International Journal of Industrial Organization 51 (2017) 39–55

Contents lists available at ScienceDirect

International Journal of Industrial Organization

www.elsevier.com/locate/ijio

Bertrand and the long run☆

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ARTICLE INFO

Article history:
Received 26 April 2016
Revised 3 November 2016
Accepted 5 January 2017
Available online 12 January 2017

JEL Classification:
D43
L13

Keywords:
Price competition
Personalized prices
Marginal cost pricing

ABSTRACT

We propose a new model of simultaneous price competition, where firms offer personalized prices to consumers, who then independently decide which offer to accept, if any. Even with decreasing returns to scale, this decentralized market mechanism has a unique equilibrium, which is independent of any exogenously imposed rule for rationing or demand sharing. In equilibrium, the firms behave as if they were price takers, leading to the competitive outcome (but positive profits). Given the unique result for the short-run competition, we are able to investigate the firms' ex ante capital investment decisions. While there is underinvestment in the long-run equilibrium, the overall outcome is more competitive than one-shot Cournot competition.

☆ We are grateful to a thoughtful referee for his/her suggestions. We have benefited from fruitful discussions with Carmen Matutes. We also thank the audience of presentations in the Bellaterra Micro Seminar, the Riccardo Faini CEIS seminar at Rome Tor Vergata, and at the EARIE 2015 conference. Burguet gratefully acknowledges financial support from the Spanish Ministry of Science and Innovation (Grant: ECO2014-59959-P), and the Generalitat de Catalunya (SGR-2014-510).

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http://dx.doi.org/10.1016/j.ijindorg.2017.01.005
0167-7187/

1. Introduction

In this paper we take a fresh look at markets where the firms compete in prices to attract consumers. This is a fundamental topic of industrial organization that has been thoroughly investigated, ever since the original contribution of Cournot (1838).[1] Our excuse for re-opening the case is that we offer a new way of modeling price competition, which naturally leads to a unique equilibrium with price equal to marginal cost, even when the latter is increasing. The innovation we propose is to allow the firms to personalize their prices. The resulting conceptual advantage is not the feasibility of first-degree price discrimination – which does not occur in equilibrium –, rather, the flexibility allowed by personalized pricing ensures that competition is cut-throat even when attracting too much demand is harmful (because of increasing marginal costs). The enhanced level of competition leads to a unique (symmetric) equilibrium with all consumers being offered the competitive price. Notably, we need not make arbitrary assumptions about either a rationing rule: each firm serves the very consumers who accept its offer; or a demand sharing rule: when a consumer receives two equal offers she randomizes according to her (endogenously derived) equilibrium strategy. Armed with a solution to price competition, we revisit the question of how competitive the outcome of two-stage competition – first technology choice, then (personalized) price competition – is relative to a one-shot Cournot model. We show that despite the competitive result of the first stage, in the two-stage game there are still distortions: there is underinvestment in the long-run factor. Nonetheless – except if the technology is Leontieff – the overall outcome is more competitive than the Cournot outcome.

1.1. Deconstructing the Bertrand Paradox

Take the standard model of simultaneous price competition between two producers of a homogeneous good at constant and identical marginal cost, commonly referred to as the Bertrand duopoly. This model has a unique equilibrium, where both firms price at marginal/average cost, thereby earning zero profit. While the model itself seems realistic, the result is clearly not: even though there are only two competitors, they have no market power at all. The literature has dealt with this issue by enriching the model, incorporating product differentiation, price-quantity bidding, privately known cost functions or dynamic competition. While these generalized models are useful in their own right, it is nonetheless conceptually relevant to note that actually nothing is amiss in the basic model.

Recall that, assuming that firms are price-takers in the input markets, when average costs are decreasing in output we have a natural monopoly: there is room for only one firm in the market. The "paradoxical" situation with constant marginal cost is the limiting

[1] While Cournot (1838) only discussed quantity competition for the more salient case of substitute goods, he did formalize price competition as well, for the case of perfect complements.