

Optimal Multi-period Pricing with Service Guarantees

Working Paper

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Abstract. We consider the multi-period pricing problem of a service firm facing time-varying capacity levels. Customers are assumed to be fully strategic with respect to their purchasing decisions, and heterogeneous with respect to their valuations, and arrival-departure periods. The firm's objective is to set a sequence of prices that maximizes its revenue while guaranteeing service to all paying customers. Although the corresponding optimization problem is non-convex, we provide a polynomial-time algorithm that computes the optimal sequence of prices. We show that due to the presence of strategic customers, available service capacity at a time period may bind the price offered at another time period. Consequently, when customers are more patient for service, the firm offers higher prices. This leads to the underutilization of capacity, lower revenues, and reduced customer welfare. Variants of the pricing algorithm we propose can be used in more general settings, such as a robust optimization formulation of the pricing problem.