Forward-Looking Behavior in Electricity Auctions: The Case of Colombia*

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Abstract

In this paper we test for forward-looking behavior in electricity auctions in which hydro-power is the dominating generation technology. Although this technology allows for virtually zero variable production costs, the possibility to store energy —in the form of water— allows firms to switch generation from one period to another, thus creating non-trivial dynamic incentives. We set up a dynamic multi-unit auction model to characterize bidding behavior in hydro-power dominated electricity markets. Our model implies that, in order to maximize expected profits, hydro producers submit bids above their marginal production costs to account for (i) strategic effects due to current period competition and (ii) the option value of waiting (i.e., holding on to water). We then show how to test for dynamic behavior when data on variables that exogenously affect future water stocks are available. Moreover, given that optimal bids are determined as the equilibrium of a game, we show that even players that do not have dynamic incentives will appear as if they are also forward-looking due to the strategic interaction in the current period. We test the predictions of our model using data from the Colombian spot electricity market. We find evidence consistent with both dynamic and strategic behavior.

Keywords: Dynamic auction model; Bidding behavior; Market power; Electricity markets.

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