



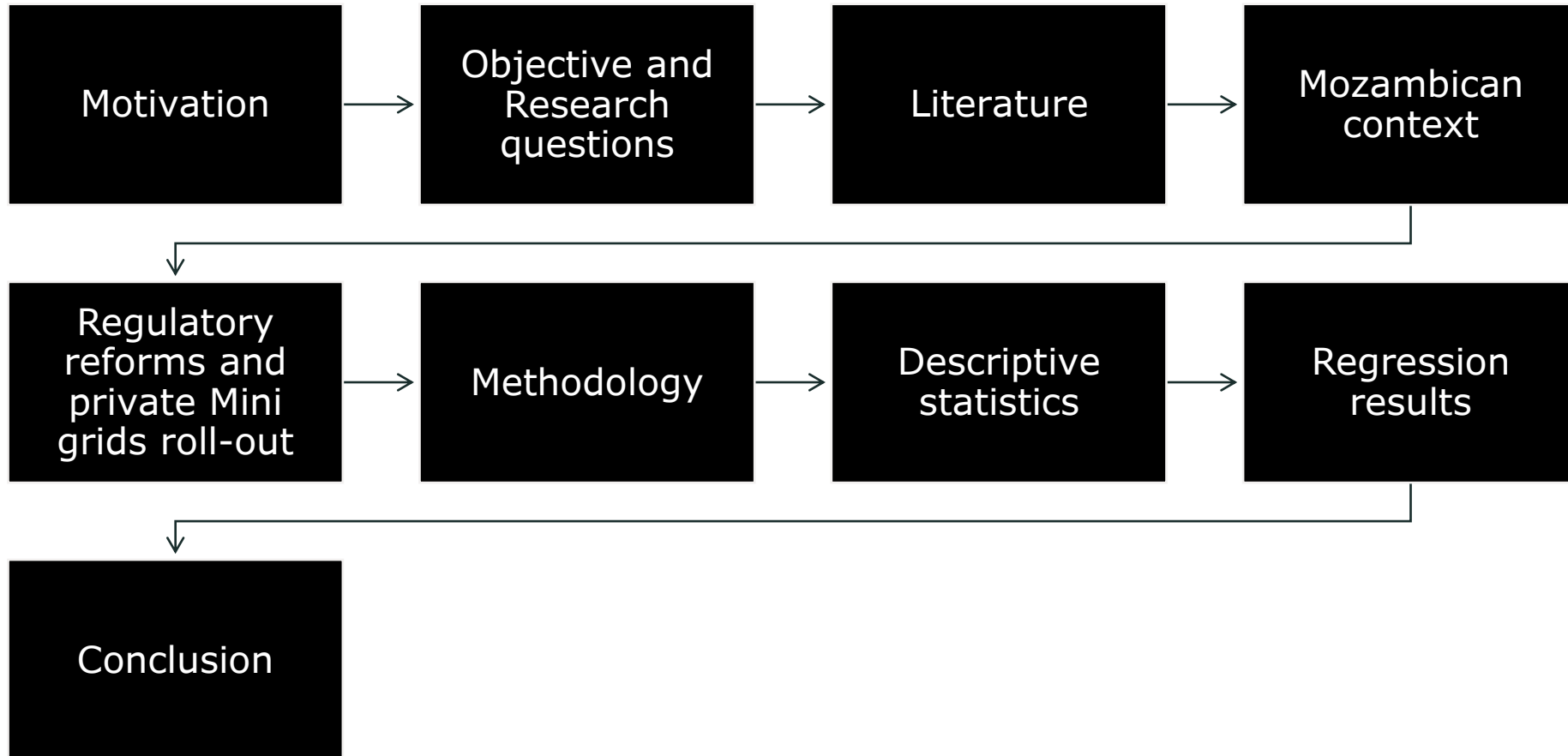
Electrification and changes in employment structure in Mozambique: *A study on the impact of rural electrification on movements out of the agriculture sector from 2014 to 2020*

Maputo, November 2023

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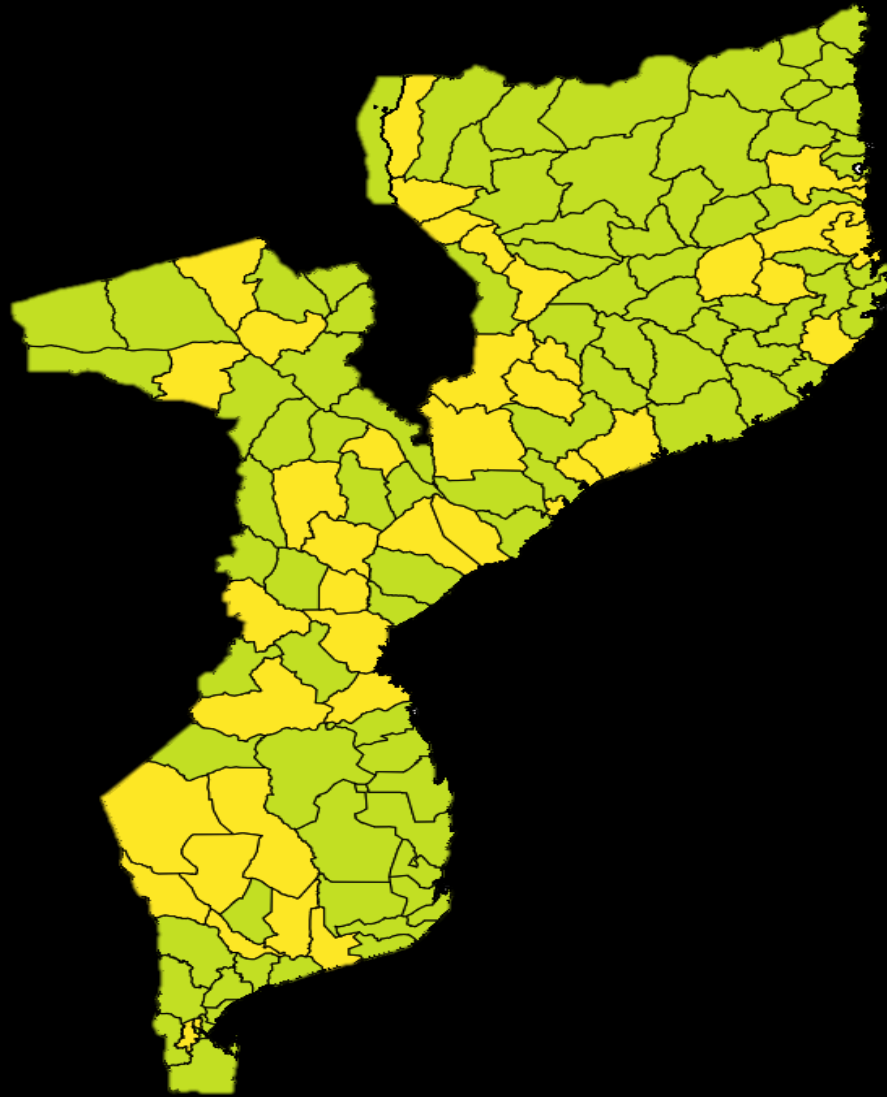
Structure



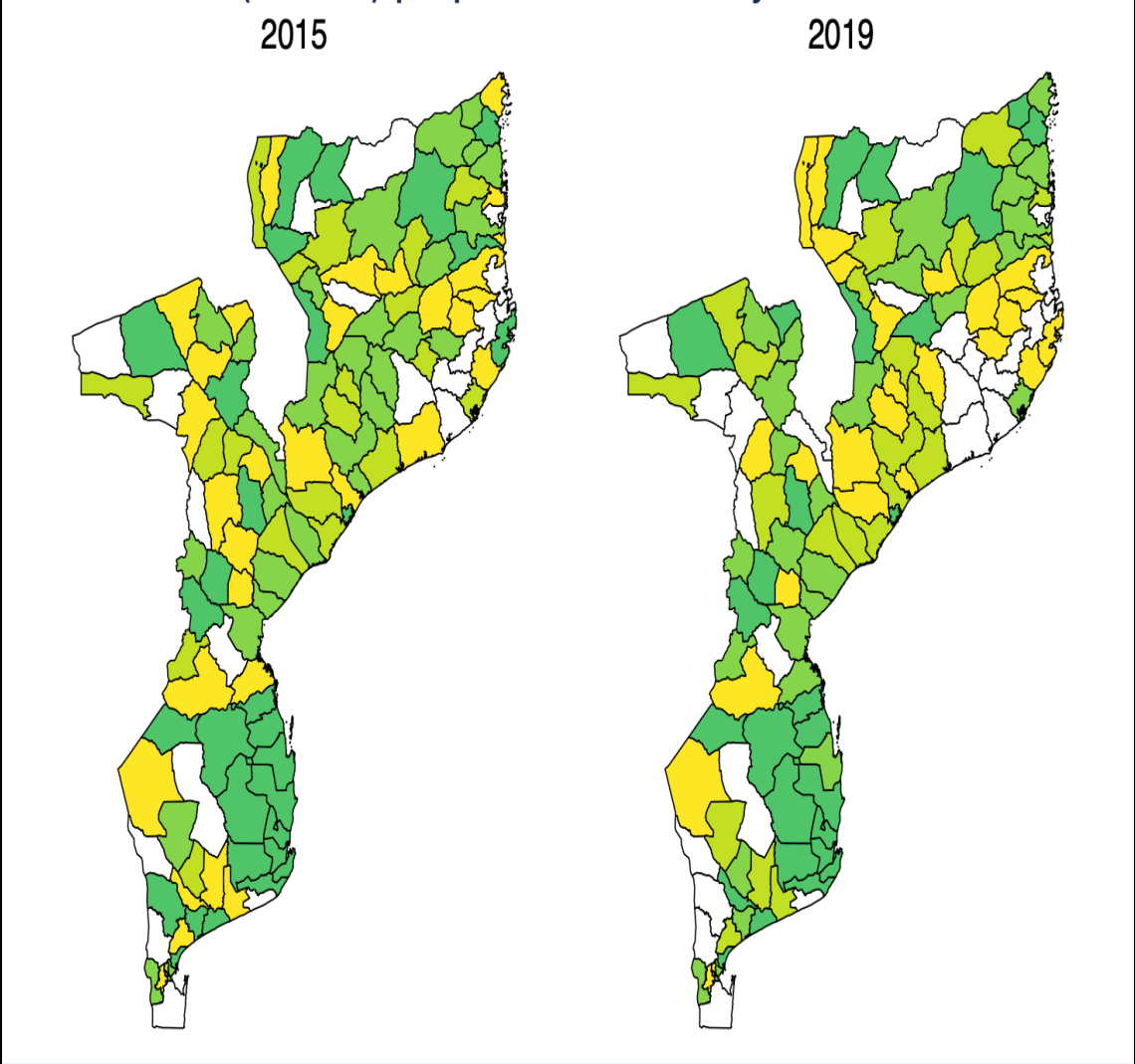
Motivation

- Agriculture is the dominant sector of the economy, employing 67% (about 82% in rural areas) of the workforce and accounting for 24% of GDP in 2020.
- Electrification rate increasing from 5,7% in 2001 to 34% in 2020 (4,5% rural compared to 75% urban).
- Legal Framework supported advancements in terms of policy measures to promote rural electrification (new legal framework).

Proposed Electrification Plans (District level)



Access to Electrification 2015 and 2019



Objective and Research questions

- **Research questions**

- To what extent does electrification lead to movements out of the agriculture sector in Mozambique?

Objective

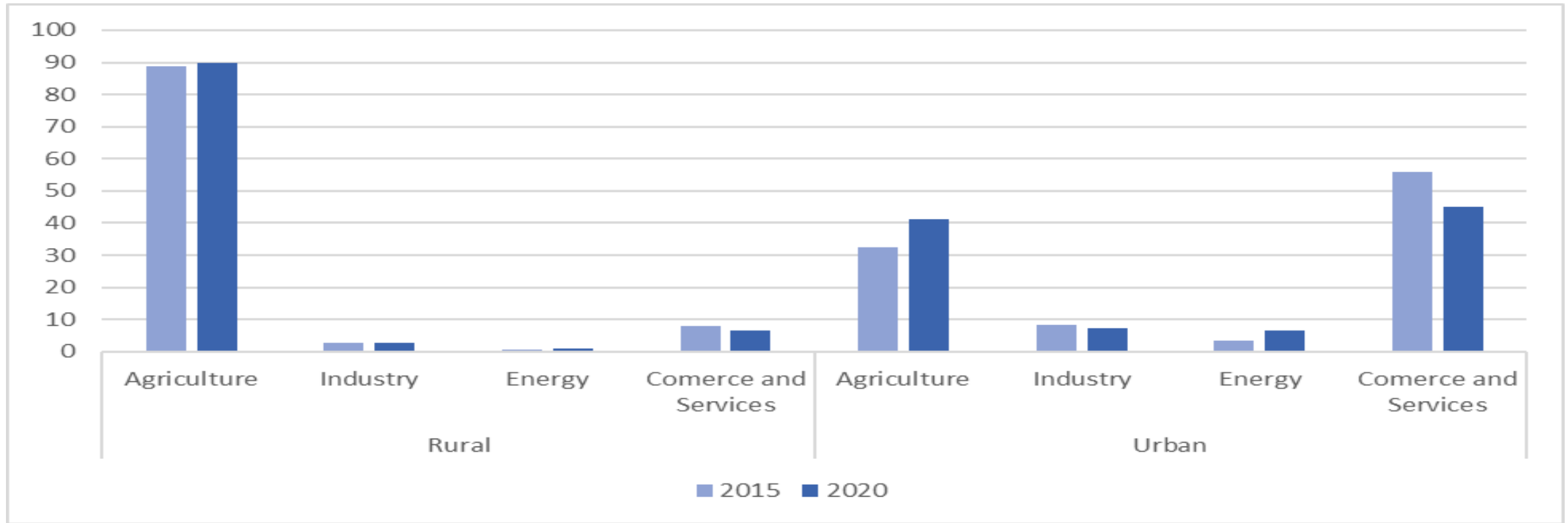
- The aim of this research is to analyze the impact of rural electrification on changes in employment structure.

Literature

- The electrification of rural areas has been shown to have significant impacts on economic development mainly in developing countries. (Litzow et al., 2019; van de Walle et al. 2015);
- Rural electrification has the potential to catalyze economic development, promote industrialization, and create new employment opportunities outside of the agriculture sector (Chhay and Yamazaki 2021);
- Electrification positively affects labor supply and stimulates movements away from the agricultural sector, especially of women (Chhay and Yamazaki, 2021; Salmon and Tanguy, 2016; Dasso and Fernandez, 2015).

Mozambican context

- Majority of the population remains rural (approximately 67% rural population, according to 2017 census)
- An employment structure is heavily dependent on the agriculture sector.



Source: Produced using data from IOF 2014/2015 and IOF2019/2020 - INE (2015; 2020)

Regulatory reforms and private Mini grids roll-out

- FUNAE and EDM, with financial support from donors and cooperation agencies, were responsible for rural electrification;
- Recently the government has approved the Off-grid energy access regulation (Decree 93/2021, from December 10th)
- The new legal framework focus on promoting private investment in rural electrification.



*Alto-Changane 200kWp solar PV mini-grid, Alto Changane, Chiobuto, Gaza
Source: FUNAE (2021)*

Methodology

- Data from The Mozambique Household Budget Survey (IOF) for the years 2014/15 and 2019/2020;
- Electrification Map extracted from the annual reports published by Electricidade de Moçambique EDM (2022);

Methodology

- Hausman-Taylor Model:

$$Y_{dt} = \Delta X'_{dj} \beta + Z'_d \gamma + u_d + \varepsilon_{dt}$$

d ($=1\dots N$) denotes districts,

t ($=1\dots T$) denotes time

- 2SLS

$$Z^i_{dt} = \beta_0 + Z^{ni}_d \gamma + X^1_{dj} \beta + e_{dt} \quad (\text{IV})$$

Descriptive statistics (District Level)

Variable	Full sample				Year = 2015			Year= 2020		
	Mean	Std. Dev.	Min	Max	Mean	Min	Max	Mean	Min	Max
% of workers in Agriculture	0.744	0.235	0.000	1.000	0.752	0.000	1.000	0.736	0.066	1.000
Mean Educ years	3.518	1.517	0.661	7.854	2.643	0.661	7.107	4.450	1.919	7.854
Mean Age	21.012	2.154	15.703	31.596	21.146	15.703	31.596	20.869	15.753	29.210
Mean HH Size	6.326	1.263	4.319	14.207	6.395	4.319	14.207	6.252	4.757	13.203
Mean time school	33.385	23.140	4.531	226.273	32.973	4.656	226.273	33.823	4.531	90.977
Mean time hospital	43.933	30.366	7.286	294.393	33.268	7.463	74.418	55.298	7.286	294.393
Mean time public transport	66.240	62.979	3.388	529.578	63.926	5.364	405.436	68.707	3.388	529.578
Mean time water	14.155	10.660	0.000	82.297	14.137	0.000	82.297	14.174	0.000	82.297
Population Density	0.008	0.022	0.000	0.138	0.007	0.000	0.135	0.008	0.000	0.138
% of Rural Area	0.707	0.352	0.000	1.000	0.712	0.000	1.000	0.702	0.000	1.000
% of Planned Electrification	0.743	0.273	0.200	1.000	0.746	0.200	1.000	0.740	0.200	1.000
% of Access to Energy	0.233	0.265	0.000	0.943	0.204	0.000	0.943	0.263	0.000	0.914
Observations		252				130			122	

Regression results

Dep: Proportion of workers engaged in Agriculture

Variable	Type of Var	Coefficient
Educ years	Tvexogenous	-0.0204***
Age	Tvexogenous	0.00114
HH Size	Tvexogenous	-0.00211
Time school	Tvexogenous	-0.000239
Time hospital	Tvexogenous	0.000492**
Time public transport	Tvexogenous	2.37e-05
Time water	Tvexogenous	0.000884
Population Density	Tvexogenous	-2.143***
% of Rural Area	Tvexogenous	0.217***
% of Access to Energy	Tvendogenous	-0.209***
North (South= Basegroup)	Tiexogenous	0.0993***
Centre (South= Basegroup)	Tiexogenous	0.102***
% of Planned Electrification	Tiexogenous	-0.0648*
Constant		0.661***
sigma_e		0.080
sigma_u		0.074
rho		0.460
Observations		252

Conclusion

- Rural electrification can potentially push households out of subsistence agriculture.
- To maximize potential development gains from electrification, there needs to be a labor market integration plan that follows the electrification.
- Without considering job quality, there are efficiency and welfare gains that result from offering more income generating opportunities to households
- The push to electrify should be accompanied by a labor market structuring plan.
- Rural electrification projects should consider measures to improve agricultural activities (Irrigation and Water pump systems);

Thank You!

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