

Will the liberalized market be sufficiently competitive?

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Overview

An essential aspect that must be considered in the evaluation of potential benefits and risks of electricity market liberalization is the degree of competition that can be expected given the market structure. An ex-ante evaluation is challenging, but important insights can be obtained from computer simulations considering the market structural features.

In this paper computer simulation is employed to evaluate how the Brazilian electricity market is likely to behave if a bid-based dispatch is adopted.

Although market reforms in the mid-1990s liberalized the commercialization of long-term electricity contracts in Brazil, the operation (dispatch) and spot pricing continue to be determined by official computer models under the supervision of the System Operator.

While the arrangement has preserved the synergetic gains of centralized hydroelectric optimization models, it has also given rise to frequent regulatory disputes and major difficulties to implement needed adjustments and improvements in the computer models due to the mixed interests involved.

Looking ahead, further market liberalization may be the most promising way to optimize Brazil's electricity system as it faces major changes in the system configuration (i.e electricity matrix).

Brazil's electricity power supply is derived primarily from hydroelectric power plants. The annual hydro inflows present high variation from year to year, which makes hydro reservoir management a major concern. Furthermore, many of these power plants are situated on the same waterways, which means there are significant operational interdependencies between hydropower plants.

Methods

The computer simulation methodology utilizes the Cournot-Nash concept to evaluate the expected market equilibrium given the ownership structure of the generating power capacity. Given the large share of hydroelectric generation in Brazil, it is useful to evaluate the market equilibrium under considering the hydro generating capacity of the different hydropower plants in different inflow scenarios (historical highs, historical lows, El Niño, La Niña...).

Results

The use of computer simulations used in this paper to evaluate likely market equilibrium in the Brazilian electricity market may be useful for other jurisdictions that may be considering market liberalization. Furthermore, the insights obtained from the analysis of various policy issues may be useful in other contexts as well, such as market design choices, major regulatory measures and of required divestiture that may be imposed on the largest market players (such as of state-owned companies).

A sensitivity analysis of the main parameters is performed to evaluate the robustness of the results. Simulations can also be used to evaluate the impact of different market design choices (degree of long-term contracting, different types of hedging contracts), price caps and divestitures.

Conclusions

While market structure is a central driver of market competition, market design choices and regulatory measures and market monitoring can be adopted to significantly mitigate potential market power problems.

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