Simultaneous and sequential price competition in heterogeneous duopoly markets: experimental evidence

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Abstract

We investigate simultaneous and sequential price competition in duoply markets with differentiated products and random matching of symmetric firms. We find that second movers gain from the sequential structure in comparison to simultaneous-move markets whereas first movers do not. As predicted by the theory, there is a significant first-mover disadvantage in the sequential game. Finally, we report the results of control treatments varying the matching scheme and the mode of eliciting choices (strategy method vs. standard sequential play).
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1. Introduction

While in a simultaneous-move duopoly firms decide upon their strategic variables (e.g. quantity or price) at the same time, in a sequential-move duopoly one firm can commit to an action first. The other firm, or second mover, is

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assumed to decide after observing the action of the first mover. The timing of decisions has a pronounced effect on the market outcome. Consider for example two symmetric firms facing linear demand. In a homogeneous market with quantity competition the following holds: First, total quantity (as well as consumers' and total welfare) is higher in the market with sequential moves. Second, in the market with sequential moves, there is a first-mover advantage as the first mover earns higher profits than the second mover. Third, both the individual quantity and profit of the first mover (second mover) is higher (lower) as compared to individual quantities and profits in the simultaneous-move duopoly.[1]

Now consider a market with heterogeneous products and price competition where firms set prices either simultaneously or sequentially. In the sequential-move market both firms set higher prices than in the simultaneous-move market implying higher profits and lower consumer rent in the sequential market.[2] Moreover, in the market with sequential moves, there is a first-mover disadvantage as the first mover earns a lower profit in the subgame-perfect outcome. The latter observation is due to the fact that reaction curves in a heterogeneous market are upward-sloping when products are substitutes (see Gal-Or, 1985, Dowrick, 1986, and Boyer and Moreaux, 1987).

Our study addresses the experimental comparison of simultaneous and sequential duopoly markets with price competition where products are imperfect substitutes. To the best of our knowledge this study is the first reporting experimental results of such a sequential duopoly market and comparing them with behavior in simultaneous duopoly markets. There are, however, a number of studies on simultaneous play in markets with differentiated products, for example, Dolbear et al. (1968), Harstad et al. (1998) and Huck et al. (2000).[3] Dolbear et al. (1968) vary the amount of information subjects receive about the basic structure of the market, i.e. about how competitors' prices influence one's own profit. Harstad et al. (1998) analyze the effect of non-binding price announcements in Bertrand markets with differentiated products. Closest to our study is the work of Huck et

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[1] Huck et al. (2001) report on an experiment designed to compare simultaneous and sequential play in a homogeneous duopoly market with quantity competition. They find that in sequential duopolies, aggregate output is in fact higher than in simultaneous duopolies. Hence, not only theory, but also experiments seem to suggest that in this case a sequential market structure is beneficial for welfare. Moreover, although first movers do not exploit their first-mover advantage as strongly as predicted, first movers earn higher profits than second movers.

[2] It can be argued that this property makes Stackelberg equilibria more plausible with heterogeneous than with homogeneous goods as both firms profit from the sequential-move structure.

[3] In addition, there is an experimental literature studying games with a unique survivor of iterated elimination of strictly dominated strategies, just as the simultaneous-move market we investigate. Overall, it emerges that the subjects' ability or propensity to play iteratively undominated strategies is limited (See in particular Rapoport and Amaldoss, 2000; Capra et al., 1999, 2000), and, most relevant for our work, Dufwenberg and Gneezy (2000) who study an experimental Bertrand market with homogeneous goods).