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Structural analysis of competitive behavior: New Empirical Industrial Organization methods in marketing

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Abstract

The impact of a firm's strategic marketing mix choices on profitability can be evaluated by understanding the impact of those choices on consumer demand for the firm's products and on the firm's costs. Additionally, a firm's strategic marketing mix choices, and its demand and costs can be affected by rival firms' strategic choices. Therefore, to understand the effects of choice of marketing mix on profitability, we have to understand its effects on demand, cost and competitor reactions. The effects of choices of marketing mix on consumer demand have been analyzed in great depth in marketing, but research on the strategic reactions of competitors to such choices have been far more limited. The New Empirical Industrial Organization (NEIO) framework provides us with a source of methods that has potential to substantially add to our insights about competitive interactions among firms.

In this paper, we first discuss a simple NEIO model to illustrate the basic methodology. We then discuss the contributions of this literature to our knowledge of competitive marketing strategy. In the process, we discuss methodological extensions of the basic model that are needed to model the institutional realities of specific markets. We also summarize how the existing literature has evolved, and provide our view of where the literature might profitably proceed from here. In particular, we discuss how future methodological innovations in the dynamics of competition, discrete strategy choice, and asymmetric information estimation will enable wider application of this methodology to competitive marketing strategy issues. The main advantage of NEIO studies is that they provide greater understanding of the competitive behavior in specific markets or industries compared to cross-sectional studies across industries. Bountiful opportunities exist for additional studies that focus on similar phenomena in different markets to draw generalizable conclusions from this line of research. © 2001 Published by Elsevier Science B.V.

Keywords: Structural models; Competition; Strategic behavior; New empirical industrial organization

1. Introduction

The impact of a firm's strategic marketing mix choices on profitability can be evaluated by understanding the impact of those choices on consumer demand for the firm's products and on the firm's costs. Additionally, a firm's strategic marketing mix choices, and its demand and costs can be affected by rival firms' strategic choices. Therefore, to understand the effects of choice of marketing mix on profitability, we have to understand its effects on demand, cost and competitor reactions. The effects of choices of marketing mix on consumer demand

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have been analyzed in great depth in marketing, but research on the strategic reactions of competitors to such choices have been far more limited.

There is a rich tradition of empirical research in marketing strategy beginning in the 1950s that examines the impact of cost and competitive characteristics of a market on the profitability of firms. This empirical tradition following the structure–conduct–performance (hereafter referred to as SCP) paradigm of empirical industrial organization uses cross-sectional data across industries to find empirical regularities across industries. Many of these studies in marketing have used the Profit Impact of Marketing Strategies (PIMS) data (see Buzzell and Gale, 1987 for a survey). These studies have provided valuable insights about the empirical regularities of relationships between marketing mix choices like advertising, cost components including R&D etc., and profits of firms.

Beginning in the late seventies, advances in game theory have led to a large amount of theoretical research analyzing strategic issues in the context of competition between firms, firms and channel members, firms and their advertising agencies, etc. (For a review, see Moorthy, 1993.) This research convinced empirical researchers that market outcomes (i.e., firms' strategic marketing mix choices and the resulting sales, etc.) and profitability are not merely a function of the broad structural characteristics used in SCP studies. Rather, these market outcomes and profitability are affected by specific industry and firm specific demand and cost characteristics that are difficult to model within the SCP framework of cross-industry analysis. A consequence of these insights has been the birth of the "New Empirical Industrial Organization" literature (henceforth referred to as NEIO; for a review see Bresnahan, 1989). This literature incorporates more industry- and firm-specific details in modeling demand, cost, and competition as steps in analyzing the relationship between marketing mix and profits. Therefore, this approach should be seen as the next step in the stream of empirical research in marketing strategy after the SCP literature. The goal of this paper is to review this literature and provide an agenda for future work.

The NEIO approach involves the development and estimation of structural econometric models of strategic, competitive behavior by firms. By a structural model, we mean a model where firms' choices are based on some kind of optimizing behavior (usually profit maximization). In this respect these models are similar to structural models of consumer choice, which are built on the assumption of utility maximization behavior of consumers. Where they differ is that NEIO structural models are strategic while structural models of consumer choice are non-strategic. Consumer models are non-strategic because one consumer's choice has no impact on another consumer's choice and therefore, these choices can be assumed to be independent. In contrast, NEIO models of firms need to account for the interdependency of firm choices: a firm's choice will cause a reaction from its competitor. This modeling of strategic behavior is the key difference between structural models of consumer choice and structural models of firm choice.

This difference between consumer choice and firm choice has two econometric implications. The first issue is simultaneity. Firms make their strategic marketing mix choices simultaneously. That is, any one firm's choice is a function of its rivals' choice, and rivals' choice a function of this firm's choices. Further, firm choices affect demand and demand characteristics affect firm choices. Therefore, from an estimation viewpoint, the realized demand and the firm's strategic choices are simultaneous. The simultaneity is accounted for by estimating the demand equations and the choice equations of firms as a system of simultaneous equations. The second issue is endogeneity. In consumer choice models, it is assumed that each individual's choice by itself has no effect on the firm's choices such as prices and promotions in consumer choice studies; therefore, firm's decisions are treated as exogenous. However, in a structural model of firm choice where separate equations for firms' choices are estimated, the choices have to be treated as endogenous. We therefore have to use instruments for these choice variables to account for the endogeneity.

A structural model of competitive interaction provides at least four benefits, which we will elaborate on in various parts of the paper.

(1) *Theory testing*: The structural approach provides an opportunity to empirically compare and test alternative theories of strategic behavior. A better