

Price Instability in Multi-Unit Auctions

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Edward Anderson and Pär Holmberg

Abstract We consider a procurement auction, where each supplier has private costs and submits a stepped supply function. We solve for a Bayesian Nash equilibrium and show that the equilibrium has a price instability in the sense that a minor change in a supplier's cost sometimes result in a major change in the market price. In wholesale electricity markets, we predict that the bid price of the most expensive production unit can change by 1-10% due to price instability. The price instability is reduced when suppliers have more steps in their supply functions for a given production technology. In the limit, as the number of steps increases and the cost uncertainty decreases, the Bayesian equilibrium converges to a pure-strategy NE without price instability, the Supply Function Equilibrium (SFE).

Keywords Multi-unit auctions, indivisible unit, price instability, Bayesian Nash equilibria, supply function equilibria, convergence of Nash equilibria, wholesale electricity markets

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Contact Par.Holmberg@ifn.se;
edward.anderson@sydney.edu.au
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www.eprg.group.cam.ac.uk