Informative advertising and heterogeneous consumer search in a monopoly with network externalities

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Information and Network Externalities in Consumption

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- Advertising relevant information, firms can prevent consumer search, secure profits and expand demand (*Konishi and Sandfort, 2002; Anderson and Renault, 2006; 2009*)

Motivation

- **Theoretical:** Related literature on network externalities in consumption considers markets with complete information where consumers observe prices, know their matches to products (product attributes), and thus they can rationally calculate their willingness to pay (*Navon at al., 1995; Grilo et al., 2001; Griva and Vettas, 2011*)

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- **Practical:** Sellers of goods with network effects disclose some information advertising relevant content:

Examples:

- Direct information: *Jaguar* and *Lamborghini* announce total supply; *Samsung* and *Apple* announce prices; dating sites and game platforms show the number of users; mobile applications and messengers show the number of downloads; "bestsellers" (books, songs, movies).
- Indirect information: horizontal matches, limited editions, expensive materials used, etc.

Research Qbjectives

1. Study the incentives of a monopoly to reveal information in the form of advertising in markets with network externalities
2. Study how the network externality in consumption affects the decision to advertise and advertising content
3. Study if advertising decision depends on the nature of the search cost and its magnitude

The Model

- A monopolist produces a good with network externalities
- Consumer valuation for the good θ_i is uniformly distributed on $[0, 1]$
- Every consumer i has a utility function $U_i = \theta_i + \gamma d^e - p$, where p is a price, d^e is the expected clientele size; and γ reflects the network externality: bandwagon effect for $\gamma > 0$ and snob effect for $\gamma < 0$
- Consumers do not know both market price and their matches θ_i and thus cannot correctly foresee d^e. Consumers cannot realize their actual benefits from the purchase
- Consumers may incur a search cost c_i, visit the store, inspect the good and know both price and matches. Search cost is uniformly distributed on [0,1]. Both θ and c are i.i.d.
- Alternatively, a monopolist may costlessly disclose relevant information with advertising

Timing

Stage 1. A monopolist decides whether to advertise or not. Consumers do not know their matches and the market price

Cases:

- **Case A:** No advertising.
- **Case B:** Only the price is advertised.
- **Case C:** Only horizontal matches are advertised.
- **Case D:** Both the price and matches are advertised.

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Stage 3. Once consumers have learned both θ and the price, they make their buying decision

Consumer Search

- If consumers do not know their θ or p, they must search
- Consumer i rationally anticipates the firm's pricing rule and visits it if the search cost does not exceed the expected benefits of search:

$$E(CS_i) = \int_{p-\gamma d^e}^{1} (\theta_i + \gamma d^e - p) d\theta$$

- $E(CS_i) < c_i \Rightarrow$ *inactive*
- $E(CS_i) \geq c_i \Rightarrow$ *search*

Firm's Problem

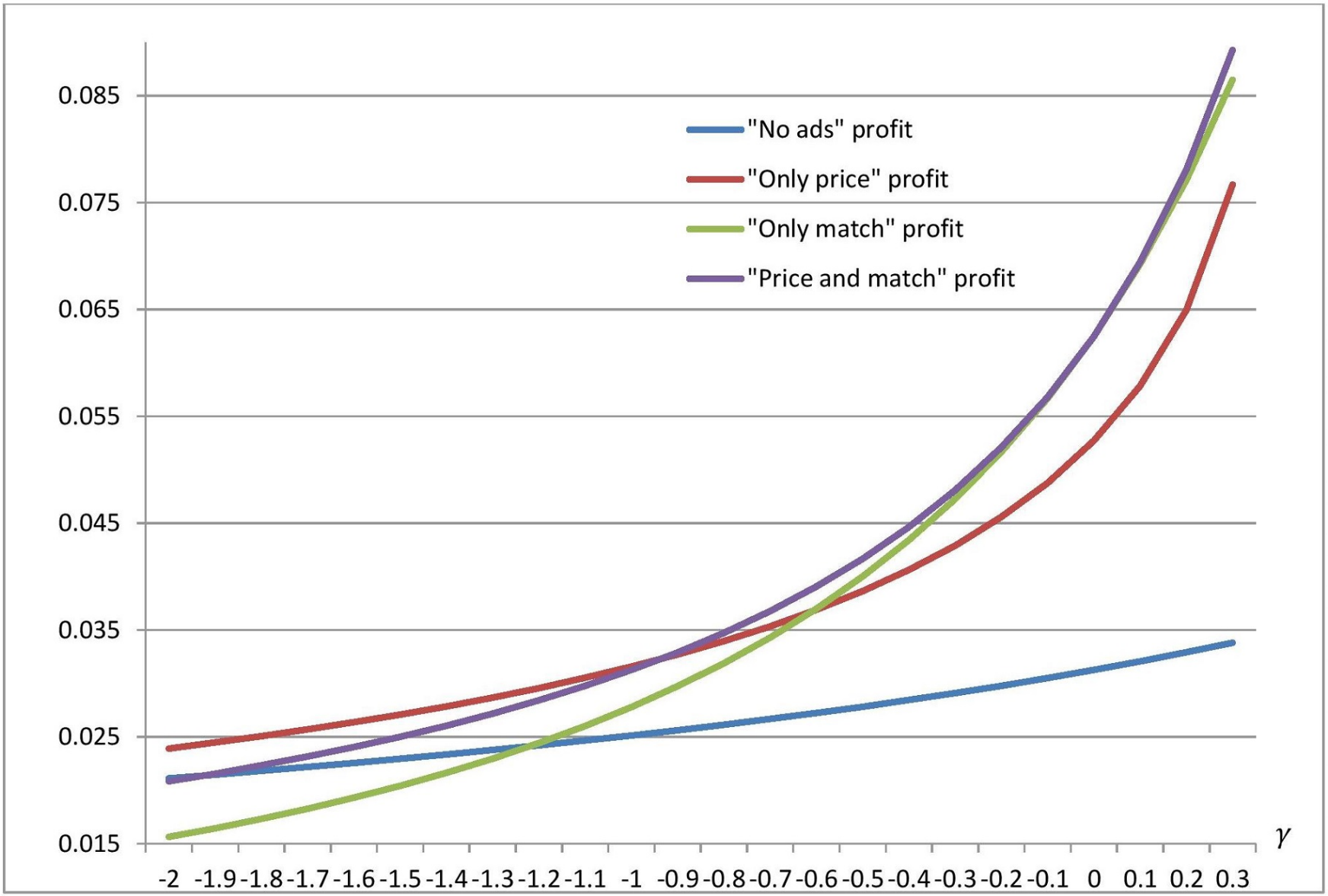
- A monopolist cannot influence the search decision and expectations of consumers without advertising.
- Therefore, monopolist chooses p which maximizes profit taking search decision of consumers and d^e as given
- Profit function:

$$\Pi(p) = p[Prob(search)Prob(trade)]$$

- $Prob(search)$ is a share of consumers who decided to visit the store, s
- $Prob(trade)$ is a share of consumers who buy

- In equilibrium, the market clearance condition satisfies:
  $d^e = Prob(search)Prob(trade)$

Results: small γ



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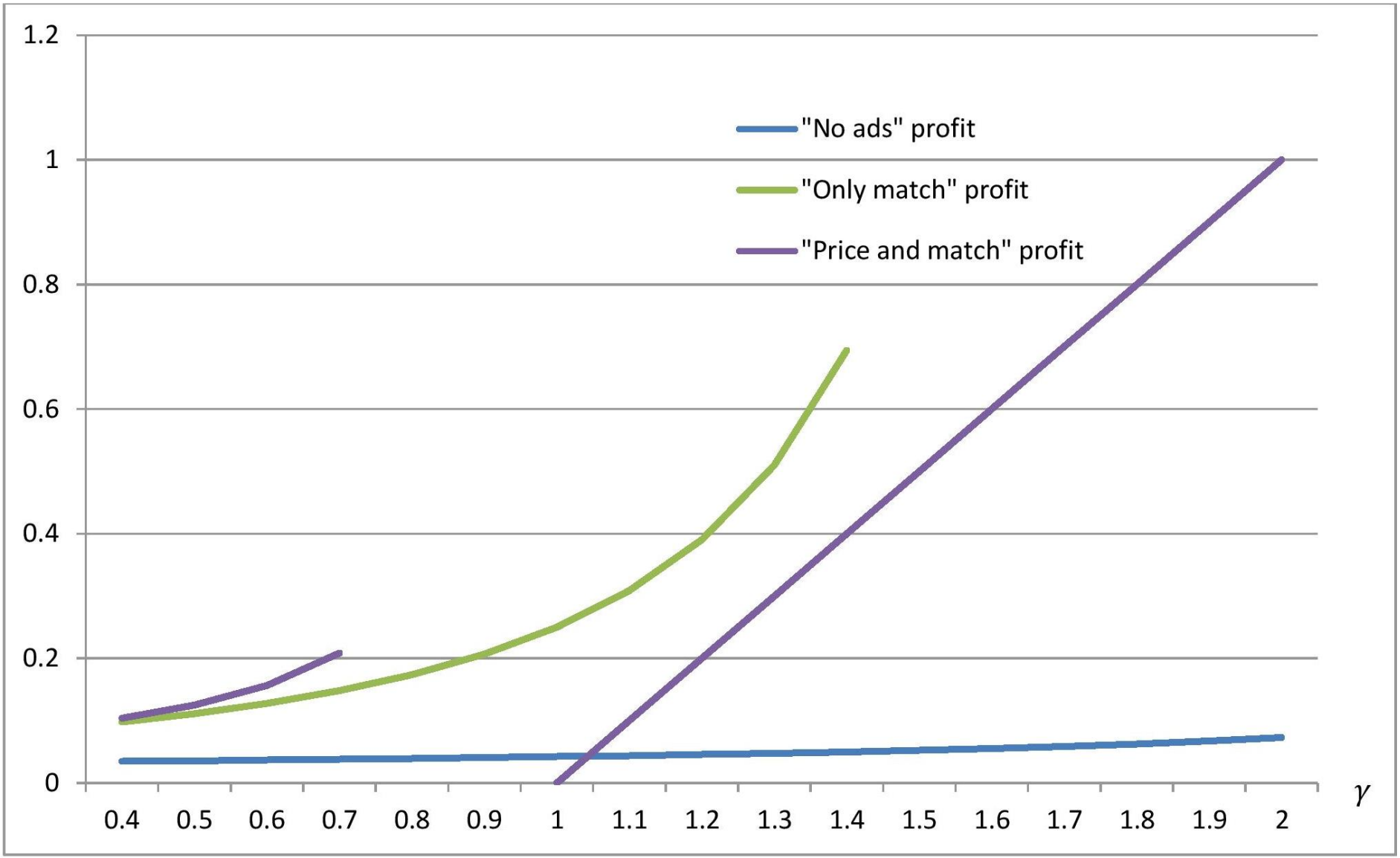

Results. Heterogeneous Cost

- As network externality moves from positive to negative, the firm reduces its advertising content from full disclosure to "price only" advertising
- The firm advertises price alone for snob effect and reveals both price and matches for bandwagon effect whenever it is possible
- Searching rule of consumers does not only depend on consumers matches but also whether their search costs are low enough.
- Less informative advertising shrinks demand. This increases WTP for snobs and thus the firm commits to a small clientele advertising a high price. In turn, snob effect decreases demand elasticity and thus the firm gains more from a higher price even with reduced sales
- In contrast, more informative advertising expands demand because it increases a likelihood of visits. This benefits the firm if there is a positive network externality. The firm commits to a larger clientele advertising a lower price. Bandwagon effect increases demand elasticity and thus the firm gains from expanded demand

Concluding Remarks

- The paper contributes to the existing literature on network externalities in consumption by considering the problem of poorly informed consumers. Poorly informed consumers cannot correctly realize the magnitude of the network externality and calculate their WTP
- The work also explains why firms producing goods with network externalities reveal some market information in the form of advertising. – This helps consumers to avoid the problems caused by incomplete information
- Firms may use different advertising content depending on the network externality and the nature of search costs, while related literature only considers advertising costs and search costs
- Further research is to consider information disclosure game in oligopoly, where firms decide on advertising first and then compete in prices