REASONS FOR ELECTRICITY OUTAGES IN CHILE: REGULATORY IMPLICATIONS

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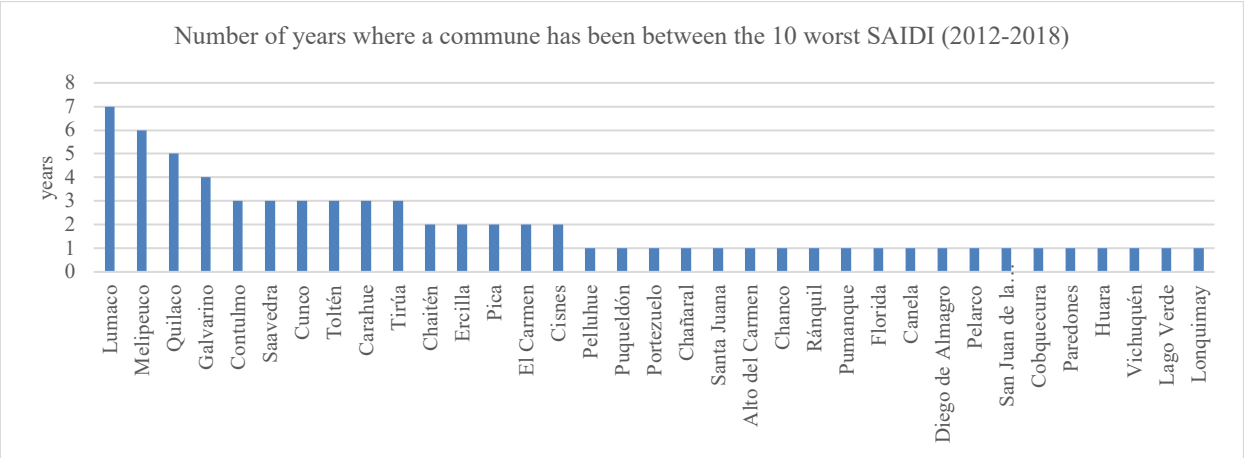
Overview

As Chile has developed economically, the public services that citizens use have also done so. Having reached an electrification coverage of 99% in the country, in recent years the challenge in electricity distribution has been in the quality of the electricity supply that users receive. The national averages of 15 hours of electricity outages during the last seven years hide a great heterogeneity, with communes that exceed 100 hours a year. The 2050 energy policy defined in 2015 [1], aims to reach an annual average of one hour of outages per year. This goal is particularly important to advance in electrification as a sustainable measure to reduce global emissions. In terms of energy consumption, electricity represents a 22% and projections are that this share will keep growing, considering than electricity generation is becoming more renewable each year[1].

Up to our knowledge there is no detailed study of both historical, geographic and demographic factors that describe the country's situation in terms of outages and how the regulatory model in distribution sector influences these results. All this contributes to the current discussion regarding changes to distribution regulation in order to cope with energy transition.

The Chilean regulatory model in electricity distribution is famous in the literature. As [2] mentions, efficient-firm regulation was conceived in the early 1980s, even before than the liberalisation of the electricity supply industry in UK. Many electricity regulators have sought to replace the traditional cost-plus regulation with incentive regulation models, and in the case of Chile, they developed a reference firm approach [3]. The problem with incentive regulation is that sometimes the quality of supply is not properly addressed in such a framework [4, 5, 6]. As a developing nation, Chile focused on the 80s and 90s on cost-efficient supply and only recently quality of service in distribution became an issue. Also, in order to reduce the regulatory cost, tariffs are settled by groups of firms, usind a representative distributor to estimate the efficient-firm. Then, it is important to address how the incentive model has been working.

First, we characterize the evolution of the number of hours of interruption per year during the period 2012-2018 by commune throughout the country. Several communes remain between the highest levels of outages along the entire period. All these communes are in rural or aisolated areas.



Secondly, we identify main determinants in terms of seasonal, geographical, demographic and climatological factors for the evolution of outage hours. There is a characteristical seasonal pattern, since outages typically increases in

[1] Chilean goverment has reacently announced a plan to close all coal plants by 2040 and to become carbon-neutral by the same year.

winter. There is also a positive correlation between rural areas and low income communes that makes difficult to understand the main driver of outages. Finally, taking into consideration the last couple of tariffication processes (2012 and 2016), we analyze the behavior of outages in the distribution sector by group of firms and by reference company of each group.

Methods

An econometric and statistical analysis has been carried out based on the following information and empirical strategy based on [7]:

1) The SAIDI indicator (System Average Interruption Duration Index) that provides the Superintendence of Electricity and Fuels for all the communes of the country will be used as indicator of electricity outages, separating them in interruptions due to failures in generation-transmission and distribution, as well as by force majeure.

2) As determinants that could affect the interruptions, following international literature, we will use indicators of community income, urban-rural relationship, characteristics of distribution companies and relevant climatic events (rains, temperature and wind speed).

Results

As it is expected, the characteristics of the network in terms of density favor an improved quality of service, while climatic events and their seasonality go in the opposite direction. Here it is relevant to analyze whether climatic events have increased their effects in the hours of outages. There are also differences between communes with greater presence of urban networks versus rural networks. But it is also interesting differentiating effect between companies that are cooperative from those that are not. Even though several cooperatives can have a good quality of service, we find a negative effect on average. Finally, the regulatory model has an impact too, since reference firm has in average a lower level of outages than the rest in the group.

Conclusions

This paper shows that besides demografic or geographic considerations, historical features of the distribution network as well as regulatory design have a relevant effect of quality of service when we look at outage hours. Since energy transition is electrifing several item in energy consumption as transportation, it is important to update the regulatory framework in order to developing countries can catch up in terms of quality of service, taking into consideration tha infrastructure conditions.

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