Dynamic Pricing and Customer Relationships: Learning by Selling

Abstract

Knowing each customer’s preferences enhances the ability to design and market the right offer in terms of content and price. The more a retailer interacts with its customers, the more it learns as it observes revealed preferences. Lower prices typically lead to more interactions and more learning but lower short-term profits. This paper brings the concept of learning functions to this dynamic pricing context to analyze how firms can quantify the trade-off between the short-term profits and learning so as to maximize customer lifetime value. The pricing problem is formulated as a dynamic program and our main finding is that the shape of the learning curve and the firm’s position in the learning curve significantly affect the optimal pricing policy. Our analysis show that simple heuristics such as a two-price policy can significantly improve profits when compared with the predominant myopic pricing paradigm.

Keywords: Customized pricing, demand learning, customer lifetime value, Poisson intensity control.

1 Introduction

This paper analyzes the problem faced by the many pricing managers whose firms assign prices to offers that have been customized for individual customers. This is an increasingly common problem, as advances in technology allow firms to implement product and price customization policies through an increasingly diverse set of interfaces than span the online and offline worlds and often blurs their boundaries. As a recent front-page New York Times article highlights, in many markets drugstores and supermarket are leading the way in the adoption of these systems (NY Times, Clifford, August 10th, 2012) and in struggling to overcome the new challenges they bring. In these brick-and-mortar settings, upon arriving at the store, customers approach automated kiosks where they identify themselves through their loyalty cards. The system analyzes each customer’s history and prints out customized coupons that can be used immediately. Other settings where customized pricing is rapidly gaining adopters include shopping centers that send SMS coupons in real time to customers who “checked in” with their mobile phones and the many internet retailers who identify customers via login information or cookies and customize the products, services, and/or bundles to be offered to each particular customer during each specific visit.