Dynamic List Pricing

Yossi Aviv[1]

Gustavo Vulcano[2]

Abstract

Dynamic pricing belongs to the broad field of revenue management, a practice that emerged more than three decades ago in the airline industry, and since then has been applied in other business areas. Under dynamic pricing, sellers use prices as a mechanism to control demand and maximize revenues. Two of the main common features of dynamic pricing settings are the perishability of the units after a fixed time horizon, and limited product availability. The purpose of this book chapter is to provide a survey of the large body of modeling-based research in this area. We begin by presenting an intensity-control continuous-pricing model of the type suggested by Gallego and van Ryzin (1994). In such setting, a seller of a single product attempts to maximize his expected revenues from the sale of a fixed number of units in stock. Other related models and natural extensions are discussed. We then continue with a presentation of settings with multiple products. A variety of interesting aspects arise when a seller offers several products to customers. For example, product substitution may become an important consideration in the pricing process. Additionally, the different products may be dependent on each other due to a finite production resource. In this case, resource allocation and pricing control become dependent of each other in a complex way. Next, we bring another critical aspect of dynamic pricing; namely, the forecasting process. Often, retailers of seasonal, short life-cycle products (such as certain toys or fashion apparel) face a significant level of uncertainty about demand. However, as they observe the sales of their product, they can update their demand forecast, and improve their pricing. A complicating factor in the pricing decision process is that retailers may need to consider the influence of pricing on learning. We introduce models that embed demand learning processes into the dynamic control system, and discuss the value of active versus passive learning. In the section that follows we introduce models that capture the important phenomenon of strategic waiting. Roughly-speaking, strategic waiting refers to the situation in which consumers may postpone their purchases if they anticipate that significant discounts are likely to be offered at a later time of the sales season. We survey a large body of research on this phenomenon that has emerged in recent years. The next section is devoted to behavioral considerations and their impact on the pricing practice. We refer to psychological considerations like the impact of past prices in setting expectations, and the influence of the product assortment on the purchasing behavior. Finally, we discuss directions for future research.

[1] Olin Business School, Washington University, St. Louis, MO 63130; email: aviv@wustl.edu
[2] Leonard N. Stern School of Business, New York University, New York, NY 10012; email: gvulcano@stern.nyu.edu