

A Joint Application of Third Degree Price Discrimination and Network Effect on Software Pricing

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ABSTRACT

This article proposes a different pricing scheme for software companies targeting customers based on customers' software efficacy. Normally, software companies optimize prices by charging a higher price on highly effective software users while charging a discount price on less effective software users (Varian's versioning scheme). The pricing pattern could be reversed if network effect between high and low effective software users is considered.

INTRODUCTION

Versioning' information goods is proposed by Shapiro & Varian recently. This mechanism involves charging a discount price to the low profiled users while charging the high profiled users with a higher price. For example, DivX is a high resolution small size video format producer (www.divx.com). It offers two versions of its main product. DivXPro is charged at \$29.99 a piece while DivX is free. This kind of practice of making money out of high profiled users with full featured product while giving away basic version copies is very common in software pricing.

This paper presents another view on this versioning mechanism. When low profiled user updates their willingness to pay based on adoption of high profiled users, the order of pricing could be reversed.

LITERATURE REVIEW

Software pricing has been paid attention by researchers both in MIS field and economics field. Questions about why software is offered free are probed by Bing(2000) and Parker and Alstynne(2000). Varian has written extensively on pricing issue of information goods: discrimination, first and second market and bundling (1995).

This article brings up another examination on versioning information goods. If user software knowledge plays a critical role in software adoption, and low profiled users update their belief based on high profiled user's action, then in some situation, it makes senses to charge a low price to high profiled users to attract low profiled users.

MODEL SETUP

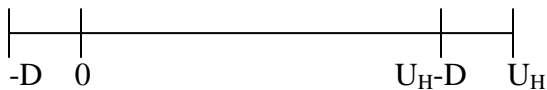
Consumers are diverse on their knowledge and expertise in software. The diversity of software skills affects how software is valued before purchases. Since software is a complicated product, there is certain amount of time/effort involved in evaluation before purchase. The evaluation cost depends on the software experience of consumers. The usefulness depends on expertise in software in general. The more efficient the software user is, the more utilities (in terms of using various functionality built in a software) he makes use of, it is more likely the software valuable to him.

Consider two groups of software users: high software efficiency type and low software efficiency type. The willingness to pay for software is affected by perceived usefulness and cost of evaluation on software. Because of that, high type user has higher perceived usefulness and lower cost of evaluation compared with low type user. Therefore, they are willing to pay more for the software.

Because of their extensive knowledge on software, high type user has positive influence on low type user's willingness to pay. More high type user adoption of the software, more positive impact it has on low type users to make the software more valuable to them. From software firm's perspective, this network effect will lead to the tradeoff between the profit generated from high type users and the profit generated from low type users. High type users may be charged with a lower price than low type users in the interest of monopoly's optimization.

Model

Assuming the customers of a software consist of two types of users of equal number, the size of each type is normalized to one. High type users have an even distribution of willingness to pay on $[0, U_H]$. Low type users have a same distribution of willingness to pay on a lower range $[-D, U_H - D]$ because they perceive less value of software and have higher cost of evaluation.



Willingness to pay of consumers

A software firm sets two prices P_h, P_l to capture surplus from two consumer groups.

Both high type user's purchase and low type user's purchase are determined by willingness to pay W_h, W_l and price P_h, P_l .

$$W_h - P_h \geq 0$$

$$W_l - P_l \geq 0$$

Demand from high type users is $(U_H - P_h)/U_H$.

Willingness to pay by low type users is increased by percentage of buyers from high type users. $W_l \rightarrow W_l + m * U_H$. m is the percentage of buyers of high type ($m = (U_H - P_h)/U_H$).

The boundary condition to determine low type user

$$W_l - P_l \geq 0$$

is changed to

$$W_l + m * U_H - P_l \geq 0$$

Then demand from low type users is updated to $[U_H - D - (P_l - m * U_H)]/U_H$.

The software firm optimizes revenue by setting two prices.

$$\begin{aligned} \pi &= P_h * D_h(P_h) + P_l * D_l(P_l) \\ &= P_h * (U_H - P_h)/U_H + P_l * [U_H - D - (P_l - m * U_H)]/U_H \end{aligned}$$

F.O.C. of objective function leads to:

$$\partial \pi / \partial P_h = 0$$

$$U_H - 2P_h - P_l = 0$$

$$\partial \pi / \partial P_l = 0$$

$$2U_H - D - P_h - 2P_l = 0$$

Optimal prices are

$$P_h^* = D/3$$

$$P_l^* = U_H - 2/3D$$

We focus on the condition when P_h^* is less than P_l^* .

Whenever D is less than U_H , P_h^* is less than P_l^* . This is quite likely considering the range difference between D and U_H . Therefore we derive a quite general condition when high type users are charged less for the software even they have higher willingness to pay.

DISCUSSION

A simplest case of two groups of software users is proposed to study the impact of network on monopoly pricing scheme. This article defines network as uni-direction, different from normal network assumption: bigger size benefits everyone in the network. Our main effort is not on general strategy to tackle network effects, rather than pointing out a consideration of network effect may challenge mainstream thoughts on application of third-degree of price discrimination in software pricing.

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