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Performance and efficiency in Colombia's power distribution system: Effects of the 1994 reform

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Abstract

We assess evolution in performance, efficiency and productivity of Colombia's power distribution utilities before and after the 1994 regulatory reform that introduced electricity market activities for the power sector in 12 distribution companies from 1985 to 2001. Performance is evaluated contrasting changes in mean and median by Wilcoxon Rank Sum and Pearson tests on financial and other performance indicators. Technical efficiency is measured by means of Data Envelopment Analysis (DEA). The nature of the dataset allows the estimation of Malmquist productivity index and its evolution in time. Results show a recovery after the reform in the main performance indicators of profitability, partial input productivity, and output. Plant efficiency and productivity increased after the reform, mainly in the largest utilities used as benchmarks in the DEA efficiency scores measures. Meanwhile, the less efficient power distribution companies did not improved after the reform and were not able to undertake plant restructuring to catch-up in plant efficiency with respect to the Pareto efficient input allocations. Econometric results on DEA efficiency scores suggest a positive effect of policy reform.

JEL classification: L510; L940; Q490

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1. Introduction

The 1994 regulatory reform of the Colombian power sector was one of the first reforms in Latin America to introduce a market system for wholesale electricity transactions, and the first to

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implement a bidding system for its pool electricity market in the region. In this sense, the reform took a step forward from the Chilean and Argentinean experiences, where wholesale electricity prices were based on declared costs rather than on marginal supply prices by 1994.[1] The reform introduced competition, established a new industry structure and a new independent regulatory agency, set up the basis for expansion and diversification of power generation sources, and improved both the sector's efficiency and reliability.

The reform focused on offering incentives for utility efficiency and productivity levels through the introduction of market competition, independent grid access, and markup price regulation for power distribution. Inspired by the British reform, the regulatory reform split the traditional vertical monopoly structure of the power sector into four different activities: generation, transmission, distribution and commercialization of electricity. Power distribution by a domiciliary public service provider faces two types of regulation. The first one is price regulation. The regulatory commission, *Comisión de Regulación de Energía y Gas (CREG)*, currently sets the markup formula for distributors and the design of the pass through component in the final user's tariffs. In particular, CREG determines: i) direct purchase costs such as the pool sale price and transportation charges, ii) capacity charges, and iii) costs of the reserve provisions to stabilize the system and prevent bottlenecks in the transmission system.[2] The second type of regulation concerns quality control, companies are subject to sanctions if their service fails to meet minimum quality standards. The reforms and regulations led power holdings to undertake a generalized divestiture process across electricity holdings in order to fully separate power generation, transmission, distribution, and the setting up of new commercialization activities. Thus, privatization arose as one instrument for promoting market competition and industry restructuring, and became a complementary policy within a broad deregulatory context.

The aim of this paper is to provide new empirical evidence on the effects of the regulatory reform in power distribution in Colombia. To the best of our knowledge there is no micro-study assessing the effects of a regulatory reform for power distribution. Nonetheless, several studies on the Colombian electricity sector after a decade of the regulatory reform have been published recently. Pombo and Ramírez (2005) test performance in privatized power holdings and measured plant efficiency for Colombia's thermal stations showing a generalized increase in productive efficiency due to market entry, introduction of cost-saving technologies, and a positive effect of the new regulation that implied the setting up of a non-regulated market of large clients that boosted transactions of forward electricity contracts. García and Arbelaez (2002) evaluate the likelihood of merging among power generators acting in the wholesale electricity market. Larsen et al. (2004) present a set of aggregate statistics of Colombia's power sector to highlight the lessons derived from the implementation of market deregulation policies in Colombia for network industries since 1994.

Despite the above, studies on several dimensions of the electricity market are still pending, i.e., price collusion in the pool market, consumers' welfare effects, quality regulation and

[1] A presentation of the regulatory reform in Colombia can be found in Pombo (2001). Estache and Rodriguez-Pardina (1998) and Mendoça and Dahl (1999) outlines a general presentation of the process in Latin America. Guash and Spiller (1999) and Kessides (2004) are comprehensive presentations of privatization, regulatory policy instruments, contract designing and results for several Latin American and developing countries. Nonetheless, the development of the power sector in Colombian has been poorly documented. IADB (2001) (Inter-American-Development-Bank) provides a short analysis of the sustainability of the power sector reforms in Latin America. For an international review see Newbery (1999).

[2] For details on the British and Colombian formulas see Green and Rodriguez-Pardina (1999) and Pombo (2001).