Redispatch in Zonal Pricing Electricity Markets

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Electricity markets are organized as nodes, where a node is a market with consumers and suppliers. Those nodes are connected through transmission lines. In the presence of transmission constraints, electricity markets can be organized as nodal or as zonal pricing electricity markets. In a nodal pricing electricity market, the equilibrium price differs across nodes when the transmission line is congested. In contrast, in a zonal pricing electricity market, the equilibrium price is the same in all the nodes that belong to the same zone. When the transmission line is congested, in a zonal pricing electricity market a redispatch mechanism has to be introduced to alleviate the congestion in the transmission line.

I characterize the equilibrium in a zonal pricing electricity market when the competition is imperfect and when four different redispatch designs are implemented by the auctioneer to manage the congestion in the transmission line. First, I work out the equilibrium when the auction in the spot electricity market is uniform and when an ex-ante redispatch mechanism is introduced by the auctioneer, i.e., it is not necessary to implement a redispatch market to alleviate the congestion in the transmission line. Second, I work out the equilibrium when the auction in the spot electricity market is discriminatory and when an ex-ante redispatch mechanism is introduced by the auctioneer. Third, I work out the equilibrium when the auction in the spot electricity market is uniform, an ex-post redispatch mechanism is introduced and the suppliers submit the same bid in the spot and in the redispatch market. Fourth, I work out the equilibrium when the auction in the spot electricity market is uniform, an ex-post redispatch mechanism is introduced and the suppliers submit different bids in both markets.

I find that the profits of the supplier located in the importing node are the same with independence of the redispatch design. In contrast, the profits of the supplier located in the exporting node depend crucially on the type of redispatch design and that can introduce long term investment distortions. Moreover, I find that consumers' surplus also depend crucially on the type of redispatch design.

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