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Price discrimination and social welfare with correlated demand☆

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Abstract

The paper analyzes the price, output and welfare effects of third-degree price discrimination triggered by the portfolio motive of a risk-averse monopolist facing random and potentially correlated market demands. It is shown that contrary to conventional wisdom, price discrimination can occur with identical expected demands, the relatively inelastic but risky market may be charged the lower price, and despite linear demands, aggregate expected output may fall while expected consumer and producer surplus may rise. These results are shown to be driven by the risk aversion of the monopolist and the asymmetry in the risk and revenue characteristics of the markets.

JEL classification: D42; L12; D81

Keywords: Monopoly (D42); Monopolization strategies (L12); Decision making under risk and uncertainty (D81)

1. Introduction

The social desirability of third-degree price discrimination has been a topic of much research ever since Joan Robinson's (1933) pioneering analysis of the problem. The conventional wisdom has been that the welfare effects depend critically on the output

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effect of discrimination. It has been well known that the output effect, in turn, depends on the concavity of demand, and in the limiting case of linear demand, discrimination does not change aggregate monopoly output except when the smaller market is not served under uniform pricing. Following a series of papers (surveyed, e.g., in Varian, 1989) on the issue, Schmalensee (1981) demonstrated that in the linear demand case, when all markets are served pre- and post-discrimination, price discrimination inevitably leads to welfare loss. Subsequently, Varian (1985) generalized the result and showed that a necessary but not sufficient condition for social welfare to rise with discrimination is a rise in monopoly output.

The normative and positive analysis of third-degree price discrimination has been extended to the context of a spatial economy with fixed production location by Greenhut and Ohta (1972), Holahan (1975) and Beckmann (1976). These papers show that with linear demands, when the radius of the monopolist's market area is endogenous, spatial price discrimination raises monopoly output and, potentially, social welfare over f.o.b. mill pricing policy. However, with a fixed radius, discrimination does not change output precluding the possibility of welfare gain. When location is endogenous, Hwang and Mai (1990) show, by contrast, that output and the welfare effect of discrimination are indeterminate and depend on the parameters of the model. In particular, they demonstrate that welfare gain is possible even if spatial price discrimination were to reduce output.

In a recent contribution, Layson (1998) analyzes the price, output and welfare effect of third-degree price discrimination when a monopolist sells in two markets with demand interdependence brought about by the substitutability and complementarity of the goods. The effects of price discrimination in this model are shown to depend on the degree of interdependence as well as convexity of demands and the slope of marginal cost.

The considerable literature on third-degree price discrimination has, for most part, been confined to a deterministic world. A notable exception is the paper by Eckel and Smith (1993) who explore the pricing decision of a multi-product monopolist facing random, correlated demands. They assume convex cost so that expected cost can be reduced by reducing aggregate output variance. It is then demonstrated that if the monopolist, assumed to be risk neutral, were to maximize the expected utility of profits, the optimal prices may involve discrimination across markets. Price discrimination, in this case, reduces aggregate demand variance by exploiting covariance in market demands.

In this paper we present a portfolio model of price discrimination alternative to Eckel and Smith. Instead of convex costs, the portfolio effect is created by the concavity of the monopolist's utility function. In the context of this model, we address the traditional issues surrounding the price, output and welfare effects of third-degree price discrimination, issues not dealt with in the Eckel–Smith model. Our model is premised on a risk averse monopolist facing two markets with stochastic and potentially correlated demands. The monopolist is assumed to commit to an irreversible price in each market before the uncertainty is resolved. Third-degree price discrimination across markets in this setting is shown to trigger several unconventional positive as well as normative results: (a) price discrimination may occur even when price elasticities are identical across markets; (b) direction of price discrimination may be opposite to the conventional case; (c) discrimination may reduce expected output even with linear demands, and despite the fall in expected output, social welfare gain cannot be ruled out when consumers are not too risk averse. All of these results, as we demonstrate,