

Capacity Investment under Postponement Strategies, Market Competition and Demand Uncertainty

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Abstract

We provide a comprehensive analysis of capacity investment decisions in duopoly models with demand uncertainty. Firms make capacity investment, production, delivery and pricing decisions. Capacity investment decisions are always made ex-ante demand whereas price decisions always ex-post. The interplay between the timing of demand information and the decision of production and delivery endows firms with different capabilities. Flexible firms can *postpone both production and delivery* decisions to after demand realization, partially flexible firms can *only postpone delivery decision*, whereas inflexible firms can do neither. For symmetric duopoly models, we provide complete characterization of the equilibrium capacity investment, production, delivery and pricing strategy. We establish the *strategic equivalence* of price and quantity competition for a symmetric duopoly with (partially) flexible firms with general demand and cost functions, extending the classical equivalence result of Kreps and Scheinkman (1983) to incorporate demand uncertainty. We identify several stochastic order properties of capacity and profit with respect to demand variability. We demonstrate the role of flexibility and the nature of demand shock (additive or multiplicative) on limiting the effect of ‘destructive competition’. Through insensitivity results we show that while the price-postponement capability of inflexible firms may (partially) shield them from the effect of demand variability, production / delivery postponement capability of (partially) flexible firms, in addition, allow them to exploit demand uncertainty to increase profits. We show that expected capacity utilization and the range of prices charged decrease with flexibility – a result that has firm-level as well as macro-economic implications. Finally, when the decision is endogenous, flexibility choice of firms depends on the nature of the demand shock – multiplicative or additive – that they face. In general, we find that firms in a duopoly are less likely to be flexible than a corresponding monopolistic firm. (*Joint work with Li Jiang*)