

Dynamic Bertrand Oligopoly

Andrew Ledvina, Ronnie Sircar

(Submitted on 10 Apr 2010)

We study continuous time Bertrand oligopolies in which a small number of firms producing similar goods compete with one another by setting prices. We first analyze a static version of this game in order to better understand the strategies played in the dynamic setting. Within the static game, we characterize the Nash equilibrium when there are N players with heterogeneous costs. In the dynamic game with uncertain market demand, firms of different sizes have different lifetime capacities which deplete over time according to the market demand for their good. We setup the nonzero-sum stochastic differential game and its associated system of HJB partial differential equations in the case of linear demand functions. We characterize certain qualitative features of the game using an asymptotic approximation in the limit of small competition. The equilibrium of the game is further studied using numerical solutions. We find that consumers benefit the most when a market is structured with many firms of the same relative size producing highly substitutable goods. However, a large degree of substitutability does not always lead to large drops in price, for example when two firms have a large difference in their size.

Subjects: **Optimization and Control (math.OC)**; General Finance (q-fin.GN)

Cite as: [arXiv:1004.1726v1](#) [math.OC]

Submission history

From: Andrew Ledvina [[view email](#)]

[v1] Sat, 10 Apr 2010 16:52:36 GMT (1665kb,D)

[Which authors of this paper are endorsers?](#)

Link back to: [arXiv](#), [form interface](#), [contact](#).

Download:

- [PDF](#)
- [Other formats](#)

Current browse context:

math.OC

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1004](#)

Change to browse by:

[math](#)

[q-fin](#)

[q-fin.GN](#)

References & Citations

- [NASA ADS](#)

Bookmark (what is this?)

