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Investment timing and predatory behavior in a duopoly with endogenous exit

Christian Bayer*

Department of Economics, Universität Dortmund, D-44221 Dortmund, Germany

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Abstract

This paper investigates the interplay of investment irreversibility and endogenous exit in a duopoly with aggregate demand uncertainty. Endogenous exit and investment irreversibility produce predatory behavior in very competitive industries in which prices react strongly to changes in quantity and in which capacity increases are not too costly. When the market is in decline, firms increase capacity in order to subsequently monopolize this market upon a further decrease in demand. Predatory behavior is particularly likely to occur if fixed costs of operation are substantial. Large uncertainty has the opposite effect and makes predatory behavior less prevalent. Predation occurs as investment irreversibility gives commitment power to delay one's own exit and to promote the exit of a competitor. This explains predatory behavior in a duopoly without invoking reputation, network effects, or learning effects.
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1. Introduction

Predation as one form of anti-competitive practices has a long tradition of debate among academic economists. Loosely speaking, predation is every action of a firm

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*Tel.: +49 231 755 3246; fax: +49 231 755 3027.
E-mail address: christian.bayer@wiso.uni-dortmund.de.

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that aims at promoting the exit of its rivals. These practices have been studied widely at least since Selten (1978) introduced his 'chain store paradox'. Selten claimed that predation could not emerge among rational competitors even though predation has some intuitive appeal – especially in a dynamic context.

The intuitive predatory outcome could be reestablished by later contributions. However, most of these contributions either modelled predatory behavior as a static and once-and-for-all increase in quantity, modelled predation as a result of learning or network effects, or defined predation as temporary deviations from tacit collusion. Moreover, most of the literature focused on predatory pricing, see the overview in Motta (2004).

By contrast, this paper presents a dynamic model of predation that is based on predatory investment strategies, i.e. investment which is only profitable because it induces the exit of the competitor. Our approach to predation is motivated by the fact that investment decisions are always strategic decisions, because the irreversibility of investment turns capital into a commitment device. Hence, our approach highlights in a different setup the commitment value of capital as it was originally developed by Spence (1977) and Dixit (1980). We integrate the idea into a dynamic framework with an evolving market, in which predatory behavior arises from time to time because the (partial) irreversibility of investment interacts with endogenous exit decisions.

If investment is irreversible, it has a strong strategic influence on all other decisions of firms and in particular it influences their exit decisions. A firm that invests and expands production receives higher earnings at the expense of other firms. Upon exit, this firm loses more income, while a non-investing firm loses less income when it leaves. As a result, the investing firm wishes to delay exit after investment, while the other firm wishes to exit sooner; and in final consequence, investment is not only a commitment to leave the market late, but also a device to force others to quit early. This may lead to a situation in which firms may wish to invest upon a decrease in demand. They do so because this depresses prices further for the moment and forces the competitor to exit. Consequently, a market decline triggers a predatory race for market shares.

In other words, endogenous exit decisions may lead to predatory investments to crowd a competitor out of a declining market. The interdependence of the earnings of competitors transforms investment into a device with a twofold strategic value, delaying one's own exit and promoting the exit of others. This strategic value gives firms a strong incentive to commit themselves and invest early. In the extreme, the ability to promote the exit of a competitor may even result in firms investing only to prey. They invest only to subsequently monopolize the market.

With a focus on the commitment value of capital, the strategic mechanism that we study is similar to the one in the seminal papers of Spence (1977) and Dixit (1980) on strategic capacity choice. A capacity choice is used to commit to more aggressive behavior later on. In Spence's (1977) and Dixit's (1980) model, capacity is a commitment to more output; in our model it is a commitment to a late exit. In both cases, it is the commitment value of capital that drives the results. In contrast to Dixit (1980) or Spence (1977), however, this paper studies exit and investment timing

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