Energy subsidies: conceptual framework and measurement for distributive impacts in Argentina

Presentation in English

Alberto Porto, CEFIP and ACNE, +5492215465038, porto.alb@gmail.com
Jorge Puig, CEFIP and CEDLAS, +5492215419100, jorge.puig@econo.unlp.edu.ar
Octavio Bertín, CEFIP and CEDLAS, octaviobertin2001@gmail.com
Thomas García, CEFIP, thomasgarciaag@gmail.com
Francisco Pizzi, CEFIP, fmpizzi@hotmail.com
Julián Puig, CEFIP, julianmpuig@gmail.com

Overview

Argentina has massively subsidized energy in recent decades and is in the ranking of the top 25 countries that subsidize energy worldwide (IEA, 2022). The distributive impact of these subsidies has been largely studied but regional disparities and public financing are two usually omitted dimensions by previous research. In this paper we extend the analysis in those directions with theory and measurement focusing on the electricity sector. First, we develop a conceptual framework to formalize the departure of prices from production cost, following the literature on the design of prices for public services. Second, combining micro-data from Argentina households' surveys and sectoral administrative data, we measure the subsidies at the household level, and we perform distributional analysis. Our results indicate that regional disparities in the costs of electricity distribution and in the prices set by the distribution companies are key drivers of subsidies' distributional incidence. Also, omitting subsidies' financing leads to bias the belief about their redistributive effect. A series of globally relevant policy recommendations (on subsidies' inefficiency, their weak distributive impact, the importance of financing, regional differences, the irreversibility of public policies, and the need for a robust conceptual framework) can be derived from the paper.

Methods

For measurement purposes we combine micro-data from Argentina households' surveys and sectoral administrative data (i.e., prices and costs of electricity). We extend the analysis from the Metropolitan Area of Buenos Aires (from now on, AMBA) to five additional provinces representative of all regions of the country that adequately capture regional disparities. These provinces are Cordoba, Jujuy, Mendoza, Rio Negro, and Santa Fe which jointly with AMBA account for more than 65 percent of the country's residential electricity consumption.

First, we order individuals by per capita household income, and we build deciles. Second, quantities are retrieved from expenditures after deducting taxes and using the tariff charts for final users. Third, we compute electricity costs which reflect generation, transmission, and distribution. Generation and transmission costs are determined in the Wholesale Electricity Market (WEM). In order to coincide with the year of the microdata we rely on the figures for the year 2018. Using the peso-per-dollar exchange rate ($28.85/USD), the unitary cost for generation and transmission was 2.20 $/Kwh. Distribution costs are determined by the cost structure of each energy distributor company (i.e., distance to final users, operational efficiency, etc.) and are not homogenous throughout the country.

Residential users pay an electricity bill that contains a fixed and a variable component. Final prices reflect a distributional criterion as distributors set higher prices for higher consumption levels. Additionally, there is a social tariff for less well-off families. The eligibility criteria are based on the income level and socioeconomic condition of the main service holder. Then, prices are personalized for each household.

We then focus on the departure of prices from costs. It mostly takes place in the WEM as, since 2002, the national state has sold electricity below the cost of production. See Giuliano et al. (2020) for further details on this background. In 2018, distributors paid a unitary price of 1.17 $/Kwh. Thus, the difference between prices and costs in the WEM was 88 percent (as a share of the price). The homogeneous margin at the WEM becomes specific for each household (in each jurisdiction) given the conjunction of several factors: the distribution costs of each company in each jurisdiction, the resulting final prices set by the distributors, and the social tariff subsidy which enables beneficiaries to pay a reduced price of electricity. Lastly, we consider a financing scheme, naturally not exhaustive as it is selected to just illustrate a conceptual point. Here it is important to note that a share of the electricity subsidies is already financed with taxes (i.e., the VAT collected through the electricity bill itself). The remaining -to guarantee balanced budget- is assumed to be financed via general VAT. So, we rely on the standard translation assumptions: VAT is supported by final consumers. We distribute the tax using the total household expenditure on goods and services and then we compute the net subsidy.

Results

The results and contributions of our paper are twofold. Firstly, we show regional disparities between provinces regarding prices, the departure of prices from costs, subsidies received, taxes paid and the net subsidies. We have found that all considered provinces show an increasing pattern of consumption with respect to income, but some jurisdictions,

such as Córdoba or AMBA show larger levels of consumption. Then, while generation and transmission costs are homogenous across the country, the distribution costs present regional disparities, being greater in Córdoba and Santa Fe than in AMBA or Rio Negro. This heterogeneity results in regional differences not only regarding final consumer prices, but also in the departure of said prices from costs. As final prices, which are personalized for each consumer in each province, are lower than costs, margins are negative and, in absolute value, larger in the AMBA or Jujuy and smaller in Córdoba or Mendoza. These disparities are crucial determinants in the regional disparities found in the distributive incidence of subsidies.

Secondly, regarding the *net* incidence of energy subsidies considering a balanced budget, we have found the well-established result that progressivity is strongly attenuated when introducing the financing scheme. Across all jurisdictions, the net incidence is still progressive and positive for almost all deciles of income. However, the magnitude of the effect is largely weakened; for example, in AMBA, the poorest deciles a household in the poorest decile received an average of 4.1 percent of its income in terms of electricity subsidies. In turn, it contributed to the financing of the subsidies with 2.2 percent of its income in terms of VAT. In net terms, the average poorest household gained 1.9 percent of its income. We have found the same result across all jurisdictions.

The previous result can be thought of in the framework of other alternatives to financing subsidies. For example, Argentina is currently experimenting with high inflation which can be considered as another source of financing for the subsidies. Assuming that inflation is regressive, conclusions can be drawn based on previous findings. In the same spirit, a comprehensive distributional analysis should look at subsidies against spending. Higher energy subsidies can substitute public spending with strong power to redistribute such as spending on education (Ebeke & Ngouana, 2015).

Conclusions

Based on the conclusions of the paper, we believe that a series of globally relevant policy recommendations can be derived. First, prices below the marginal cost of provision (due to subsidies) are not usually a recommended instrument for income redistribution as leakages towards higher-income groups can often take place. They should only be considered when policymakers have no other viable policy instruments available. Most of all, if electricity consumption exhibits low correlation with income. In this sense, our paper reinforces Levinson and Silva (2022) remark on electricity pricing: "*… is an indirect tool for addressing income inequality. Perhaps, unsurprising, it is not an effective tool.*" Second, it is worth noting that even with leakages, the subsidy can be progressive since the subsidy-to-income ratio decreases with increasing household income. However, we recommend evaluating the distributive impact of subsidies considering Musgrave's (1964) observation: both sides of the budget must be considered. Third, beyond the distributive impact, it is recommended to consider the efficiency-equity trade-off. Subsidies are inefficient from an economic point of view as they reduce production and increase consumption. Even with a balanced budget, the economy's average income decreases due to these reasons (i.e., the equality between the marginal value of the good for consumers and the marginal cost of production is broken). Subsidies may improve equality but decrease the average income due to inefficiency. This is a common result in public policies: equality comes at a cost in terms of efficiency, and it is necessary to focus on measures with minimum cost (e.g., financing with fixed charges, segmentation, etc.).

Fourth, it is recommended to consider the "irreversibility of subsidy policies": once established, they are difficult to remove. This characteristic is common in budgetary policies. The Argentine experience shows the difficulty of reversing subsidies. The government that took office in December 2015 attempted to reverse the sizeable subsidies (Giuliano et al., 2020) and faced legal problems and great social and political resistance, leading to abandoning the policy in 2019 and maintaining it thereafter. Since mid-2022, attempts have been made to mitigate the burden of subsidies.

Finally, the paper recommends analyzing both public policies in general and those that particularly affect the energy sector based on solid and well-established conceptual frameworks. This will provide accurate guidance in the analysis and yield well-founded conclusions that lead to good policy recommendations.

References

Ebeke, C.H, & Ngouana, C.A. (2015). Energy Subsidies and Public Social Spending: Theory and Evidence. International Monetary Fund. IMF Working Papers 2015/101.

Giuliano, F., Lugo, M.A., Masut, A., & Puig, J. (2020). Distributional effects of reducing energy subsidies: Evidence from recent policy reform in Argentina. ***Energy Economics***, 92(C).

Hancevic, P., Cont, W., & Navajas, F. (2016). Energy populism and household welfare. ***Energy Economics***, 56(C).

IEA (2022). International Energy Agency. www.iea.org/statistics.

Levinson A. and E. Silva (2022): "The electric Gini: income redistribution through energy prices", ***American Economic Journal: Economic Policy***", 14 (2).

Musgrave, R. A. 1964. Estimating The Distribution Of The Tax Burden. ***Review of Income and Wealth***, 10(1).

Navajas, F. H. (2009). Engel curves, household characteristics and low-user tariff schemes in natural gas. ***Energy Economics,*** 31(1), 162–168. https://doi.org/10.1016/j.eneco.2008.09.005.