**Electrification Strategy.** MEPRED (2008) developed the methodology for the national electrification strategy. The same document listed the localities that were considered *development poles*. These are localities with good access to public goods and high growth potential as indicated by the development potential index (Web Appx. Table B.1) and a large population in the catchment area. In addition, for the complete set of Burkina Faso's localities the document lists the proposed connection methods: A - 33kV line, B - isolated and C - clustered diesel generators, D - Single-wire earth return (SWER) lines, and E - pre-electrification (i.e. not be connected to the grid). For A and D, the year of connection was proposed as well. Using the Geo-MST plugin in QGIS, we computed the *minimum spanning tree* (MST) that would connect all 312 development poles at minimum total network length. We then calculated for each electrified locality the distance to the MST (in km).

## A.2 Other Data at the Locality Level

**Administrative units.** We extracted region, province and commune of the electrified locality using a commune boundary shapefile for Burkina Faso as of January 2007 from OCHA (2020).

**Night-lights.** We use cloud free satellite imagery of stable night-light from i) the Defense Meteorological Satellite Program (DMSP) and ii) the Visible Infrared Imaging Radiometer Suite (VIIRS). Wu et al. (2013) explained that differences in atmospheric absorption, solar altitude angle, terrain illumination, and sensor calibration cause large differences between data from the same year obtained by different DMSP satellites. We want to minimize measurement error as much as possible. We therefore refrained from averaging night-lights across satellites of and rely on imagery of one satellite per year. In particular, we use satellites F10, F12, F14, F15, F16, and F18 for the years 1992-93, 1994-96, 1997-99, 2000-03, 2004-09 and 2010-13 respectively. DMSP measures luminosity in digital numbers (DN), for the years 1992-2013, ranging between 0 and 63 (capped), available at 30 arc-second grid resolution (ca. 1x1 km). VIIRS measures luminosity

in radiance in nano Watts per square centimeter per steradian, for the years 2012-2018, at 15 arc-second grid resolution.

We create two measures of luminosity based on the highest pixel value lit within the locality's polygon derived from Facebook and CIESIN (2019). First, we create a measure of extensive margin, a dummy variable indicating whether the locality was visible from outer space at all. Second, we create a measure of intensive margin. We only use ever lit localities. We merge the DMSP and VIIRS series based on their correlation in 2012 and 2013 predicting radiance from DN. In addition, we calculated mean pixel values i) within the locality's polygon and ii) within 2 km and 5 km around the locality's brightest pixel. Buffer-based estimates may be less precise as they can overlap with neighboring localities, potentially misattributing light that originated from somewhere else, similar to overglowing (Web Appx Figure B.3).

**Population.** We have population counts for the years 1996, 2006, 2015 and 2019. The 2006 data comes from MEPRED (2008) and is based on the census. It is available for all localities. We accessed the 2019 census data through the Ministère de l'Eau et de l'Assainissement (2020b). The source listed geographic coordinates at the quarter (Admin 5) level only for "rural" areas; we added latitude and longitude for the "urban" localities from NGA (2017). For 2015, we used the Burkina Faso - High Resolution Settlement Layer from Facebook and CIESIN (2019). The layer provides population estimates at a 1 arc-second resolution (approximately 30m). It is based on satellite images and building recognition, to which then population derived from sub-national census data was proportionally allocated. We followed a procedure similar to Baruah et al. (2020) and AFRICAPOLIS (2022). First, we removed single hamlets from the layer. Second, we defined the boundary of a locality as the continuous built-up area within 100 meters. Hence, we constructed a buffer of 100 meters and joined all overlapping polygons. Finally, we calculated the total population within those polygons for each electrified locality.

**Roads.** From the 2007 Michelin Map 741 *Africa North & West* we digitized the network of asphalt roads. We then computed for each locality the distance to the nearest asphalt road (in

km).

**Education.** We obtained panel census data on primary schools for the years 2003/04-2012/13 (Ministère de de l'Éducation Nationale et de l'Alphabétisation, 2019). The dataset includes information on school type (public/private/denominational), enrollment numbers, and whether the school had electricity. It also reports the availability of sanitation facilities (latrines) and teaching materials including geographical wall maps ("cartes murales géographiques"), metric compendiums ("compendiums métriques"), scientific compendiums ("compendiums scientifiques"), dictionaries / DVA ("dictionnaires / DVA"), terrestrial globes ("globes terrestres"), educational kits ("maquettes pédagogiques"), scientific charts ("planches scientifiques"), and curricula ("programmes"). Since geographic coordinates are not reported, we matched schools to localities based on region, province, commune, and place names. For each locality and year, we computed total enrollments, the number of public schools, electrified schools, latrines, and teaching materials.

**Irrigation.** We digitized the location of 97 irrigation systems in 2008 from MEPRED (2008, Figure 5). In Burkina Faso, rain-fed agriculture dominates.

**Drinking Water.** The Ministère de l'Eau et de l'Assainissement (2020a) provides information on drinking water supply systems, including the locality and year of installation. The source distinguishes between "Adduction d'Eau Potable Simplifiée" (AEP) and "Poste d'eau autonome" (PEA). AEPs are small-scale piped water systems with storage tanks and public standpipes sometimes serving several villages, whereas PEAs (Point d'Eau Autonome) are standalone water points, such as boreholes fitted with motorized pumps, without a wider distribution network. Both systems treat and transport water for human consumption. These systems typically rely on motorized pumps, which, after electrification, can run on grid power rather than diesel or solar. One limitation of the data is that it does not indicate whether the systems were in operation every year. From Ministère de l'Eau et de l'Assainissement (2018) we retrieved the installation years of water pumps along with their trademarks. We classified the pump types India, India Mark II, Vergnet, ABI, DIAFA, Kardia, and Volanta as hand- and foot-operated pumps. Together, these accounted for

97.7% of all water pumps installed by 2016.

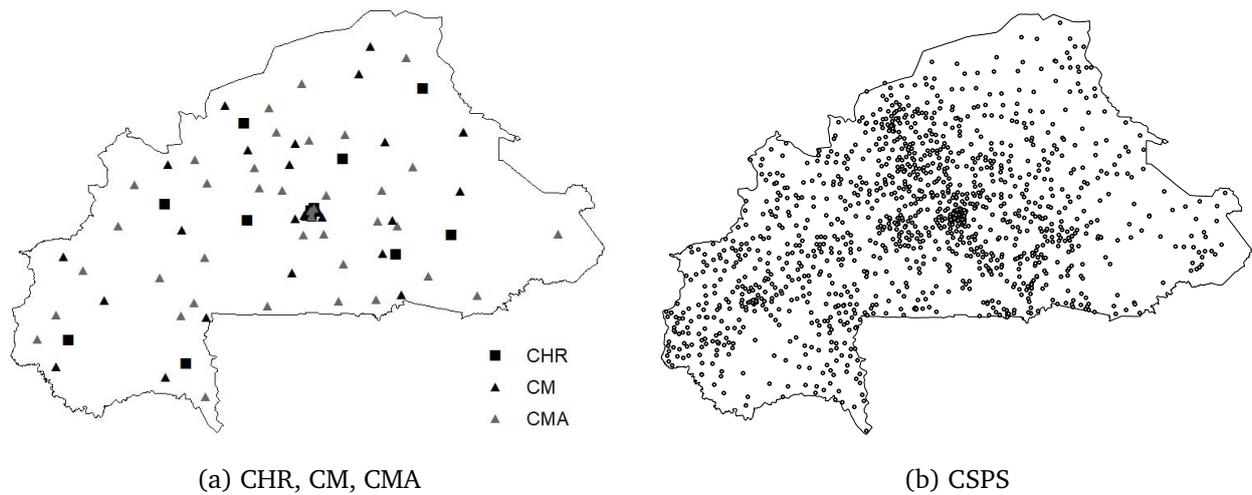
**Cattle Markets.** The data is based on the 2019 Survey of Livestock Markets, which contains a sample of 45 major, permanent livestock markets in Burkina Faso (Table 1, Minot and Elahi, 2020).

**Health Facilities.** From Ministère de la Santé (2008) we digitized the names of localities with health facilities in 2007. The accompanying maps helped us georeferencing 1,402 out of the 1,445 facilities (or 97.0%). We have information on four types of facilities: i) CHR: Centre hospitalier régional (N=12); ii) CMA: Centre médical avec antenne chirurgicale (N=41); iii) CM: Centre médical (N=34); and vi) CSPS: Centre de santé et de promotion sociale (N=1,355) and v) dispensaries (N=86).<sup>1</sup> The CSPS are the first level of care and correspond to primary healthcare centers. Staffed with about three health workers and two unqualified volunteers, they are responsible for 5 to 23 villages, providing basic outpatient services, including maternity care and administering vaccination programs in the villages. The CM and CMA are the first referral level and are equipped with beds and surgical facilities (Marschall and Flessa, 2011). CHR are regional hospitals. We calculated the distance between each locality and health facility. We then assigned health facilities to the closest locality. The mean distance to CSPS and higher level health facilities is 2.5 km and 19.8 km (sd=3.6 and sd=13.4) respectively.

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<sup>1</sup>We detected minor inconsistencies with the summary statistics reported in Ministère de la Santé (2008): N(CSPS)=1,268; N(CM)=33; N(CMA)=42; N(CHR)=12.

Figure A.1: Health Facilities in Burkina Faso in 2007



Notes: Data is from Ministère de la Santé (2008).

### A.3 Matching DHS Clusters to Electrification Points

To ensure confidentiality, the DHS surveys masked the true location of households (Burgert et al., 2013). Geographic coordinates of urban and rural clusters were displaced up to a distance of 2 and 5 km respectively.<sup>2</sup> The displacement followed a “random direction, random distance” method, while ensuring that the newly assigned coordinates are located in the true administrative unit (=region). Overall, the method “produces a near uniform distribution, with an average displacement of 1.0 kilometers for urban areas and 2.5 kilometers for rural areas” (Burgert et al., 2013, p.11). This displacement of household coordinates introduces measurement error: Households that appear within/outside an electrified community may actually be located outside/within.

In an effort to reduce attenuation bias and improve the precision of the estimates we calculated *probability scores* that approximate the probability that a DHS cluster is located within a locality.

**Step 1:** We determined the geographic extent of the localities. The 2015 High Resolution Settlement Layer from the Facebook Connectivity Lab and Center for International Earth Science Information Network (Facebook and CIESIN, 2019) provided us with population estimates at a 1 arc-second resolution (ca. 30m) based on satellite imagery and computerized building

<sup>2</sup>Furthermore, a randomly-selected 1% of rural clusters is displaced by up to 10 km. This small proportion is unlikely to affect estimates. For the sake of simplicity, we therefore ignore this.

recognition. We defined localities as contiguous populated settlements. Operationally, for urban places we took the boundary shapefile from Africapolis (Moriconi-Ebrard et al., 2016). For rural places, we merged all buildings within a 100 meters distance from each other and that formed a contiguous shape into one settlement.<sup>3</sup> We defined the electrified locality as the one which contains the electrification point.

**Step 2:** We calculated the population within 2 and 5 km of a DHS cluster.

**Step 3:** We calculated probability scores as the proportion of population within radius of the DHS cluster that falls in the electrified community. We apply the 2 km and 5 km radius to DHS clusters classified as urban and rural respectively.

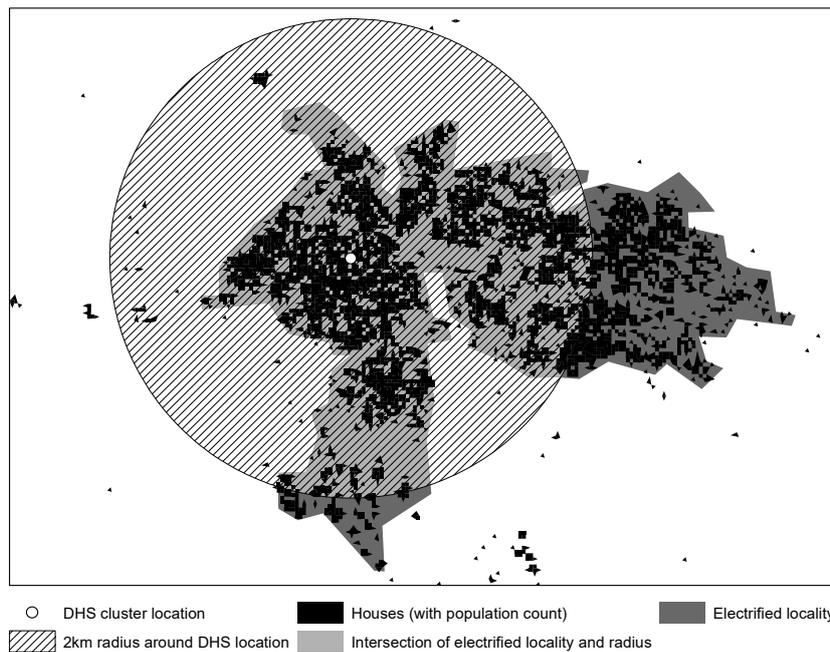
$$probscore = \frac{pop(radius \cap electrified)}{pop(radius)}$$

Figure A.2 illustrates the computation of the probability score for an urban DHS cluster. In this case the probability score is very high, because almost all of the population in the 2km radius around the cluster is located within the electrified locality. Figure A.3 illustrates the case of a rural DHS cluster for which the 5km radius overlaps with two localities. One locality lies completely in the radius and contains most of the population within the radius. The probability score for this electrified community is very high, meaning that the DHS survey was most likely carried out in this community. The second electrified community (at the top of the Figure) contains only a small fraction of the population within the radius, yielding a much lower probability score.

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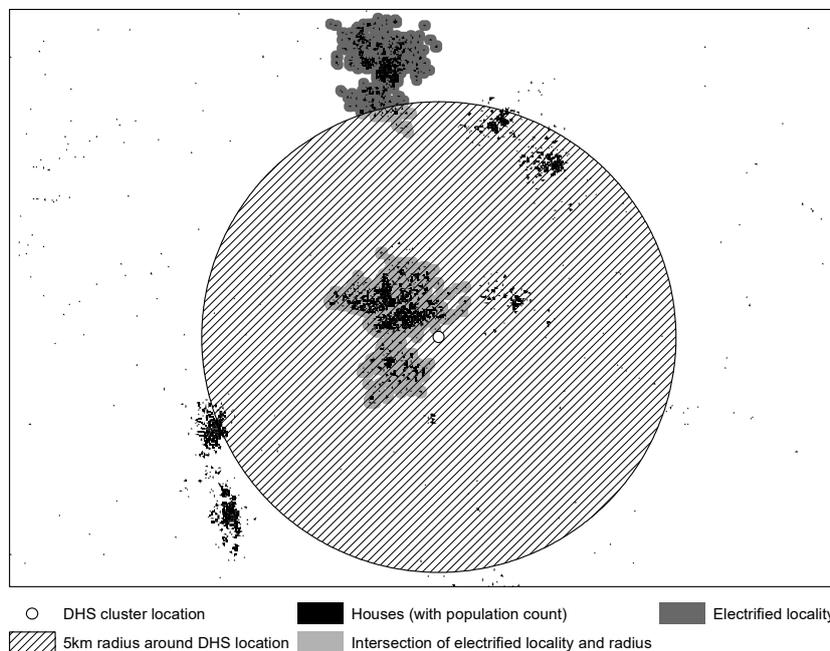
<sup>3</sup>This follows Moriconi-Ebrard et al. (2016) who defined an urban agglomeration as a continuously built-up and developed area, with less than 200 meters between two buildings. The criterion was then followed by de Bellefo et al. (2021). For rural places, the choice of 200 meter is too conservative, as it would include large low-populated spaces that encroach into the area of other villages (as indicated by the Housing Census and the list of electrification points).

Figure A.2: Calculating Probability Scores for DHS Clusters - Urban Setting



Notes: This Figure illustrates the construction of the probability score for an urban DHS cluster. The gray area shows the electrified community. The white dot denotes the reported location of the DHS cluster (subject to random displacement). The shaded area shows a 2km radius around the reported DHS cluster location.

Figure A.3: Calculating Probability Scores for DHS Clusters - Rural Setting



Notes: This Figure illustrates the construction of the probability score for a rural DHS cluster. The gray areas show two different electrified communities. The white dot denotes the reported location of the DHS cluster (subject to random displacement). The shaded area shows a 5km radius around the reported DHS cluster location.

We use this methodology to match our electrified communities to data from DHS surveys from

1993, 1998, 2003, 2010, and 2014. As illustrated in Figure A.3, a DHS cluster can be matched to more than one electrified locality. For some matches the probability score is very low, meaning it is unlikely the DHS cluster actually lies in the electrified locality. We want to only consider DHS clusters with a high probability of representing our treatment areas.

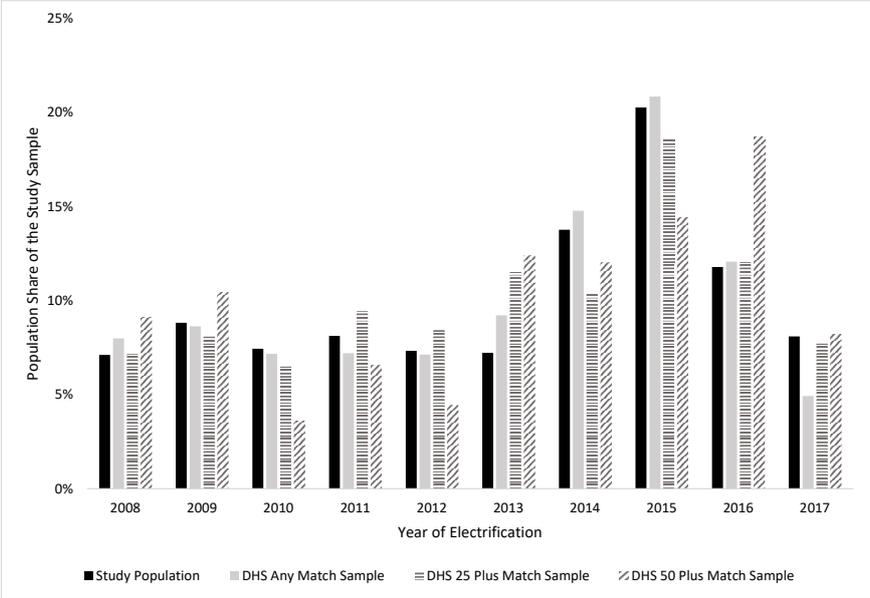
What is an acceptable probability score? There is a trade off. Setting the probability score too high will reduce sample size and increase standard errors. Setting it too low will increase measurement error and attenuate the estimated coefficient. Complicating a theoretical derivation is the fact that probability scores may depend on settlement patterns. Localities that are finely delineated with few localities in close vicinity will have higher probability scores. In order to better understand the consequences of choosing certain assignment rules, we construct two samples of DHS clusters following two different definitions of “high probability”. The first sample considers all matches with a probability score of at least 50% (the “50% plus sample”). In the second sample we consider all matches with a probability score of at least 25%, provided it is the most likely match for the DHS cluster (the “25% plus sample”). This ensures that within both samples, DHS clusters are assigned to one electrified locality. For example, imagine a DHS cluster with two matches - one with a probability score of 45% and one with 30%. For the second sample we would include the former match, but exclude the latter. For comparison, we constructed an “any match sample” that includes all DHS clusters that can be assigned to an electrified locality (provided it is the most likely match).

From census data, we know the population of each electrified locality and how it evolves over time. We use this information to check whether our two DHS samples (the “25% plus sample”, and the “50% plus sample”) are representative of the study population. Figure A.4 illustrates this exercise for the year 2010. The black bars show the true distribution of the study population across treatment times (years of electrification) and across administrative regions. The grey and dashed bars show the distribution of three possible DHS samples (adjusted for DHS population weights). The distributions of the “25% plus sample” are similar to those of the true population, while the

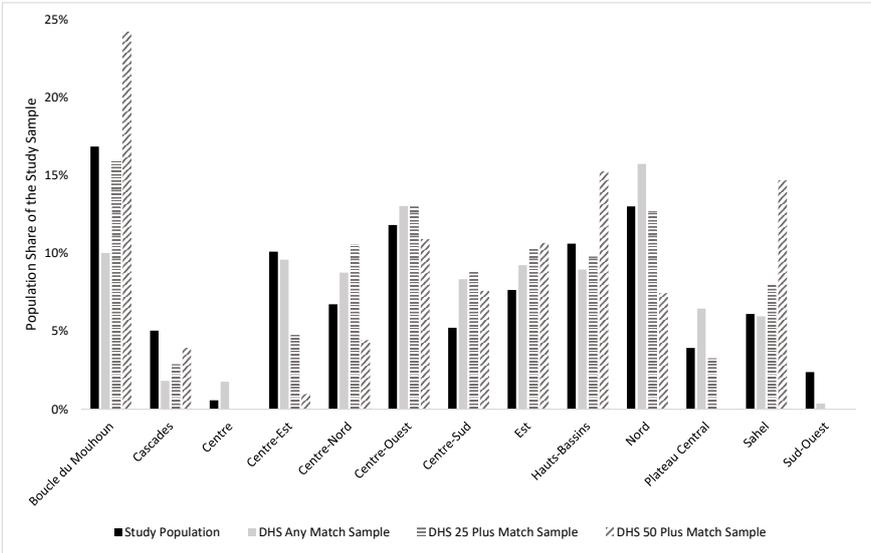
distribution of the “50% plus sample” is significantly different. This could be due over-sampling of larger towns/ exclusion of smaller towns in the “50% plus sample”. The “25% plus sample” outperforms the “Any Match sample” with respect to the spatial distribution, Figure [A.4b](#). Thus, we chose the “25% plus sample” for our analysis.

For the analysis, we are interested in localities that were electrified from 2008 onward. Table [A.1](#) illustrates the number of DHS clusters matched to electrified localities for each treatment year. This includes only DHS clusters where the probability score is at least 25% (with each cluster assigned only to the most likely electrification point). We exclude the 1998 survey round from our analysis, because coverage is very low, owing to a change in the DHS sampling strategy that year as shown in Figure [A.5](#). In 1993, 230 clusters were sampled across the country. In 1998 a similar number of clusters were sampled (2010), but this time they were more strongly focused on the larger urban centers (especially Ouagadougou and Bobo-Dioulasso). This leads to a much lower coverage of the smaller towns that make up our sample for analysis. In 2003, the DHS sampling continued to focus on large urban areas, but the overall number of clusters was increased to 400 - once again providing good coverage in our areas of interest. The survey carried out in 2014 was a Malaria Indicator Surveys (MIS) with a smaller sample.

Figure A.4: Population Distributions in the full Study Population and various DHS Study Samples (2010)



(a) Population Distributions across Treatment Times



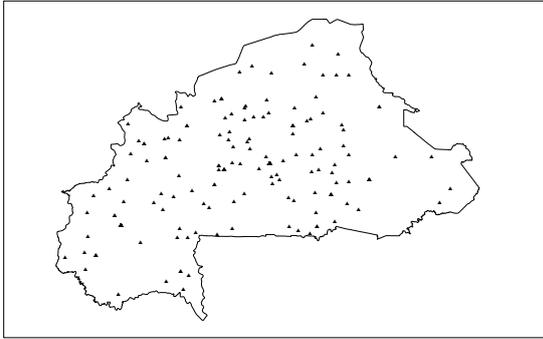
(b) Population Distributions across Administrative Regions

Table A.1: Number of matched DHS & LSMS Clusters by Year of Electrification

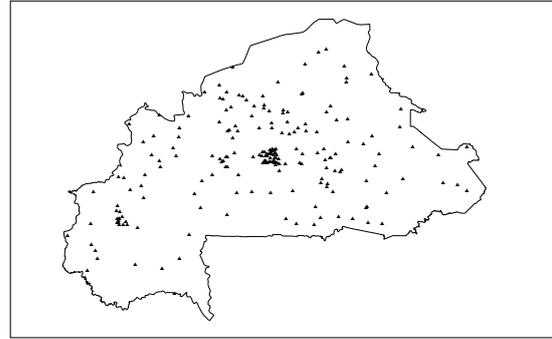
Year of electrification	Survey & Round						Total
	DHS1993	DHS1998	DHS2003	DHS2010	MIS2014	LSMS2014	
2008	6	3	7	6	5	3	30
2009	5	1	12	7	5	3	33
2010	4	1	5	4	3	2	19
2011	3	0	3	6	5	7	24
2012	7	0	2	6	1	8	24
2013	0	1	8	7	3	8	27
2014	2	2	9	8	7	14	42
2015	8	2	12	15	7	10	44
2016	5	0	1	9	3	7	25
2017	5	3	4	4	0	5	21
<b>Total</b>	<b>45</b>	<b>13</b>	<b>63</b>	<b>72</b>	<b>39</b>	<b>67</b>	<b>232</b>

*Notes:* This includes all DHS clusters with a probability score of at least 25%, assigned to their most likely electrified locality.

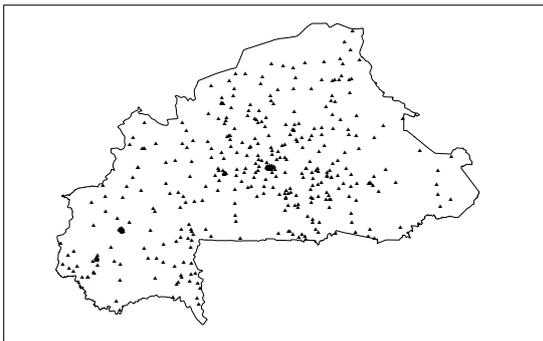
Figure A.5: Geographic Distribution in DHS clusters



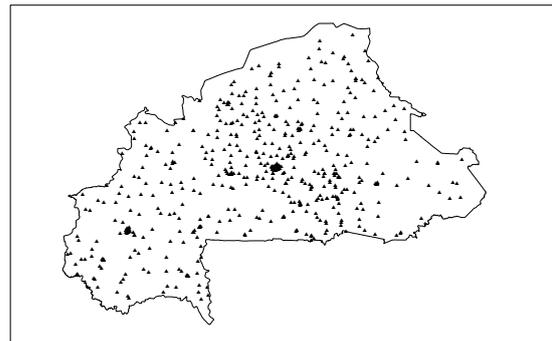
(a) DHS 1993



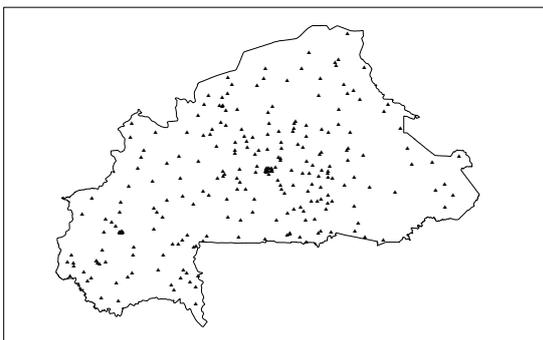
(b) DHS 1998



(c) DHS 2003



(d) DHS 2010



(e) DHS 2014

## B Web Appendix - Supplementary Tables & Figures

Table B.1: Calculation of the Development Potential Index (DPI)

Component	Weight	Criteria	Weight	Indicator	Value
Health	1/3	Health Facilities	1/2	Medical Center equipped with surgical facilities (CMA)	1
				Medical Center (CM)	0.6
				Health and Social Promotion Center (CSPS)	0.4
				Dispensary or Maternity	0.2
		Access to Water	1/2	Simplified drinking water supply system (AEPS)	1
				Borehole	0.5
Well	0.2				
Education	1/3	Non-formal education	1/3	Existence of a training structure (CEBNF)	1
				Literacy facility (CPAF)	0.6
		Formal Education	2/3	Higher institution	1
				Vocational training establishment	0.5
				Secondary School	0.5
Primary School	0.3				
Local Economy	1/3	Population	1/4	More than 5,000 inhabitants	1
				2,501-5,000 inhabitants	0.5
				1,001-2,500 inhabitants	0.2
		Agriculture	1/4	Cattle market	1
				Irrigation	0.7
				Cereal Bank	0.5
		Markets	1/6	Daily Market	1
				Regular Market	0.5
				Occasional Market	0.2
		Distance to nearest Asphalt Road	1/6	0 km	1
				0-10 km	0.5
		Financial institutions	1/12	Bank	1
Microfinance	0.75				
Telephone line	1/12	Available	1		

Notes: This Table shows the elements and weights of measures that enter into calculating the Development Potential Index, which is used to identify localities to be electrified.  
Source: Ministère des Mines, des Carrières et de l'Énergie (2008).

Table B.2: Summary Statistics and Balance, Table 1

	Non-electrified			Electrified			Diff	p-value
	n	Mean	SD	n	Mean	SD		
Electrified 2008-2017	7226	0.00	0.00	558	1.00	0.00	1.000	
LN(Population) 2006	7170	6.92	0.93	538	7.93	0.74	1.010***	0.000
Development Pole	7224	0.04	0.21	506	0.44	0.50	0.400***	0.000
DPI	7170	0.07	0.07	538	0.18	0.11	0.110***	0.000
CMA 2007	7224	0.00	0.03	558	0.02	0.13	0.020***	0.000
CM 2007	7224	0.00	0.03	558	0.01	0.11	0.010**	0.001
CSPS 2007	7224	0.12	0.32	558	0.51	0.50	0.390***	0.000
Dispensary 2007	7224	0.00	0.05	558	0.01	0.09	0.010	0.013
Missing value in AEPS 2007	7226	0.12	0.32	558	0.12	0.32	0.000	0.880
AEPS Drinking Water 2007	7224	0.02	0.13	558	0.17	0.37	0.150***	0.000
Private Secondary School 2007	7224	0.00	0.04	558	0.02	0.14	0.020***	0.000
Primary School 2007	7224	0.55	0.50	558	0.84	0.37	0.290***	0.000
Cattle Market	7224	0.00	0.05	558	0.03	0.17	0.030***	0.000
Irrigation 2007	7224	0.01	0.09	558	0.01	0.11	0.010	0.280
Asphalt 0 km 2007	7226	0.04	0.20	558	0.15	0.36	0.110***	0.000
Asphalt 0-10 km 2007	7226	0.16	0.37	558	0.18	0.39	0.020	0.160
SQRT (N Primary students)	7224	6.93	7.00	558	16.62	9.02	9.690***	0.000
Admin Capital (Level 2 & 3)	7224	0.01	0.12	558	0.30	0.46	0.280***	0.000
Within 60km to grid 2007	7226	0.53	0.50	558	0.70	0.46	0.170***	0.000
LN(Dist. to grid 2007 (km))	6860	3.78	1.07	558	3.27	1.41	-0.500***	0.000
LN(Dist. to dev. pole (km))	6870	3.23	0.86	558	2.75	1.17	-0.480***	0.000
LN(Dist. to MST (km))	6870	2.90	1.07	558	2.28	1.29	-0.620***	0.000

Notes: This Table reports summary statistics and a balancing test for Table ???. Variables are expressed in terms of their contribution to the DPI as shown in Web. Appx. Table B.1. For example, if a locality had a CMA, CM, CSPS as well as a dispensary, only the CMA indicator variable would take on the value 1. Columns (2)–(4) report the number of observations, means, and standard deviations for localities that were not electrified, while columns (5)–(7) report the same for localities electrified between 2008 and 2017. Column (8) shows the difference in means between the two groups, tested using a two-sample t-test with unequal variances. Asterisks indicate statistical significance at the following levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The last column reports the p-value for the t-test.

Table B.3: Average Treatment Effects of Electrification on Teaching Materials

	Mean ( $T = -1$ )	Baseline		Controls		Pre-Trends (p-value)		Nt / N
		ATT	se	ATT	se	Baseline	Controls	
1. N Metic Compendiums	1.43	0.165	(0.258)	0.250	(0.274)	0.226	0.253	440 / 5353
2. N Scientific Compendiums	0.37	0.116	(0.174)	0.086	(0.194)	0.745	0.602	440 / 5353
3. N Dictionaries	4.16	-0.090	(0.383)	0.128	(0.422)	0.009	0.020	440 / 5353
4. N Globes	1.79	0.215	(0.134)	0.283	(0.149)	0.918	0.639	440 / 5353
5. N Pedagogical Kits	0.23	0.065	(0.045)	0.096	(0.049)	0.374	0.426	440 / 5353
6. N Scientific Charts	12.80	0.177	(0.842)	0.308	(0.926)	0.327	0.131	440 / 5353
7. N Teaching Programs	0.92	-0.178	(0.170)	-0.094	(0.180)	0.019	0.050	440 / 5353

*Notes:* This table reports Average Treatment Effects on the Treated (ATT), balanced with respect to event-time for  $T = [0, 3]$  using the imputation estimator of Borusyak et al. (2024). For each variable, we estimate two models: (i) a “Baseline” model with locality and year fixed effects; and (ii) a “Controls” model adding development-pole-by-year fixed effects and time-invariant controls (as measured in 2007) interacted with year dummies. These controls include the square root of primary school enrollment in 2007 and the predicted development potential index. The test for parallel pre-trends is conducted by regressing the outcome on dummies for periods  $T = -6, \dots, -1$  using only non-treated observations (cluster-robust Wald test). The final column reports the number of treated units ( $N_t$ ) across all horizons and the total number of observations ( $N$ ).

Table B.4: Household Asset Ownership - Short- and Medium-Term Treatment Effects

<b>Panel A: Short Term Effects: ATTGE for T=(0,1)</b>								
Dependent Variable Controls in:	Total Effect		Spillover Effect		Pre-trend p-value		Mean Dep t=-1	N
	Levels	Trends	Levels	Trends	Levels	Trends		
1. Electricity	0.05** (0.02)	0.05*** (0.02)			0.39	0.29	0.00	5221
2. Radio	0.06** (0.03)	0.05 (0.04)	0.05* (0.03)	0.04 (0.04)	0.26	0.45	0.54	5224
3. Television	0.00 (0.02)	0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.68	0.87	0.11	5224
4. Refrigerator	0.01 (0.00)	0.01* (0.00)	0.00 (0.00)	0.00 (0.00)	0.75	0.65	0.00	5223
5. Piped Water	0.01 (0.03)	0.00 (0.03)	0.01 (0.02)	0.01 (0.03)	0.93	0.93	0.05	5225

<b>Panel B: Medium Term Effects: ATTGE for T=(2,6)</b>								
Dependent Variable Controls in:	Total Effect		Spillover Effect		Pre-trend p-value		Mean Dep t=-1	N
	Levels	Trends	Levels	Trends	Levels	Trends		
1. Electricity	0.15*** (0.03)	0.15*** (0.03)			0.39	0.29	0.00	5282
2. Radio	0.15*** (0.04)	0.09* (0.05)	0.15*** (0.04)	0.08* (0.05)	0.26	0.45	0.54	5284
3. Television	0.06*** (0.02)	0.07** (0.03)	-0.03* (0.02)	-0.03 (0.02)	0.68	0.87	0.11	5284
4. Refrigerator	0.02** (0.01)	0.02** (0.01)	0.00 (0.00)	0.00 (0.00)	0.75	0.65	0.00	5284
5. Piped Water	0.07** (0.03)	0.07* (0.04)	0.03 (0.03)	0.03 (0.03)	0.93	0.93	0.05	5285

Notes: This table shows the average treatment effects across event time (ATTGE) based on Borusyak et al. (2024) for the time frame T=[0,1] and T=[2,6]. Unit of observation is the household treatment is the locality; there are 201 localities electrified between 2008 and 2017. Each cell represents a separate estimation model and shows the average treatment effect of electrification on the dependent variable. The columns entitled "Total" calculate the average treatment effects for all households, while the columns entitled "spillover" calculate the average treatment effects only for households who have access to electricity. The dependent variables are all binary, taking the value 1 if the household owns (at least one of) the item. "Piped water" equals one if the household has access to piped water privately in the household or publicly in the vicinity (i.e. a public standpipe). The community controls are all significant variables from column 5 of table 1. They are included either in levels or trends (as specified in the column header). Household controls comprise the sex and age of the household head (plus age squared), as well as the share of adult women in the household who have primary or secondary education, respectively. Pre-trend p-values refer to the F-test for joint significance of the 6 periods preceding treatment. Standard errors, clustered at the locality level, in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

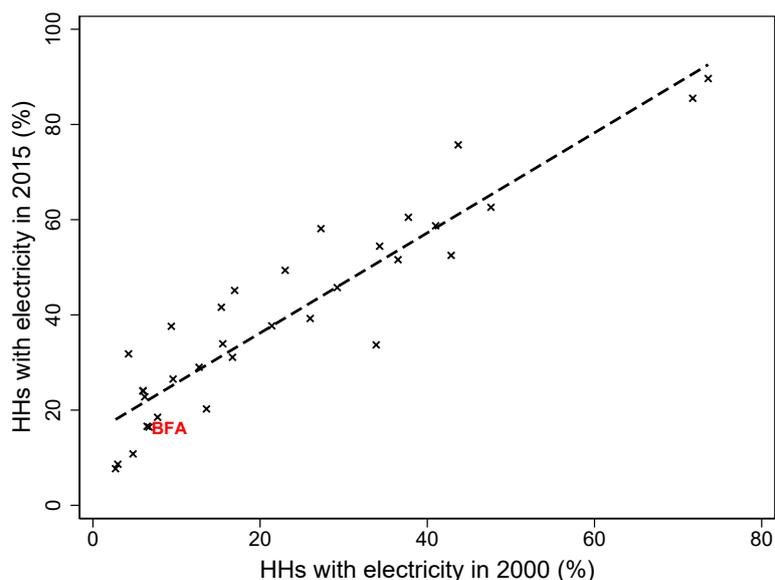
Table B.5: Child Health - Average Treatment Effects (0-6 Years After Electrification)

Dependent Variable	Total Effect		Spillover Effect		Pre-trend p-value (N)		Mean Dep t=-1	
	Controls in:	Levels	Trends	Levels	Trends	Levels		Trends
1. Infant Mortality		0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.02)	0.07 (4506)	0.02 (4506)	0.06
2. Height for Age Z-Score		-0.06 (0.12)	-0.13 (0.15)	-0.10 (0.13)	-0.16 (0.15)	0.60 (3847)	0.79 (3847)	-0.71
3. Weight for Height Z-Score		-0.05 (0.11)	0.04 (0.13)	-0.05 (0.11)	0.05 (0.13)	0.11 (3979)	0.37 (3979)	-0.28
4. Prenatal Care		0.04 (0.04)	0.02 (0.06)	0.03 (0.04)	0.02 (0.06)	0.88 (4664)	0.85 (4664)	0.45
5. Skilled Birth Attendance		-0.04 (0.05)	-0.07 (0.06)	-0.03 (0.05)	-0.06 (0.06)	0.39 (5833)	0.36 (5833)	0.80

Notes: This Table shows the average treatment effects based on [Borusyak et al. \(2024\)](#). Each cell represents a separate estimation model and shows the average treatment effect of electrification on the dependent variable. Unit of observation is the live birth for rows 1, 4, and 5; here treatment is defined as being born after electrification. For rows 2 and 3 unit of observation is the living child under the age of 5 and treatment is defined as living in an electrified community. The columns entitled “Total” calculate the average treatment effects for all households, while the columns entitled “spillover” calculate the average treatment effects only for households who do not have access to electricity. Infant mortality takes the value 1 if the child died before their first birthday. Prenatal care takes the value 1 if the mother attended at least 4 prenatal appointments during pregnancy. Skilled birth attendance takes the value 1 if a healthcare professional was present at birth. All specifications control for child’s age (theoretical age at interview for deceased children), sex, and whether it is a multiple birth. Additionally, all specifications control for mother’s age and religion, as well as household and community controls. Community controls are all significant variables from column 5 of table 1. They are included either in levels or in levels and trends specifications (as specified in the column header). Household controls comprise the sex and age of the household head, as well as the share of adult women in the household who have any primary education. Pre-trend p-values refer to the F-test for joint significance of the 6 periods preceding treatment. Standard errors, clustered at the locality level, in parentheses. See Web Data Appendix for data sources.

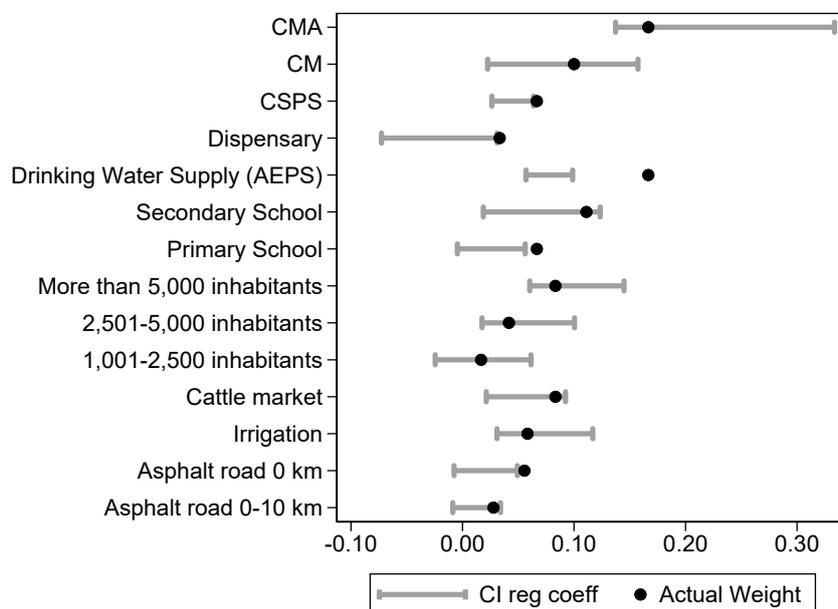
\*\*  $p \leq 0.01$ , \*  $p \leq 0.05$ , \*  $p \leq 0.1$ .

Figure B.1: Electrification in Comparative Perspective, Sub-Saharan Africa, 2000-2015



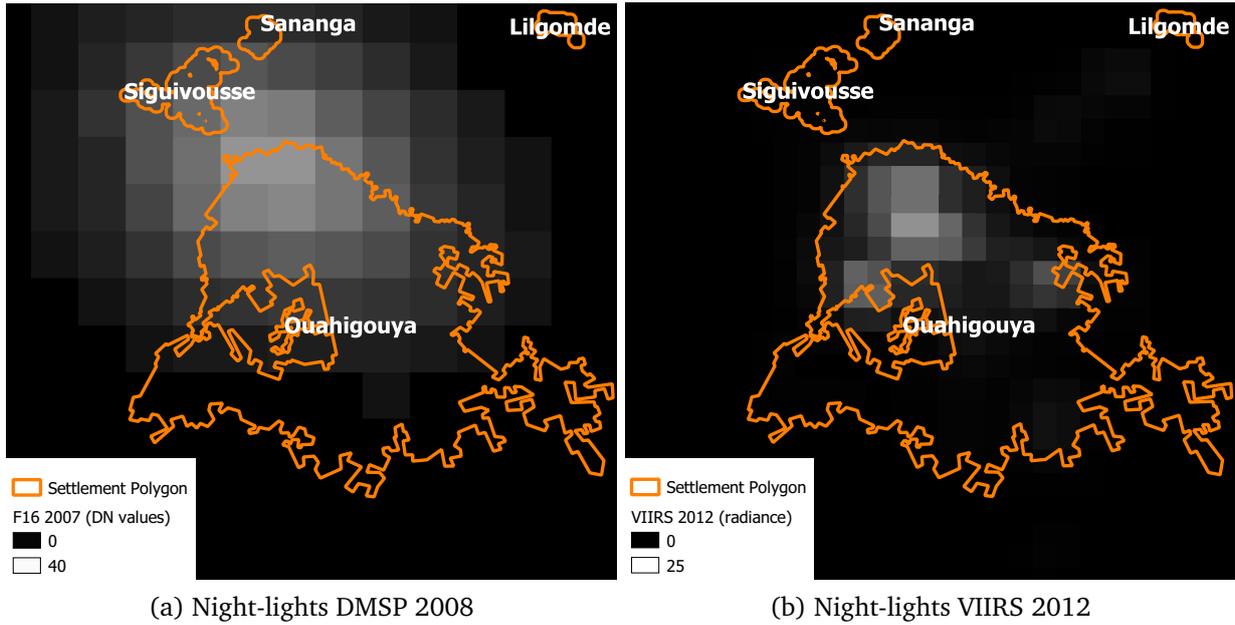
Notes: This Figure shows the percentages of households with electricity in 2000 and 2015 across sub-Sahara African countries (World Bank, 2020). The dashed line represents the linear fit. Burkina Faso was among the lower tercile of countries and it roughly stayed there in 2015 despite of an increase from 7% to 19%. On average, the percentage of households with electricity increased in sub-Saharan African countries by 1% per year.

Figure B.2: Correlation between DPI Weights and Regression Coefficients



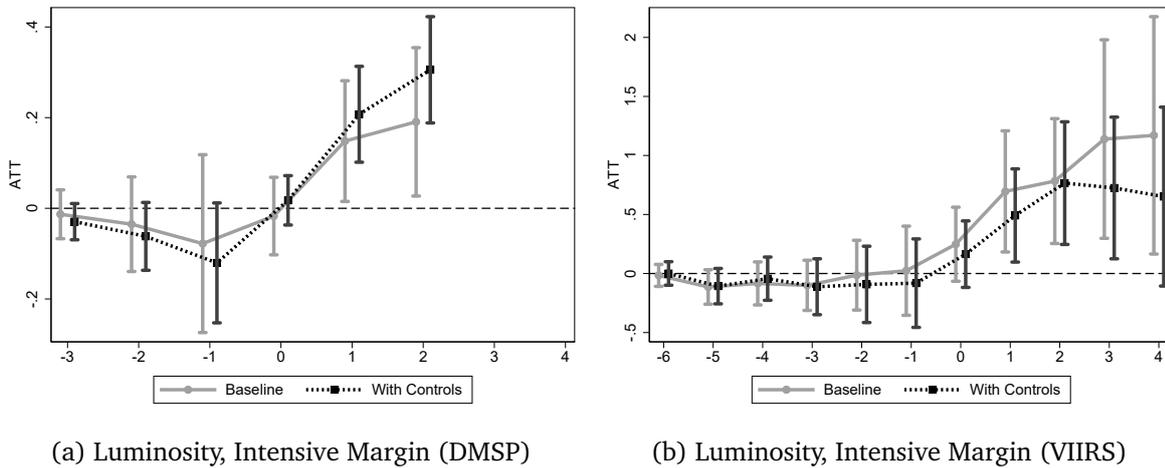
Notes: This figure illustrates the weight assigned to each indicator in the calculation of the Development Potential Index (black circle) and the 95% confidence interval derived from a multivariate regression of the indicators on DPI Index values, as reported in Ministère des Mines, des Carrières et de l'Énergie (2008). An overlap between the weight and the confidence interval indicates that our data matches the actual weights for predicting DPI values for those localities for which they are not reported. N=535 localities.  $R^2=0.37$ .

Figure B.3: Overglowing - DMSP versus VIIRS



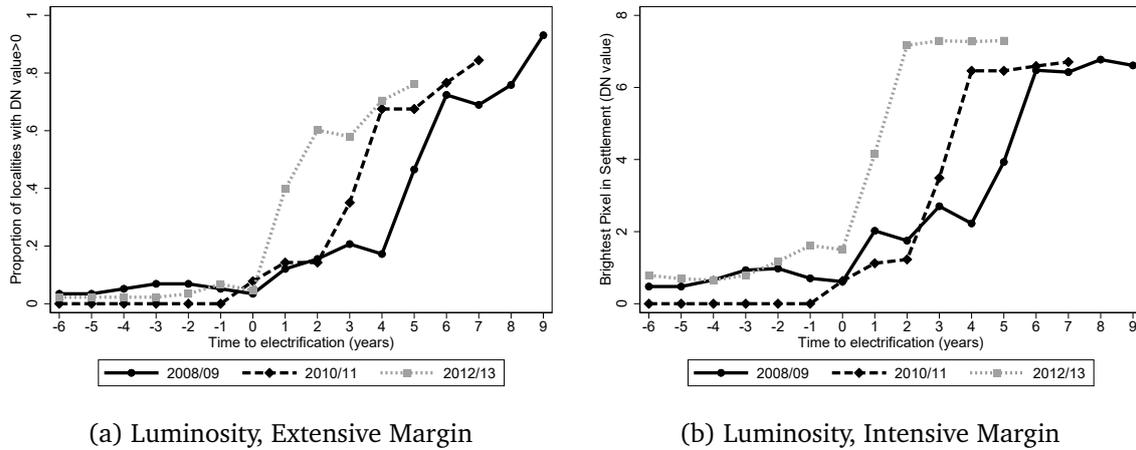
Notes: This Figure shows the settlement boundaries of the electrified localities overlaid over the raster of night-lights. Subfigure B.3a displays the DMSP raster for 2008, whereas Subfigure B.3b displays the VIIRS raster for 2012. Ouahigouya is a city with more than 70,000 inhabitants in 2006 (Institut National de la Statistique et de la Démographie, 2011); it was electrified in 1964. In contrast, Siguivousse and Sananga are small towns with about 2,000 inhabitants in 2006; both were electrified in 2009. DMSP is prone to over-glowing: light that probably originated from the large city of Ouahigouya extend into the settlement boundaries of Siguivousse and Sananga, about 2 km from Ouahigouya.

Figure B.4: Luminosity Before/After Electrification using DMSP/ VIIRS



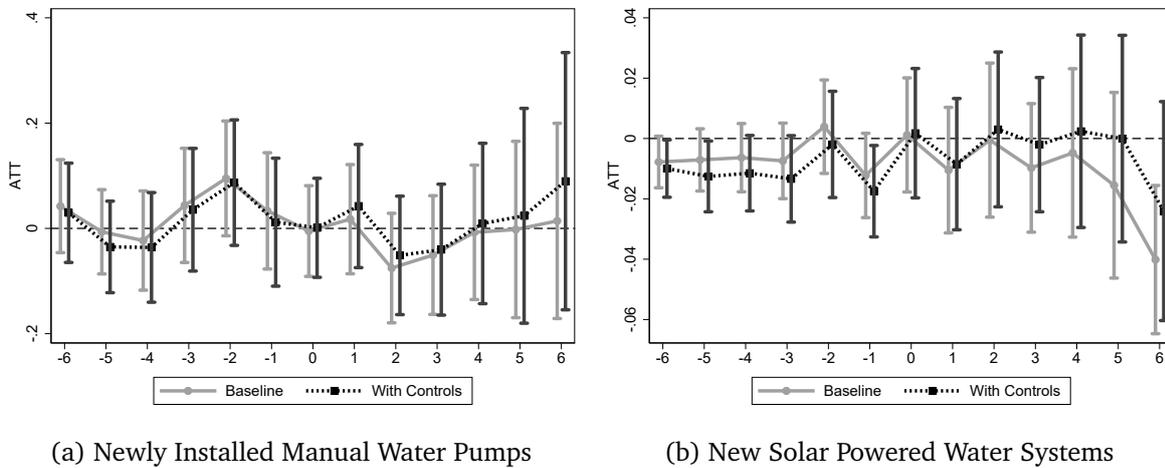
Notes: This figure presents the average treatment effects by length of exposure to electrification, along with 95% confidence intervals. The horizontal axis represents the length of exposure to the treatment ( $T = [-6, 4]$ ). The zero line refers to the average of all pre-treatment estimates. The estimator is the imputation estimator proposed by Borusyak et al. (2024), and standard errors are clustered at the locality level. Pre-treatment parameters are reported as "short differences" ( $Y_t - Y_{t-1}$ ). DMSP measures luminosity in digital numbers (DN) and cover the period 1992–2013, while VIIRS data provide more precise radiance measurements in  $W/(cm^2 \cdot sr)$  but are available only from 2012 onward. The 2012/2013 overlap indicates a structural break, complicating data harmonization. Differences in data coverage lead to variations in sample composition and limit the duration of post-treatment effects that can be estimated.

Figure B.5: Electrification and Luminosity Using the Harmonized Data by Li et al. (2020)



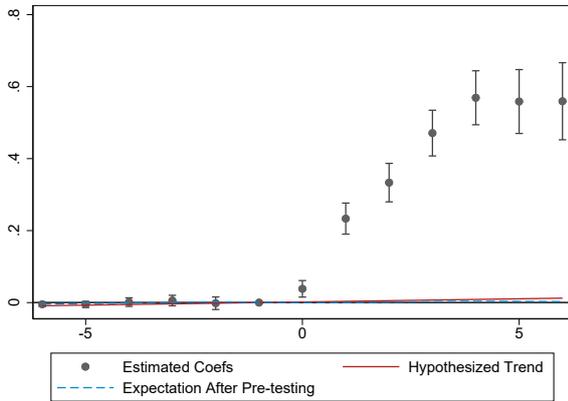
*Notes:* Balanced panel. This Figure shows “harmonized” DN values in the run-up and after electrification. The data was prepared and made available by Li et al. (2020) and is available for the years 1992-2018. Their data integrates DMSP and VIIRS in the year 2014. The graphs plot three types of localities: those that received access to electricity in i) 2008/2009, ii) 2010/11 and iii) 2012/2013. Subfigure B.5a shows the proportion of lit localities (extensive margin).  $N(\text{localities electrified in 2008/2009, 2010/11, and 2012/13}) = 58, 81$  and  $90$ . Subfigure B.5b shows the mean of the brightest pixel within the settlements (intensive margin). The patterns point to an artificial increase in luminosity due to switching from DMSP to VIIRS in 2014.

Figure B.6: Powering Water Supply

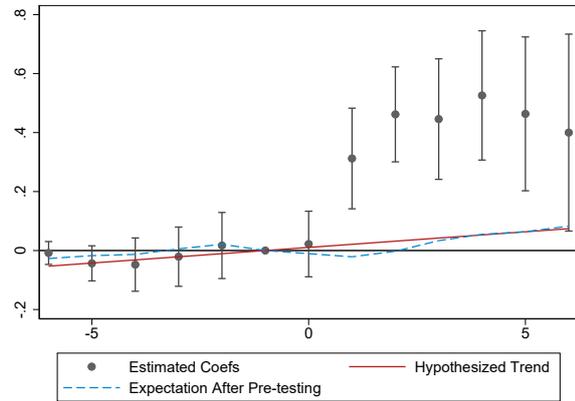


*Notes:* This figure presents ATT by length of exposure to electrification, along with 95% confidence intervals. The horizontal axis represents the length of exposure to the treatment ( $T = [-6, 6]$ ). The zero line refers to the average of all pre-treatment estimates. The estimator is the imputation estimator proposed by Borusyak et al. (2024), and standard errors are clustered at the locality level. Pre-treatment parameters are reported as “short differences” ( $Y_t - Y_{t-1}$ ). Subfigure B.6a shows the installation of hand and foot-operated pumps are of the types India, India Mark2, Vergnet, ABI, DIAFA, Kardia, and Volanta. Subfigure B.6b presents the number of newly installed AEPS/PEA water systems powered by solar. See Web Data Appendix for data sources.

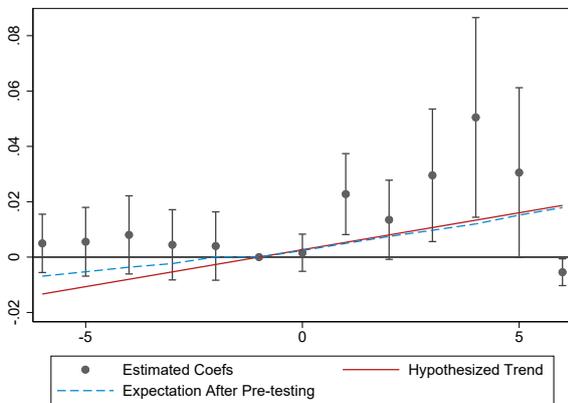
Figure B.7: Power Analysis and Visualization of Parallel Trends Violations for Luminosity, Water Supply, and School infrastructure



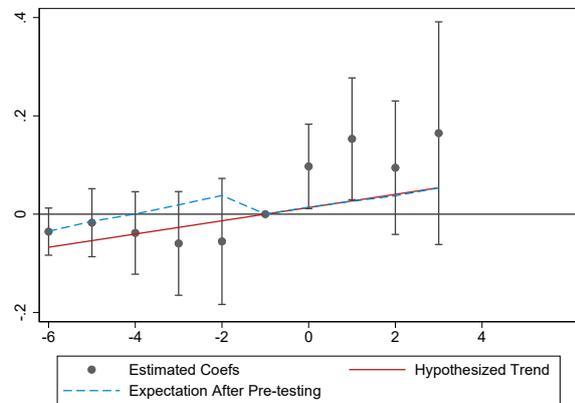
(a) Luminosity, Extensive Margin



(b) Luminosity, Intensive Margin



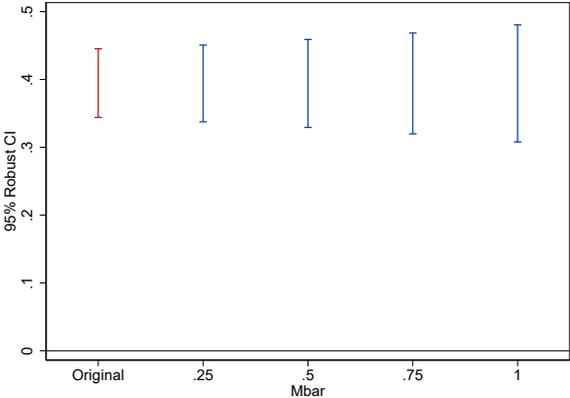
(c) New Grid-Powered AEPS/PEA Water Systems



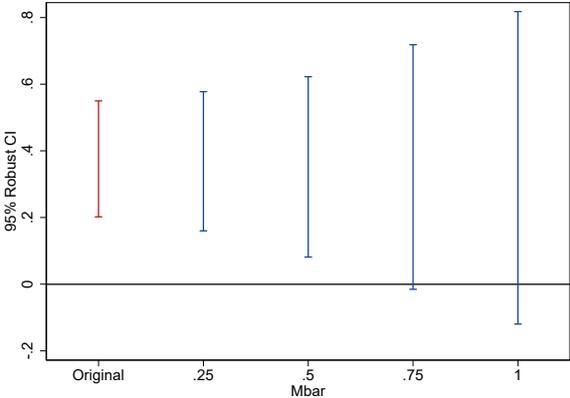
(d) N Electrified Schools

Notes: This Figure presents the pre-trends power analysis developed by (Roth, 2022) using the `pretrends` command. The analysis is based on the BJE estimations from Figure ???. The test evaluates whether differences in trends between treated and control units are statistically detectable in the pre-treatment period ( $T = [-6, -1]$ ), with a statistical power of 80%. This is similar to the minimal detectable effect (MDE) size reported in power calculations.

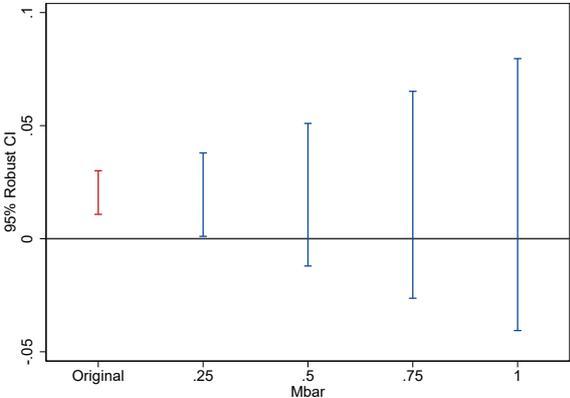
Figure B.8: Sensitivity Analysis of Parallel Trends in Electrification Impacts on Luminosity, Water Systems, and School Electricity



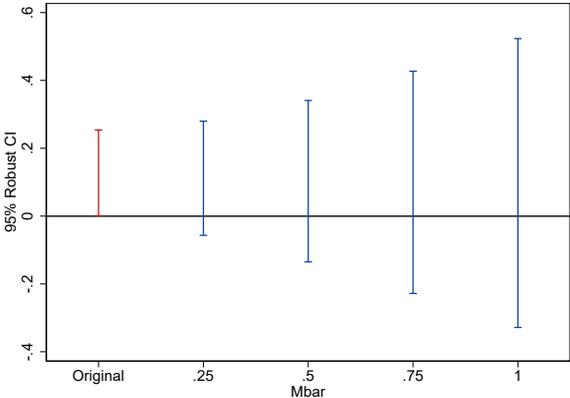
(a) Luminosity, Extensive Margin



(b) Luminosity, Intensive Margin



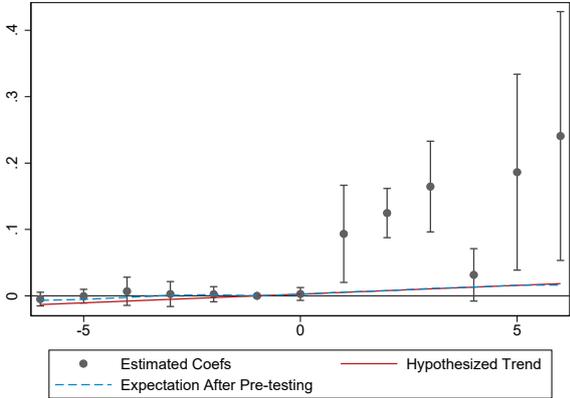
(c) New Grid-Powered AEPS/PEA Water Systems



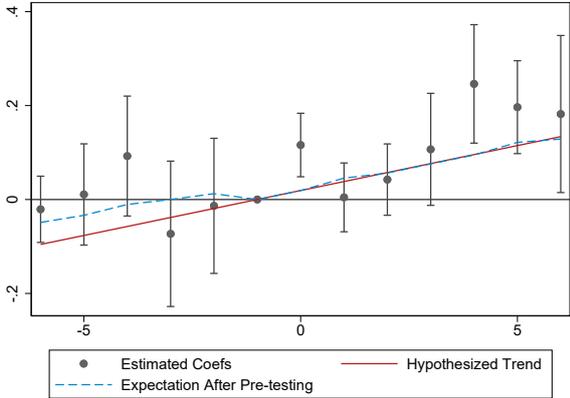
(d) N Electrified Schools

Notes: This Figure presents the sensitivity analysis proposed by (Rambachan and Roth, 2023), assessing the robustness of estimated effects to violations of the parallel trends assumption. The parameter  $Mbar$  represents the *breakdown value* — the maximum post-treatment deviation from parallel trends, measured relative to the largest pre-treatment deviation, that still allows the estimated effect to remain statistically significant. The analysis is based on the BJE estimations shown in Figure ???. The weighting vector  $\ell$  is specified such that equal weight is assigned to all post-treatment periods. Robustness-adjusted confidence intervals are computed using the `honestdid` command for values of  $Mbar$  ranging from 0.25 to 1.5.

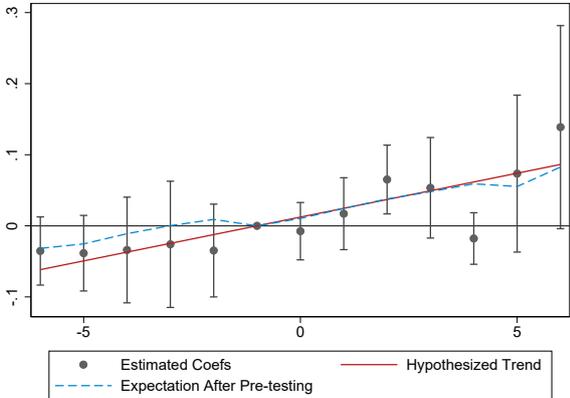
Figure B.9: Power Analysis and Visualization of Parallel Trends Violations for Household Asset Variables



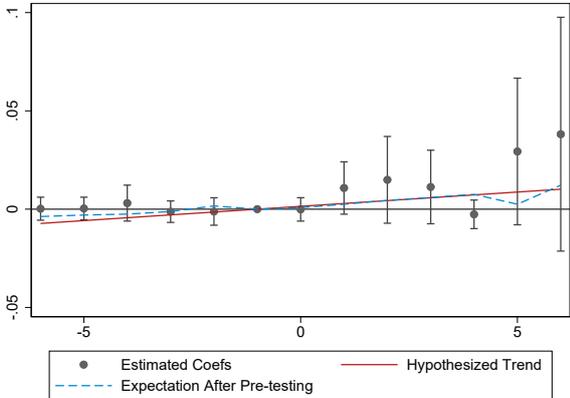
(a) Household has Electricity



(b) Household Owns Radio



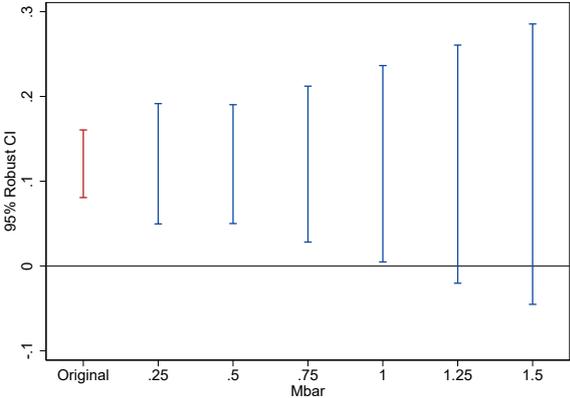
(c) Household Owns Television



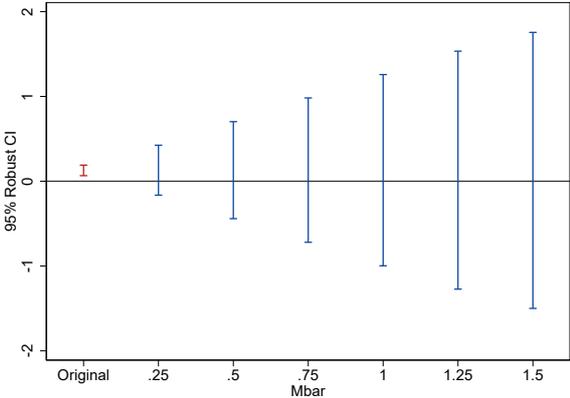
(d) Household Owns Refrigerator

Notes: This Figure presents the pre-trends power analysis developed by (Roth, 2022) using the `pretrends` command. The analysis is based on the BJE estimations from Figure ???. The test evaluates whether differences in trends between treated and control units are statistically detectable in the pre-treatment period ( $T = [-6, -1]$ ), with a statistical power of 80%. This is similar to the minimal detectable effect (MDE) size reported in power calculations.

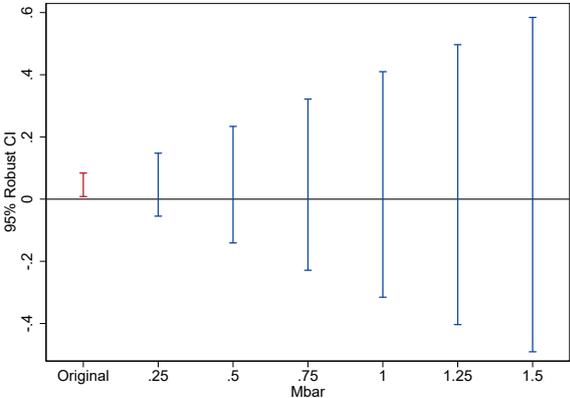
Figure B.10: Sensitivity Analysis of Parallel Trends in Electrification Impacts on Household Asset Variables



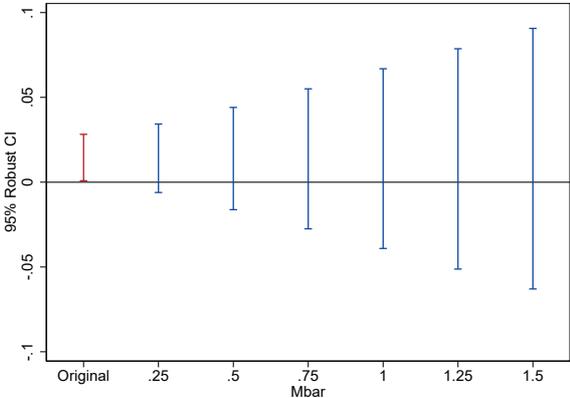
(a) Household has Electricity



(b) Household Owns Radio



(c) Household Owns Television



(d) Household Owns Refrigerator

Notes: This Figure presents the sensitivity analysis proposed by (Rambachan and Roth, 2023), assessing the robustness of estimated effects to violations of the parallel trends assumption. The parameter  $Mbar$  represents the *breakdown value* — the maximum post-treatment deviation from parallel trends, measured relative to the largest pre-treatment deviation, that still allows the estimated effect to remain statistically significant. The analysis is based on the BJE estimations shown in Figure ???. The weighting vector  $\ell$  is specified such that equal weight is assigned to all post-treatment periods.

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