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Price Discrimination with Producer & Consumer Transaction Costs

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Abstract

This paper examines the impact of transaction costs on the social efficiency of first-degree price discrimination. Price discrimination requires the producer to expend resources and compels consumers to incur costs. The consideration of producer and consumer transaction costs alters the conditions under which first degree price discrimination enhances social welfare.

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1. Introduction

First degree price discrimination is generally regarded as a socially efficient alternative to standard pricing for monopoly firms. A single price strategy in a monopoly market results in a price above marginal cost, creating a deadweight loss. First degree price discrimination is commonly believed to eliminate deadweight loss by charging consumers according to their willingness to pay and transferring consumer surplus to the producer. However, standard price discrimination theory ignores both the costs that firms incur to successfully price discriminate and the costs imposed on consumers from a price discrimination strategy.

While previous research has alluded to the costs involved in price discrimination (Posner, 1975), Varian (1989) is one of the first to question the impact of complex forms of price discrimination on economic welfare. He notes that the costs required of producers and imposed on consumers may grow as price discrimination techniques become more complex. In a survey of recent economic literature regarding price discrimination, Armstrong (2006) highlights a number of creative strategies that firms can employ to engage in price discrimination. In order to successfully implement such price discrimination schemes, firms incur costs through activities such as information collection, the design of pricing schemes, and resale prevention when attempting to price discriminate. Costs are also imposed on consumers as the consumer must search for the least expensive way to purchase and provide information to the firm to prove their willingness and ability to pay. These costs are prevalent in the most common examples of price discrimination such as airline ticket sales, used car purchases, and higher education tuition. The consideration of these costs alters the impact of first degree price discrimination on social welfare.

Bhaskar and To (2004) show that price discrimination can be socially inefficient with free entry in a monopolistic competition setting due to excessive entry into the industry. Leeson and Sobel (2008) provide the first model to incorporate transaction costs into price discrimination theory. They note that the monopolist will engage in price discrimination if the gains to the monopolist, composed of extracted consumer surplus and deadweight loss, are greater than the costs associated with the price discrimination strategy. This can result in a reduction of social welfare if the firm's costs of price discrimination are less than the combined gains to the monopolist but greater than the social welfare gains from eliminating deadweight loss. While socially inefficient, the monopolist may find it privately beneficial to price discriminate.

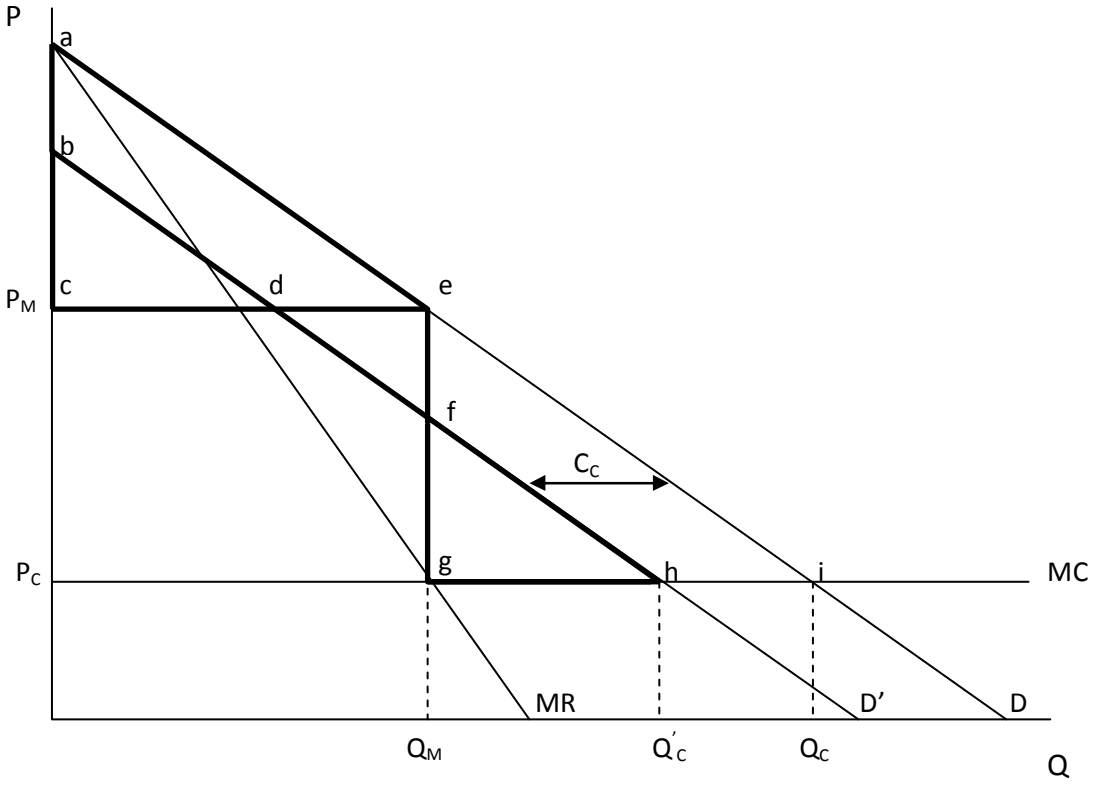
The model developed in this paper evaluates first degree price discrimination by examining the additional costs incurred by the monopolist firm and the costs imposed on consumers from a price discrimination strategy. The inclusion of consumer costs reduces the consumer surplus and the deadweight loss that the monopolist can transfer through price discrimination while also reducing producer surplus previously attributed to the firm. These additional costs alter the scenarios under which the monopolist will find price discrimination profitable and impact the extent to which price discrimination can improve social welfare.

2. Theory and Discussion

Assuming linear demand and constant marginal cost, the conditions for the monopolist firm are displayed in Figure 1. Standard price discrimination theory suggests that the monopolist can gain the area of triangle *ace* (consumer surplus) and triangle *egi* (deadweight loss). However, this

does not include the additional costs that are required of consumers and producers due to price discrimination.

Figure 1: Monopolist Private Benefit and Social Welfare Gains with Producer & Consumer Transaction Costs



For simplicity, it is assumed that the price discrimination strategy imposes a constant cost C_C on consumers and all parties have full information.[1] C_C has the effect of reducing the benefit of purchase to consumers. Graphically, this reduction of benefit can be displayed similar to the imposition of an excise tax on consumers. Because C_C reduces the benefit to the consumer, consumers are less willing to pay for the good or service by the amount of C_C. This cost is

[1] The costs imposed on consumers from a price discrimination strategy may not necessarily be constant as lower paying customers may need to exert more effort to identify the lower price available to them and prove their willingness and ability to pay. Higher paying customers may simply pay the price indicated on the demand curve.

accounted for in Figure 1 with demand curve D'. The firm will sell fewer units at any given price with D' when employing price discrimination relative to D under a single pricing scheme.

With the demand curve D' accounting for the additional costs that consumers face, the monopolist sells the quantity Q_C' under first degree price discrimination. However, the costs imposed on consumers from price discrimination have a negative impact on the amount of consumer surplus that the monopolist can capture through price discrimination. Additionally, the deadweight loss available to the monopolist for transfer is reduced by the transaction cost imposed on the consumers. The consumer transaction costs reduce the consumer's value gained from purchase of the product, thus reducing their willingness to pay for the product. This results in a reduction of both consumer surplus and deadweight loss available for transfer. The eliminated consumer surplus and deadweight loss that cannot be captured by the firm are displayed in Figure 1 as area *abde* and area *efhj* respectively. Furthermore, the monopolist loses a portion of the producer surplus that the firm enjoyed under a single pricing scheme. This occurs because consumers are less willing to pay for the product due to the transaction costs. This is defined as area *def* in Figure 1. The monopolist is able to capture some of the consumer surplus, area *bcd*, and some of the deadweight loss, area *fgh*, when engaging in price discrimination with consumer costs included.

Furthermore, the monopolist firm faces additional costs when engaging in price discrimination. For simplicity, it is assumed that the monopolist firm faces a fixed cost when engaging in price discrimination, defined as C_F.[2] Once accounting for both the costs imposed on consumers, C_C, and the costs that the monopolist firm must expend to successfully price discriminate, C_F, the conditions under which the monopolist firm will find price discrimination profitable and the conditions where price discrimination results in social welfare gains can be defined.

Referring to Figure 1, the monopolist firm will choose to engage in price discrimination if the gains to the firm from transferring consumer surplus (area *bcd*) and capturing deadweight loss (area *fgh*) outweigh the loss of producer surplus under a single pricing scheme (area *def*) and the transaction cost of implementing the price discrimination strategy (C_F). Otherwise, the monopolist will choose a single price strategy. However, social welfare may be enhanced or reduced when the monopolist chooses to engage in price discrimination.

In order to evaluate the impact of price discrimination on social welfare, it is necessary to compare the deadweight loss that the monopolist gains (area *fgh*) to the combination of the lost portion of consumer surplus (area *abde*), the lost portion of producer surplus (area *def*), and the transaction cost that the firm must undertake to successfully price discriminate (C_F). If the deadweight loss captured by the monopoly firm exceeds the loss of producer and consumer surplus and the cost of price discrimination attributed to the firm, social welfare is improved.

Formally, the gained deadweight loss can be identified as $\int_{Q_M}^{Q_C'}[P'(Q) - MC(Q)]$. The combined loss of consumer surplus and producer surplus can be written as $\int_0^{Q_M}[P(Q) - P'(Q)]$. When combined with the transaction cost of the firm (C_F), we can derive the formal conditions under which price discrimination enhances or reduces social welfare.

[2]Firms may experience variable costs when engaging in first degree price discrimination as there could be different costs associated with implementing a price discrimination strategy for different consumers. The inclusion of variable costs would not alter the general results of this analysis.

If $\int_{Q_M}^{Q_C'}[P'(Q) - MC(Q)] > \int_0^{Q_M}[P(Q) - P'(Q)]$ + C_F, the implementation of price discrimination results in an increase in social welfare. The gained deadweight loss outweighs the lost consumer surplus, lost producer surplus, and the costs incurred by the firm. However, if $\int_{Q_M}^{Q_C'}[P'(Q) - MC(Q)] < \int_0^{Q_M}[P(Q) - P'(Q)] + C_F$, social welfare is reduced when price discrimination is employed. While the producer may find it privately beneficial to engage in price discrimination, the result is a net reduction in social welfare.

3. Conclusion

When the costs that producers incur to engage in price discrimination and the costs that are imposed on consumers as the result of a price discrimination strategy are examined, the potential gains from price discrimination available to the firm are less than previously considered when ignoring transaction costs. While the price discriminating firm is able to capture a portion of consumer surplus and deadweight loss relative to a single pricing scheme, the firm must expend resources to successfully price discriminate and concede a portion of their previous producer surplus. Additionally, a portion of consumer surplus and part of the deadweight loss from a single price strategy are eliminated due to the transaction costs imposed on consumers.

The model described in this manuscript shows that first degree price discrimination does not necessarily result in an increase in social welfare. While price discrimination can lead to an increase in social welfare, the improvement in social welfare is contingent on the deadweight loss that the monopolist captures outweighing both the transaction costs incurred by the firm from implementing price discrimination and the reduction in consumer and producer surplus that is the result of the price discrimination strategy.

As Varian (1989) argues, the transaction costs that consumers and producers face become important as price discrimination techniques advance and become more complex. The costs of price discrimination can rise as firms develop increasingly sophisticated techniques to engage in price discrimination. Additionally, complex forms of price discrimination may impose non-trivial costs on consumers who must search for the best price and signal their ability and willingness to pay for a good or service. The consideration of these additional transaction costs highlights the difficulty of engaging in price discrimination. Firms must consider a number of potentially significant costs that are difficult to measure when considering a price discrimination strategy.

Producer and consumer transaction costs are present in all forms of price discrimination and regardless of the demand and cost conditions. Although this analysis assumes that first degree price discrimination imposes a constant cost on consumers, costs may vary among consumers that pay different prices. Lower paying consumers may face higher transaction costs as they must identify themselves to firms while higher paying consumers may simply pay the higher price and not incur additional transaction costs. Additionally, an examination of the consequences of alternate demand specifications and varying cost structures would be useful. While this analysis focused on the social efficiency implications of first degree price discrimination, producer and consumer transaction costs will also impact social efficiency in second and third degree price discrimination. If the additional transaction costs outweigh gains in efficiency, price discrimination can be socially inefficient in second and third degree cases as well.

References

Armstrong, M. (2006) "Recent Developments in the Economics of Price Discrimination" in *Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress, Vol. II*. by R. Blundell, W.K. Newey, and T. Persson, Eds., Cambridge University Press: Cambridge, 97-141.

Bhaskar, V. and T. To (2004) "Is Perfect Price Discrimination Really Efficient? An Analysis of Free Entry" *Rand Journal of Economics* 35, 762-776.

Posner, R. (1975) "The Social Costs of Monopoly and Regulation" *Journal of Political Economy* 83, 807-828.

Leeson, P.T. and R.S. Sobel (2008) "Costly Price Discrimination" *Economic Letters* 99, 206-208.

Varian, H. (1989) "Price Discrimination" in *Handbook of Industrial Organization, Vol. 1.*by R. Schmalensee and R. Willig, Eds., North-Holland: Amsterdam, 597-654.