

Robustness of various capacity mechanisms to regulatory errors

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During recent years the idea of regulatory interventions to ensure that sufficient generation capacity is constructed has regained popularity among governments. Regulators in Columbia, Netherlands, Ireland, Spain, France, Germany, Great Britain and Sweden have either considered or implemented different forms of capacity mechanism. This raises the question about the relative efficiency of capacity mechanism designs. While many authors have analysed the impact of forward markets and voluntary option contracts between producers and consumers, there are only a handful of studies that offer a comparative analysis of different regulatory capacity mechanisms.

In this paper we use a perfect competition model to analyse the performance of a strategic reserve, capacity payments - with a fixed yearly total or a fixed uplift per MWh- and financial and physical reliability markets. The main difference between our paper and other comparative analyses of different capacity mechanisms is, that we consider both the impacts on producer rents and consumer rents and welfare in total, and also analyse the impacts of regulatory errors on the performance of the different capacity mechanisms.

The analysis of consumer and producer rents reveals, that the role of revenue stabilisation, which is one of the standard reasons for introducing capacity mechanisms, could be of secondary importance. In our model, the investment shortfall due to revenue uncertainty was very small and the additional investment that was achieved by the capacity mechanism therefore only led to moderate a welfare increase. The largest cost reductions for consumers were achieved by the substitution of less efficient plants as well as a shift from producer to consumer rents. The main reason for the shift from producer to consumer rents is the assumption that perfect competition in forward markets can remove irreducible excess revenues which producers would incur in spot markets due to the lumpiness of investment.

The introduction of regulatory inefficiencies in the form of a moral hazard of dropping the reserve despatch price, a wrong calibration of the loss of load probability, the choice of too high or low strike prices, an incorrect prices during hours of load shedding in the spot market or excessive capacity targets can reduced the attractiveness of the respective capacity mechanisms. However, despite these inefficiencies, physical reliability markets remained the preferred choice as they resulted in a lower cost to consumers than the other capacity mechanisms or the energy only market.

Our analysis points to the importance of further research on the amount of competition that can be achieved in specific regional forward markets, as this seems to be one of the main drivers behind cost reductions by physical reliability markets. These analyses should also take into account the limited availability of suitable sites for construction and other factors that may increase the barriers to entry and thereby reduce competition in forward markets.

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