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Location choice and price discrimination in a duopoly

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Abstract

This paper analyses the problem of price discrimination and product design in a duopoly model with both horizontal and vertical differentiation. Discriminatory contracts are first characterised at each customer location. It is then shown that firms' locations have a big impact on their discriminatory ability and that equilibrium locations are not monotonic with respect to the heterogeneity parameter for the distribution of consumer preferences over quality; however firms never locate too far away from the first and third quartiles.

Keywords: Spatial competition; Price discrimination; Horizontal and vertical preferences

JEL classification: D43; D82; L13

1. Introduction

This paper studies price discrimination and product design in a duopoly where firms offer alternative contracts that discriminate between different groups of consumers. Much is known about the analysis of such contracts under monopoly, following a seminal paper of Mussa and Rosen (1978) that has initiated a family of principal–agent problems illustrating the equivalence between price discrimina-

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tion using quantity discounts (second-degree discrimination) and monopoly pricing of products of differing quality.[1]

Discriminatory practices are also very common in oligopolistic industries, but the analysis of this setting is not entirely well understood. If firms offer perfect substitutes, then we can expect efficient Bertrand-type outcomes. Prices will be brought in line with costs, and customers will buy their preferred quality. However, if firms offer imperfect substitutes, then matters are more complex. For instance, it is not obvious whether the mechanism at work is simply a transfer between buyers and sellers, or whether allocations are affected as well.

I consider a model of two firms located at some points of a line segment along which consumers are located. Consumers have heterogeneous preferences both over a horizontal parameter (brand) and a vertical one (quality). It is assumed that firms observe the location parameter while vertical preferences are private information. The difference in types gives a rationale for non-linear contracts, while the horizontal dimension is used at first to control for the intensity of price competition.

For given firms' locations, I characterise discriminatory contracts that change according to preferences over brand and quality. In particular, I discuss how there are three different discriminatory mechanisms at work ('monopoly-type', 'intermediate' and 'competitive' price discrimination) that define three corresponding regions according to consumers' tastes.[2] By providing a closed-form solution to contracts, I can proceed one step further and address another question that represents the second theme of this paper. I endogenise firms' locations, thus

[1] They show that a monopolist offers a quality range that is broader than that required for efficiency. This is because by exaggerating quality differences, the firm can effectively screen different customers and discriminate between them. Efficiency, however, is achieved 'at the top', among those customers with the highest willingness-to-pay. See also Maskin and Riley (1984), Phlips (1983), Varian (1989) and Wilson (1993).

[2] Previous work has been done on the symmetric case of unobservable horizontal parameters and observable vertical ones (Spulber, 1989; Hamilton and Thisse, 1997), while the case dealt by this paper has been studied by Stole (1995). The mechanisms that Stole identifies in Section 4 of his paper are very similar to those that emerge in the first part of this paper and they have been derived independently. While Stole considers a continuum of types over the vertical dimension, I have discrete types. This has an impact on the regions of validity of 'non standard' binding constraints. For instance, in Stole's paper all the consumers' participation constraints are binding only when consumers are located in the midpoint between firms, while in this paper participation constraints for all types bind at numerous locations when vertical preferences are very heterogeneous and this leads to the emergence of 'competitive' price discrimination. When I turn to the first stage of the game when firms choose their locations, the present analysis is novel and the model I employ is quite useful in explaining how firms compete by trying to choose the width of the three different regions where they can enjoy different screening ability. The interest of Stole is not on the location game and he simply places firms symmetrically around a Salop circle, hence entry is dictated by the magnitude of fixed entry costs. In Valletti (2000), I also discuss price dispersion, i.e. the observed range of prices for class of customers, and present an extension of the model with capacity constraints together with an application to the UK mobile telecommunications market.