On pricing of multiple bundles of products and services

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This paper considers the pricing decision faced by a seller of bundles composed of a service and an associated product offered to customers on a subscription basis using a two-part tariff scheme. An optimal pricing policy that maximizes the profit of a firm is obtained using a dynamic programming approach and it is found that, in the long run, there is an optimal number of customers associated to each bundle. Due to managerial purposes, two suboptimal fixed-price policies are derived and compared to the optimal pricing policy. The conditions under which it is profitable for the firm to expand its offer from one to two bundles is studied. Finally, it is concluded that introducing a fee for subscribed customers to deter the switching from one bundle to the other, increases the profitability of the firm.

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1. Introduction

It is crucial for companies to seek new ways of offering their products and services in order to increase their profits; this is due to the fact that their customers have different preferences. Thus, companies group their products and services into packages at a special price, a strategy known as bundling (Guiltnan, 1987; Fuerderer et al., 1999).

Bundling has been studied for several decades. Stigler (1963) claims that it may be more profitable to offer products in bundled form rather than on a stand-alone basis. Adams and Yellen (1976) showed that it is more profitable for a firm not only to offer a "pure" bundle but also to offer its components separately, which they call a "mixed" strategy, if the market is made up of both, asymmetrical consumers as regards to their tastes and of consumers with homogeneous preferences. They also concluded that the more adequate pricing strategy, "pure" or "mixed"; strongly depends on the reservation prices, which are the consumer's maximum willingness to pay for each component.

Telser (1979) examines complementarity across products as a ground for using bundling, which results in a superadditive valuation for the bundle that enhances the probabilities of the strategy being profitable. This may happen, for instance, when a firm offers a service together with an associated product, as in the case of cellular telephony, in which a cell phone plan is offered together with a handset. Given the complementarity of these products and services, which offered together add value to consumers, a bundling strategy is expected to arouse greater willingness to pay on their part than if components are offered separately.

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Due to the growing demand for bundles of products and services, and given that companies have built their strategies based on this type of bundles (Simonin and Ruth, 1995), a need has arisen to set pricing policies that allow firms to maximize profits. Fruchter and Rao (2001) and Fruchter et al. (2006) discuss the optimal price dynamics for a growing monopolistic and duopolistic communications network respectively, which makes use of an admission fee and a periodic fee (in the duopolistic case the authors discriminate between onnet and offnet calls). Such fees depend on the number of customers in the network, which allows the problem to be solved using optimal control. Xiao et al. (2008) study consumer choices when two service bundles for cell phones are offered to the market under a three-part tariff scheme. This consists on a fixed fee which includes a free quantity of minutes and text messages, and two variable charges related to the extra minutes and text messages used respectively. Although these authors study sophisticated pricing structures for services, they do not consider pricing the physical product.

Jain et al. (1999) obtain a two-part tariff scheme for cellular telephony minutes and handsets considering a two-period horizon. Bitran et al. (2008) generalize the problem context studying the pricing decisions of a firm that offers a product and an associated service on a subscription basis with an infinite time horizon. They define a fixed-price policy based on an optimal pricing structure, using a dynamic programming approach, both for a monopoly and a duopoly. Each firm offers a bundle using a two-part tariff scheme consisting of an admission fee and a periodic fee. By comparing pricing policies under monopolistic and competitive conditions, they conclude that admission fees are usually higher in a duopolistic market, thus illustrating the existence of a cost that should be assumed by customers who decide to switch firms (switching cost).