

Two-part tariff competition in duopoly

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Abstract

This paper develops two models of two-part tariff competition. When consumers are differentiated à la Hotelling, equilibrium prices equal marginal cost if and only if the demand of the marginal consumer equals the average demand. Entry fees are socially optimal in a symmetric equilibrium if all consumers participate in the market. Two-part tariffs tend to result in lower prices, higher profits and social welfare relative to uniform pricing. In the logit model, marginal cost pricing holds but entry fees are higher than socially optimal, and two-part tariffs lead to lower aggregate net consumer surplus but higher profits than uniform pricing.

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1. Introduction

Recent worldwide deregulation in telecommunication and other utilities has converted many traditional monopolies into oligopolies. Consequently, two-part tariffs, which were widely practiced in these industries, have extended to an imperfectly competitive environment. Elsewhere, competition with two-part tariffs also prevails. For instance, stockbrokers charge an annual maintenance fee on an account and a per-trade fee for each stock exchange; various clubs (health, golf, book and wine), and many websites levy a membership fee plus a per-use or per-unit charge. In all these circumstances, competitors in the same business provide close substitutes of products or services to well informed customers. What is the Nash equilibrium of two-part tariff

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competition in these markets? Can such an equilibrium be first-best optimal? Are two-part tariffs better than uniform pricing for consumers surplus, profits and social welfare? The purpose of this paper is to address these issues.

Two types of consumer preferences are under consideration. The first model is built on the location model of [Hotelling \(1929\)](#),¹ where a consumer purchases only one type of product produced by either firm in a duopolistic industry. For a product to be bought, it has to provide positive net consumer surplus (net of the purchase cost and lump-sum fee) and more surplus than the rival product as well. Although there is competition in duopoly, the necessary and sufficient condition for marginal cost pricing in equilibrium is the same as in monopoly; that is, the demand of the marginal consumer has to be equal to the average demand. In an equilibrium with some consumers not served by either firm, the lump-sum entry fees are too high relative to the welfare maximum. But if all consumers participate in the market, the symmetric equilibrium entry fee maximizes social welfare. In comparison with uniform price competition, the two examples of the model show that two-part tariffs result in a lower marginal price, higher profits and social welfare. But the aggregate net consumer surplus is ambiguous.

A limitation of Hotelling preferences is that firms either compete against each other or compete against the outside option. To study the situation where a firm competes simultaneously with the other firm and the outside choice, this paper develops another model with logit demand. In such a setting, when a firm marginally raises its marginal price and/or entry fee, there is a marginal decline in the demand for its product and the profit function changes smoothly without kinks. It is found that two-part tariff competition leads to marginal cost pricing which is socially optimal, but yields entry fees which are too high. In comparison with uniform pricing, it yields more profits but less aggregate net consumer surplus in a symmetric equilibrium.

The effects of two-part tariffs on pricing strategy and social welfare have been of interest to economists since the seminal contribution of [Oi \(1971\)](#). However, the majority of the literature focuses on monopolistic two-part tariffs. Although two-part tariff competition has attracted more attention recently, formal analyses focusing on this issue are few. [Armstrong and Vickers \(2001\)](#) propose a framework of competition in utility space to investigate competitive price discrimination. Applying their analysis to Hotelling preferences, they find that two-part tariff competition is an equilibrium outcome of general non-linear price competition and they then specify the conditions for marginal cost pricing. While their model is more general in terms of considering multiproduct firms and allowing for both horizontal and vertical preference heterogeneity, they also restrict the transportation cost to a form of shopping cost.² We consider more general horizontal preferences but exclude differences in vertical preferences and implicitly assume full non-linear pricing to be infeasible. In particular, our second example of the Hotelling model is a shipping model, and firms set price above marginal cost in equilibrium.

¹ In contrast to conventional location models, we allow for elastic demand and focus on price and lump-sum fee competition.

² [Anderson and Engers \(1994\)](#) characterize two types of transportation costs. A shopping cost is independent of the amount purchased. A shipping cost is proportional to the quantity bought.

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