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# Price elasticity of demand for fuels by income level in Mexican households☆

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ABSTRACT

The price elasticities demand of electricity, gas, oil fuel, gasoline and steam coal are estimated using household surveys from 1992 to 2014. The analysis uses alternative econometric techniques – OLS, SURE, and Quadratic Almost Ideal Demand System (QUAIDS) – the last of which is based on the methodology of Banks, Blundell and Lewbel considering socioeconomic characteristics of the households to account for the difference in demand of energy related goods. It is found that the demands for fuels are price inelastic, and the differences in elasticities between poor and non-poor households are small but statically significant. The income elasticity of demand is generally found to be positive and higher in absolute value than price elasticity, and the differences are greater between poor and non-poor. Consequently, there would be a differentiated reaction of consumers to changes in energy prices according to their poverty status. Steam coal and firewood, each of which could be considered inferior goods, stand as counterexamples in that the income elasticity is found to be negative. The contribution of this study helps policy makers to analyze household welfare when applying changes in energy prices in the face of fiscal and/or energy reforms, such as those Mexico is implementing.

## 1. Introduction

In 2010, Mexico committed to reduce up to 30% of its greenhouse gases emissions (GHG) by 2020 compared to a baseline scenario, and 50% in 2020 by 2050. This commitment is a challenge for a country in which energy infrastructure needs improvement, energy services are provided historically by government monopolies, the economy is highly dependent in oil price and remittances, and high-stake reforms made by a previous administration – spanning energy, fiscal, labor and education – are being reversed. In addition, the latest poverty measures reveal that poverty has increased, a signal that something in the socio-political construct in Mexico is not helping the fight to reduce poverty. Measuring the collective impact of strategies that aim to reduce greenhouse emissions and reduce poverty starts with analyzing energy consumption in poor and non-poor households, accounting for the official definitions of poverty used to design social programs and energy pricing decisions.

The provision of basic services to the entire population in Mexico has been steadily increasing in the last few decades. This can be seen with various energy services, as the percentage of the population connected to the electricity grid has increased 70 percentage points in the last 55 years (see in Graph 1). However, the services that are provided to a substantial percentage of the population come from government monopolies through pricing schemes that are highly regulated with relatively low-quality. For instance, electricity blackouts have occurred in major areas of the country when power demand is high; potable water is not provided to all municipalities; and, some communities do not have distribution pipelines to receive natural gas, which forces them to use alternative, often less environmentally benign energy sources for heating and cooking.[1]

Electricity service is provided by the Federal Commission of Electricity (CFE), a regulated institution of the Mexican government. Past research using CFE tariffs and average consumption has shown that short run price elasticities range from −0.348 at national level to

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[1] In fact, many poverty studies in Mexico use the variable "ownership of an electric domestic appliance" as proxy of electricity infrastructure in the area; the same happens with the variable "ownership of a gas stove".

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