Auctions with Unknown Capacities: Understanding Competition among Renewables*

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Abstract

The transition towards renewable energies will imply a change in the competitive paradigm of electricity markets. Competition-wise, one distinguishing feature of renewables versus fossil-fuels is that their marginal costs are known but their available capacities are uncertain. In order to understand competition among renewables, we analyze a uniform-price auction in which bidders are privately informed about their capacities. Due to capacity uncertainty, renewables mitigate market power as compared to conventional technologies, even though some market power remains. In particular, firms exercise market power by either withholding output when realized capacities are large, or by raising their bids above marginal costs when realized capacities are small. Since markups are decreasing in realized capacities, a positive capacity shock implies that firms offer to supply more at lower bids, giving rise to lower but also volatile market prices. An increase in capacity investment depresses market prices, which converge towards marginal cost only when total installed capacity is sufficiently large (or when the market structure is sufficiently fragmented).

Keywords: multi-unit auctions, electricity markets, renewables, forecasts.

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