



Welfare and output in third-degree price discrimination: A note

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Abstract

One main result on the welfare effects of third-degree price discrimination by a monopolist is that an increase in total output is a necessary condition for welfare improvement. This note provides two examples showing that this proposition does not generalize to an oligopoly with heterogeneous firms. In these examples, price discrimination makes competition more favorable to the low cost firm. This induces a cost saving that overcomes the welfare loss associated with price discrimination.

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1. Introduction

A well-known conclusion about the welfare effects of third-degree price discrimination by a monopolist is that “an increase in total output is a necessary condition for welfare improvement.” To avoid repetition, in our paper this is called “proposition WO,” or simply, “WO.” Schmalensee (1981), Varian (1985), and Schwartz (1990) proved WO with different levels of generality. This note shows that, although WO is valid for a monopolist, it does not extend to more than one firm.

The logic of WO is clear. There is a consumer inefficiency associated with third-degree price discrimination: output is not optimally distributed to consumers because their marginal utilities will be unequal. With a change from uniform price to price discrimination, units of the good are

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taken away from consumers with a higher valuation of the good and given to consumers with lower willingness to pay. Proposition WO asserts that the only way to overcome this consumer inefficiency is a sufficient increase in total output. This is true when there is only one cost function. However, with heterogeneous firms, cost saving by a better redistribution of output among firms can also overcome the consumer surplus inefficiency. When this is the case, it is no longer true that welfare must fall if output decreases when price discrimination is introduced.

Some papers challenge proposition WO. Adachi (2002, 2005) shows that WO may not hold in the presence of consumption externalities.¹ Yoshida (2000) refers to proposition WO because his result is in stark contrast with it. In Yoshida's model, an upstream monopolist, by price discriminating, can induce production inefficiencies by increasing the price of its product to the more efficient downstream firms and lowering its price to the less efficient firms. In this way, inefficient firms increase their production and efficient firms reduce theirs. Yoshida shows that with price discrimination total welfare is lower when the aggregate production of the final good is increased: exactly the opposite of WO. But, in Yoshida's model, there is no consumer inefficiency to overcome, anyway.

Although the welfare effects of price discrimination under competition have been studied (see Stole, 2003, for a good survey), WO has not been challenged. Holmes (1989, note 2) rightly states, without a formal proof, that WO "holds for this oligopoly analysis," because in his paper, each firm produces with the same constant average cost. Corts (1998) considers consumer welfare and firm profits, but does not analyze the relationship between a reduction in output and welfare. Armstrong and Vickers (2001), when considering WO in duopoly, assume symmetric and constant marginal costs between firms. Since most models suppose symmetric costs among firms, it is stated sometimes that WO is valid beyond the case of monopoly, with no reference to costs. See, for example, Layson (1994, p. 323).

In the next section we present two examples, and we finish the note with some conclusions.

2. The examples

Both examples involve a homogeneous good industry with two firms. Firm L has low marginal cost, and Firm H has high marginal cost. They compete in quantities. Consumers can be divided into two separate markets. There are two possible price regimes: price discrimination and uniform pricing. A hat over a variable (for example, \hat{Q}) denotes its equilibrium value under price discrimination. A bar over a variable denotes its equilibrium value under uniform price (for instance, \bar{p}). Throughout the note, subscripts refer to markets and superscripts to firms.

2.1. A Cournot duopoly

Example 1. Our first example is a Cournot duopoly. Both firms have constant marginal cost, $c = c^H > c^L = 0$, and sell in two distinguishable markets, A and B . In market A , demand is $Q_A = A_p^{-a}$, with $a \leq 1$. In market B , demand is $Q_B = B_p^{-b}$, also with $b \leq 1$. That is, both market demand curves have constant elasticity, and both are inelastic. Five parameters, (a, b, A, B, c) ,

¹ One example of these externalities is a bar that gives discounts on drinks sold to women to attract more women, hoping to attract more men as well. The willingness to pay of men increases with the number of women. However, an improvement in welfare due to positive externalities is not a big surprise.

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