Microsimulation Project : Electricity Demand in Mauritius

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January, 2017

Outline

Microsimulation

- Econometric Model
- Generalization of Economic Policies

Econometric Model

An econometric model is ran in order to enable the production of a simulated economy. Using the data set from Mauritius containing some microeconomic and macroeconomic variables, the elasticity income-electricity demand is generated through a quantile regression. This regression provides the estimates of the energy demand variations in response to a shock on the income variable. These estimates correspond to the elasticity per class of income among the households: the effect of a variation of 1 percent on the income variable on the electricity demand.Once these results are obtained, the impact of an economic policies regarding the electricity demand can be quantified.

Micro-simulation

The principle of a micro-simulation model is to based on a base trend, simulate an environment by attributing new factors to the latter or by modifying its characteristics in order to study the response after these changes. In the energy demand set-up, scenarios are created each corresponding to an economic policy designed to foster electricity access by shocking the income variable. The relation between income growth and electricity demand in developing countries is at this moment a very hot topic dividing the economists, as some studies have shown that an increase in income leads to an increase in electricity, others argue the reverse relationship. From the data used for this study, it appears that an increase in income generates a higher demand in electricity. However, the budget constraints is not taken into account in this model, the data does not provide an income ratio specific to electricity consumption.

[0] The scenarios are described on page 6

Table: Scenarios: Economic Policies

Scenarios	Description	Overall GDP Rate
Base Scenario	Using an income growth rate of 3.0 percent as forecasted in 2008	3.0 %
Scenario pro-poor	In this scenario, the bottom 25 percent receive an amount of 6.909 dollars corresponding to the cost of mean electricity consumption (53.146KW) observed in 2014	3.0%
Scenario pro-poor and medium class	This scenario stimulate the economy by providing fund to the bottom 25 percent as in the pro-poor scenario, and in addition, it distributes half of the cost of the mean electricity annually consumed to the households belonging to the income class 25-50 percent	3.0%

Results

The base scenario is considered to be a state free of action. And will be used as a comparison basis. The following table will contain the results obtained from the different scenarios for years 2020 and 2030. [1]

[1] Table page 8

Table: Results

Scenarios	Electricity demand for the bottom 25 percent	Annual Electricity demand for the bottom 50 percent in KW	Total Weighted Electricity demand within the Population
Base Scenario	*160953.7 [2020] - 160953.7 [2030]*	*321907.3 [2020]- 362552 [2030]*	*69542341 [2020]- 78304773 [2030]*
Scenario pro-poor	*152602.5 [2020] -170139.5 [2030]*	*305205 [2020]-340278.9 [2030]*	*68359574 [2020]-76459208 [2030]*
Scenario pro-poor and medium class	*179526.6 [2020]-198259.3 [2030]*	*359053.2 [2020]-396518.6 [2030]*	*75540896 [2020]-83756012 [2030]*

Summary

- There is a marginal effect between a shock in income and electricity demand depending on the time frame.
- The bottom households with the lowest income are more elastic to a shock in income compared to the rest of the population.
- Therefore, the pro-poor policies are likely more effective in terms of increasing the electricity access.
- These policies have the same effect on the inquality indicators (Gini,Entropy...)

- Outlook
  - Having access to the budget constraints can be very crucial in fully controlling the impact of a policy on the electricity demand