Optimal pricing from shopping time distributions.

Francisco Álvarez [1], José-Manuel Rey [2], Raúl G. Sanchis [3]

Abstract

We consider a business-interaction model in which consumers' distinctive trait is the shopping time per observed item and the sellers set their prices optimally in a environment of market price dispersion. Specifically, we consider a large population (a continuum) of comparison shoppers whose unitary search costs τ is a random variable obeying a non-atomic distribution T. A shopping distribution Φ is then obtained from T as the distribution of the random variable

$$n^* := \text{argmin}_{n\in\mathbb{N}_+}\{\mathbb{E}[p_{(n)}] + \tau n\},$$

where $p_{(n)}$ is a random sample of n prices drawn from the distribution F of market prices and $\mathbb{E}[\bullet]$ denotes expectation.

On the supply side, we assume a large number (a continuum) of competitors whose prices follow a distribution F. A seller with unit production cost (or reservation price) c determines his asking price from the (discrete) shopping distribution Φ and the underlying price distribution F by optimizing expected profits, namely, by solving

$$p^* := \text{argmax}_{p\geq c}\, \mathbb{E}\pi(p),$$

where

$$\mathbb{E}\pi = \sum_{n\in\text{supp}\Phi} \Phi(n)(p-c)\left(1-F(p)\right)^{n-1}.$$

In this paper we produce an exhaustive analysis of the response of the seller under different scenarios for both the shopping time distribution and the

[1]Department of Economics, Universidad Complutense de Madrid (Spain). E-mail fralvare@ccee.ucm.es.

[2]Department of Psychology, Harvard University, USA and Department of Economic Analysis, Universidad Complutense de Madrid (Spain). E-mail rey@fas.harvard.edu. Corresponding author.

[3]ICADE Department of Economics, Universidad Pontificia Comillas de Madrid and ICEI, Universidad Complutense de Madrid. E-mail raulgsanchis@pdi.ucm.es

market price distribution. The problem cannot be solved analytically in general and requires significant computational analysis. In particular, we estimate quantitative relationships relating the distributional moments of consumers search costs with optimal prices and profits.
