Low-Carbon Energy Transition in Sub-Saharan Africa and the MENA Region

LY Alpha

Chaire EIEA & Chaire EC
Université Paris-Dauphine & UM6P
PSL Research University
Supervisors: Anna Creti (Dauphine) & Raja Chakir (INRAE)

Matinale sur le programme de recherche joint: Accès universel à l'énergie

Key issues

- Rural Electrification and Deforestation Dynamics : Evidence from Côte d'Ivoire
- Electricity Utilities Performance in the MENA countries: the role of Institutional and Organisational factors
- Electricity Utilities Performance and Energy Transition nexus in the MENA countries
- Does Electrification Reduce the Risk of Sovereign Default? (with Estel, CERDI)

Chaire Energie et Prospérité, Workshop Access to Energy, 14th January 2021

The "packetization" of essential services in developing cities:

Cases on the delivery of water, electricity, and mobility services

- Bangalore, Dar Es Salam, Kampala, Kigali -

Akil Amiraly - Management Research Centre, Ecole polytechnique, CNRS (France)

The « packetization » of essential services in developing cities: Case studies on the delivery of water, electricity, mobility services (Bangalore, Dar Es Salam, Kampala, Kigali)

Objective: Assessing the development of digital leapfrogging technologies + frugal payment models

- **Issue**

  Packetization is the ability to digitize "something"—an activity, a process, a product, or a service—that was previously not digitized (Tiwana 2014)
  « *Packetisation* is the ability to make something affordable and accessible through new forms of service payments" (Modi, interview 2019)

  -> Small transactions in low value where the service delivery is poor

- **Case studies in 3 sectors:**

  Qualitative field surveys with users and promoters of packetized service

  (2019) Water: Water Kiosks (Bangalore: Karnataka State): Packet of Water (5 Rs. for 20 liters)

  (2021) Electricity: Electricity Kiosks (Dar Es Salam: OffGridBox): Packet of Solar energy

  (2021) Mobility: Electric-Two Wheelers (Kampala: Zembo - Kigali: Ampersand): Battery swap

- **Findings**

  How to find the tune balance between **(1)** cost recovery **(2)** capacity to pay
  - Utility: Recover the cost of the service

  - Poor: Heavy constraints on their budget despite the system being designed for them

  # Packet system is even not accommodating their constraints

  # Subsidies goes to the richer sections

  -> Risk of "lock-out" (prepayment of electricity in Zanzibar, Tanzania)

  -> Extreme events in life of people
  (3) financial support syst.-> Loan system by the State

Electrification impact evaluation in Subsaharan Africa

Chloé SAUREL, PhD student, LEMMA

- **Treatment** : electrification at household, village and district levels
- Estimating **spillover effects** of electrification *(Rwanda, Tanzania, Nigeria)*
- Is there a significant impact on **gender inequalities** within households through time ? (education, paid employment...)
- Is there an impact on **couple's negociation strategy** when it comes to decision-making for the family ?
- Impact of electrification on **health-related behavior** ?
- Methodology : difference-in-difference, repeated cross section, randomized control trial
- Use of household surveys, GPS data, Demographic Health Surveys.

EXTREME WEATHER EVENTS (EWE): EFFECTS OF ADAPTATION STRATEGIES ON AFRICAN FOREST COVER

EWE in Sub-Saharan Africa

- RQ: droughts & deforestation interaction; focus on the socioeconomic variables that affect land clearing choices (efficacy of PA during EWE, conflicts, investments).
- Prospective IPPC5 Africa: medium confidence that **droughts** will intensify in the 21st century in some seasons; Increasing temperatures, reduced precipitation and/or increased evapotranspiration → *very likely* to **reduce crop productivity**.
- Context: **98% of agriculture in SSA is rainfed** → the risk of EWE strongly affects poor households; CC will interact with non-climate drivers and stressors to **exacerbate vulnerability of agricultural systems** or multiply existing threats to human security;

Households adaptation strategies & Forest cover change

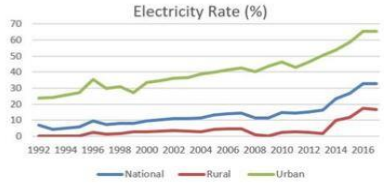
- Linking forests and adaptation: forests allow for **portfolio diversification** and insurance (specialized - diversification - coping strategy)
- Degree of forest reliance defined by: integration of households in the market and the level of use of **Non Timber Forest Product** extracted from the forest (safety net products)
- Twist: excessive forest reliance may induce **changes in forest cover and quality**;

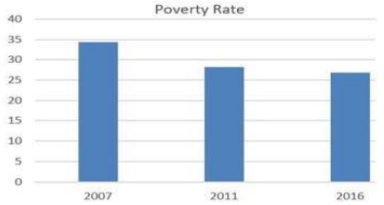
Socioeconomic variables of interests

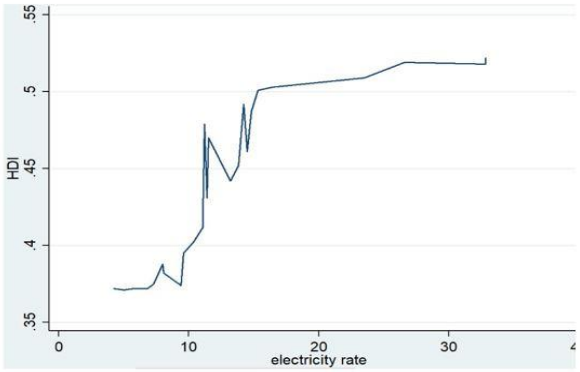
- Drivers of deforestation: **proximate drivers** & **underlying forces** (enabling socioeconomic and environmental conditions).
- Underlying forces: Market and finance instrument access, conflicts & investments (existence of feedback loop), ethnicity, environmental protection policies, **energy access (reduced reliance on fuelwood & development of other economic activities)**, ...

HOW DOES ELECTRICITY IMPACT HOUSEHOLD CONSUMPTION? EVIDENCE FROM TANZANIA

Research Question







Does access to electricity increase the households income?

How does electricity contribute to revenue growth for home-based businesses?

What role does electricity play in job creation by these companies?

Data

Source (SLMS): Panel Survey of Tanzania households (2008-2010-2012)

Sample size : 3087 households

Conclusion

The informal sector, the main provider of jobs in developing countries and in particular in Africa, needs electricity to offer good working conditions to its actors.

Electrification programs can be accompanied by a microfinance program to enable poor households to easily undertake and therefore make better use of their electricity.

Results

Consumption (per adult equivalent) has doubled after household access to electricity (between 2008 and 2012)

Electricity access has not significant effect on household business incomes

Capital stock increases household business income by 45.5%/ 59.3%

Electricity has negative and non significant impact on employment number

It has positive and non significant impact on employment probability

Capital stock has positive effect on household employment number and probability

Energy consumption patterns among Moroccan households

Maryème Kettani, Université d´Evry Val d´Essonne, CEA/I-t ésé, Paris, maryeme.kettani@gmail.com
Maria Eugenia Sanin, Université d´Evry Val d´Essonne, Paris, meugenia.sanin@gmail.com

Chair Energy & Prosperity

1. Reasearh Question

- What are the main patterns in the residential energy consumption in Morocco? Who suffers from energy poverty?

2. Main findings:

- In line with previous literature income, household size, geographic location and dwelling type are the most significant drivers of energy consumption. The education level seems to have a significant impact only for electricity expenditures, but not for butane
- As income increases, the share of energy expenditures in total households' expenditures decreases from 10% in Quintile 1 (the poorest) to 3% in Quintile 5 (the richest)
- 20% of households (1.4 million households) mostly belonging to Quintile 1 are in a situation of energy poverty

3. Importance :

- First study
- Limited access to other independant variables: appliance ownership, energy prices …

4. Perspective :

- Forecast future energy demand based on the variation of independant variables (impact of ubranization, higher level of education or income growth)
- Targeted energy policies to renewables may deepen affordability issues

Does Financial Inclusion Facilitate Solar Panels' Adoption? Evidence from Tanzania

Mamadou Saliou Barry[a] and Anna Creti[a]

[a] *Université Paris-Dauphine – Climate Economics Chair*

Access to electricity in Tanzania is very low. Only 36% of population have access to electricity.

Solar home systems can be a viable solution for many people. However, its uptake is still very low.

- Credit constraint and lack of access to financial are the main culprits.

This paper examines the effect of mobile money on households' decision to buy solar panels for electricity access in Tanzania.

Data : First wave of the refreshed sample of the Tanzania National Panel Survey

Main results :

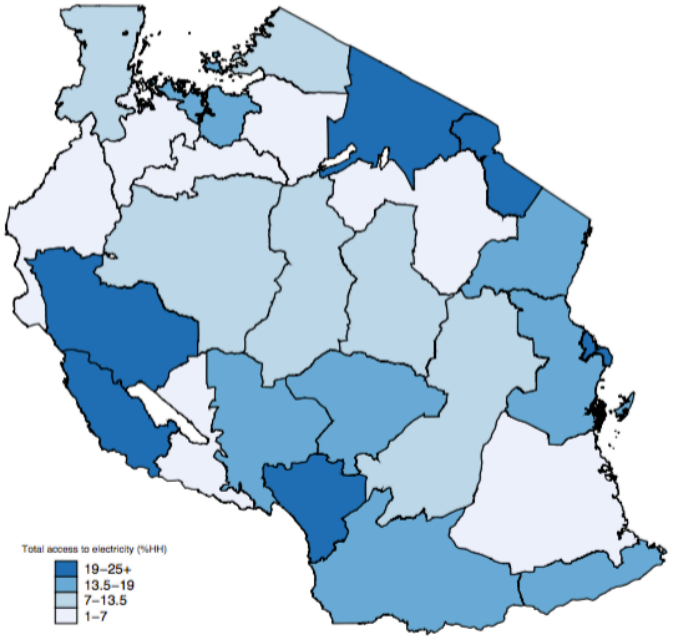
- We find that the odds of buying solar panels is 2.65 times higher for mobile money using households than non-using ones.
- We also find that the effect of mobile money on solar panels' adoption to be positive and statistically significant for only poorer households.

Main channels at play :

- Reception of remittance, access to credit and off-farm revenue generating activities are the mediating channels through which mobile money affects solar panel adoption.

Policy recommendations :

- Extend financial services to poorest
- Accelerate the integration of mobile money solutions in the business model of energy service providers.



Access to electricity % of households