

Network externalities and market segmentation in a monopoly

Bing Jing*

44 West 4th Street, KMC 8-80, IOMS Department, Stern School of Business, New York, NY 10012, United States

Received 4 April 2006; received in revised form 22 August 2006; accepted 31 August 2006

Available online 28 November 2006

Abstract

Network externalities characterize the consumption of many products. In a setting where a monopolist does not price discriminate without externalities, we show that presence of network externalities induces the monopolist to price discriminate and segment its market.

© 2006 Elsevier B.V. All rights reserved.

Keywords: Vertical differentiation; Network externalities; Quality; Market segmentation

JEL classification: L12; L15; L63

1. Introduction

Consider a market where products are differentiated along a single quality dimension. Consumers differ in their willingness to pay for quality and their utility functions are strictly increasing in quality. Price discrimination by a monopolist in such settings has been investigated by many studies, including, for example, Gabszewicz et al. (1986), Maskin and Riley (1984), Mussa and Rosen (1978), Salant (1989) and Stokey (1979).¹ In particular, Salant (1989) and Stokey (1979) identify conditions under which the monopolist does not find it optimal to price discriminate. Their conditions for inducing consumer self-selection to be sub-optimal share the following property: If all consumers rank the products in increasing order of quality when they are made available at costs, then the monopolist should offer only its highest feasible quality, i.e., a corner solution obtains.

* Tel.: +1 212 998 0822; fax: +1 212 995 4228.

E-mail address: bjing@stern.nyu.edu.

¹ Maskin and Riley (1984) consider quantity-based price discrimination (i.e., nonlinear pricing), where a larger quantity generates higher utilities for all consumers.

The papers by Salant (1989) and Stokey (1979) are developed in the context of conventional markets without network externalities, where the product's inherent attributes are the sole source of consumer utility. Many products (such as computers, software, telephone, telefax, and some products and services on the Internet) demonstrate salient network externalities. For such products, consumers benefit from both the user base and their intrinsic features. The following questions naturally arise: In these markets, how do network externalities affect a firm's decision to price discriminate? In particular, will offering the highest quality continue to be optimal for a monopolist under the same essential market conditions as examined by Stokey and Salant? The present short paper attempts to answer these questions.

Under the same market conditions for market segmentation to be sub-optimal to the monopolist, we shall show that the presence of network externalities restores the optimality of price discrimination. The monopolist now will offer two distinct quality levels: the highest and the lowest qualities in the admissible quality set. The reason is that, due to network effects, the firm has an incentive to expand its market coverage through selling a second, low-end product. As the product network expands, consumers will value the products more highly, which in turn allows the firm to extract more surplus. In the language of marketing professionals, therefore, network externalities are a factor that favors extending a product line. When network effects become stronger, we show that the monopolist will lower the price of the low-end product and raise the price of the high-end product. When network effects are sufficiently strong, the monopolist will price the low-end product below-cost. It is thus clear that the monopolist employs the two qualities for rather different purposes: The low-end product is used mainly to expand its network size and the high-end product is its primary source of profits.

This paper naturally draws on the literature on network externalities. Formal research on this subject dates back to the articles by Rohlfs (1974) and Oren and Smith (1981) on the telecommunications industry. Later studies have examined the idiosyncratic features of markets with network externalities (e.g., Arthur, 1989), product compatibility and standardization (e.g., Church and Gandal, 1992; Economides and White, 1994; Farrell and Saloner, 1986; Katz and Shapiro, 1985), technology adoption (e.g., Choi, 1994; Katz and Shapiro, 1986) and entry deterrence (Fudenberg and Tirole, 2000). Complementary to these studies, the present paper investigates how network externalities affect the product line decision of a firm.

The rest of the paper is organized as follows. Section 2 presents the model. Section 3 contains the analysis and our key results. Section 4 summarizes and concludes.

2. Model

We first introduce the supply side. Consider a single-period product market operated by a monopolist. The set of feasible product qualities is represented by a closed interval $[s_L, s_H]$, where $0 < s_L < s_H$. Here s_L may be viewed as some minimum quality level required by government regulation, and s_H the monopolist's state-of-the-art quality level. There are no fixed costs of any kind. The monopolist has to choose the number of qualities as well as their specific levels to offer. We assume that the unit variable cost is constant and remains the same across different qualities. Without further loss of generality, we normalize the unit variable cost to zero.²

² Under the quasilinear consumer utility function, our analysis equally holds for a unit cost function that is increasing, linear in quality. Essential to our cost structure is the following property: When offered at costs, a higher quality product is strictly preferred by all consumers. The constant marginal cost assumption is widely used for analytical convenience in models of vertical differentiation. See, for example, Gabszewicz and Thisse (1979), Shaked and Sutton (1982), and Gabszewicz et al. (1986), among others.

Download English Version:

<https://daneshyari.com/en/article/5062464>

Download Persian Version:

<https://daneshyari.com/article/5062464>

[Daneshyari.com](https://daneshyari.com)