

ENERGY ACCESS IN DEVELOPING COUNTRIES: THE ROLE OF ELECTRICITY GENERATION

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Presentation structure

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Introduction

- ▶ Although the world is moving towards universal access to energy, the main target of Sustainable Development Goal 7 (SDG 7), more than 600 million people will still not have access to electricity in 2030 if expansion trends continue.
- ▶ Thus, the main objective of this study is to analyze and evaluate the differential effect of access to electricity in developing countries between 2000 and 2019.
- ▶ RESEARCH QUESTIONS
- ▶ (i) What are the main sources of electricity access in developing countries?
- ▶ (ii) What are the mains equality in access to electricity in developing countries?

Literature review

- ▶ In the literature review focusing on access to electricity in developing countries, there appears to be a "gap" in the analysis and evaluation of metrics that influence energy poverty (access to electricity) at the generation level.
- ▶ Another contribution of this proposal is that, in order to validate the relationships/equations formulated in the econometric estimation, several quantile regression models will be applied to the panel of developing country economies considered in the analysis.



Theoretical framework

- ▶ The theoretical framework introduced by Boldyrev et al. (2019), denoted as the "Deterministic Management Model of the Socio-economic Development of the Region".
- ▶ Naturally, access to sources through coal correlates with factors of access to sources through natural gas (NG) (s2), oil production (P3), nuclear sources (N4), and the penetration of renewable sources (ER5).
- ▶ In an economy with high rates of access to electricity through fossil fuels, greater access to electricity is expected. The s5 relationship exhibits negativity as it encounters challenges in integrating or generating mix of the national power generation systems.

Data and methodology

- The sample is composed of twenty-five (25) countries.
- To analyze the inequality in access to electricity in developing countries, through the source of its generation, quantile regression (QR) models were chosen.

Table 1 – Description of variables

Variable	Unit	Acronym	Source
Dependent variable			
Acess to electricity	% AE	AE	worldbank.org
Independent Variable			
Coal	% C	C	OMS
Natural Gás	% GN	GN	OMS
Oil	% P	P	OMS
Nuclear	% N	N	OMS
Renewable Energy	% ER	ER	worldbank.org

Source: Own elaboration



Results and discussions

- ▶ The results suggest that developing countries currently tend to use coal and certain renewables (i.e., hydropower) to provide access to electricity.
- ▶ Other important findings may demonstrate that there is less access to energy from gas, oil and nuclear sources.
- ▶ However, these sources can become smaller and more limited over time. These findings make it possible to affirm that access to energy is differentiated and that the energy policies designed can contribute to achieving the SDG 7 2030 goal.
- ▶ The strict interpretation to be made is that 25% of developing countries have access to electricity of up to 0.7121. Similarly, the value of 0.79013 represents that 50% of developing countries have access to electricity in this proportion.

Table 2- Quantile Regression - Bootstrap 25, 50.75, 90% access to electricity (African Countries 14)

	Q25	Q50	Q75	Q90
C	0.7121*** (0.1681)	0.79013*** (0.29413)	1.1212*** (2.9413)	8.9613*** (1.1913)
GN	-0.01624*** (0.04636)	-0.0187*** (0.03297)	-0.1298*** (0.02306)	-0.059*** (0.00167)
P	0.011866*** (0.0261)	0.01526*** (0.01556)	0.11991*** (0.01398)	0.04341*** (0.01049)
N	0.9451 (0.0111)	-0.9651 (0.14111)	2.4812 (1.1913)	-1.3612 (9.7712)
ER	0.06445*** (0.1498)	0.01887*** (0.12558)	0.0006*** (0.0788)	0.2547*** (0.1253)
CONST	25.8266*** (0.31745)	38.4745*** (2.1344)	55.4384*** (2.8659)	75.7625 (1.6585)
Observações	750	750	750	750

Note: standard errors in parentheses. p-Value ≤ 1%. **p-Value ≤ 5%. *p-Value ≤ 10%.

Tabela 3 – Quantile Bootstrap Regression 25, 50.75, 90% of Electricity Access (Asian 11 Countries)

	Q25	Q50	Q75	Q90
C	1.2312*** (2.7713)	3.9912*** (4.3513)	4.0212*** (4.3513)	3.6612*** (4.6913)
GN	0.05864*** (0.01608)	0.002856 (0.02385)	-0.0599** (0.001967)	-0.12795** (0.006224)
P	2.4511 (1.7611)	8.1911* (4.0211)	1.1010*** (2.6411)	6.0911*** (5.2611)
N	0.02051 (0.008443)	-0.1306*** (0.01445)	-0.2393*** (0.01992)	-0.3227*** (0.02285)
ER	0.0954 (0.08443)	1.4528*** (0.28498)	2.817*** (0.037385)	0.39561*** (0.33037)
CONST	5.3317 (2.56549)	24.9758*** (0.284981)	51.3999*** (3.86876)	73.5901*** (9.6868)
Observação	756	756	756	756

Conclusions

- ▶ This research used the quantile regression (QR) method to investigate developing countries' access to electricity. Significant differences were found in the estimates between quantiles.
- ▶ Developing countries' access to electricity varies according to the source of power generation.
- ▶ QR described very well the distribution of access to electricity in developing countries. The coefficients that are generally assumed to be constant are distinguished by the quantile and showed statistically significant differences at the level of 1%.





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Thank you very
much!