Addressing 'novel' anticompetitive conduct and conducting advocacy work in the context of the digital economy

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### Introduction

- Research Proram on Industrial Economics and Competion Policy
- Part I: Pricing algorithm and collusion
  - Ezrachi and Stucke (2019), Johson and Sokol (2019), OECD (2017), my thoughts
- Part II: Cross-boarder entry by platforms
  - My recent thinking about the issue

#### Highly frequent interaction and transparent pricing

- Tit-for-tat implements instant price matching: Incentive to undercut is gone
  - "algorithms might enable firms to achieve the same outcomes of traditional hard core cartels through tacit collusion." (OECD, 2017)
- "About half of the retailers track online prices of competitors... 67% of those retailers that track online prices use (also) automatic software programmes for that purpose." (European Commission 2015-2016 e-commerce Sector Inquiry)

#### Use of common pricing algorithm

- Suppose competitors use the same software company's pricing algorithm and the software company's compensation from each firm is a fraction  $\alpha =$  of the firm's profit
- Then the software company's incentive is to maximize

$$\alpha\left[\sum_{i=1}^n \pi_i\right].$$

In other words, it is optimal for the software company to set prices like a cartel

• How can we guarantee that the software company maximizes  $\pi_i$ , for i = 1, ..., n?

#### **Delegation as commitment**

- Now suppose firms using different pricing algorithms
- Suppose both firms may be tempted to deviate from collusion due to some changes in environmental factors, including possibly the firms' discount factors. Anticipating that, even it is optimal to start collusion today, collusion is not sustainable
- If there are two pricing algorithms which are known to ignore those environmental factors, then it is an equilibrium that both firms each adopt one of these pricing algorithms and collusion become stainable

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## Competition among pricing software companies

#### Competition among pricing software companies

- Suppose there are two types of pricing software companies: collusion-facilitating and non-collusive
- In markets where all firms use collusion-facilitating pricing algorithms and collusion is sustainable, firms all earn high profits
- In markets where some firms use non-collusive pricing algorithms, competitive equilibrium emerges and most firms earn low profits
- Pricing software companies selling collusion-facilitating algorithms on average earn higher profit. They also attract more clients
- In the long-run, the market is consist of mostly collusion-facilitating pricing algorithms

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### Additional implications (if pricing algorithms facilitate collusion)

- Collusion via pricing algorithms is tacit collusion, not violating antitrust laws
  - Reduce incentive for horizontal mergers among competitors
- Can free entry address issue?
  - Algorithms can use predatory pricing to drive out entry
  - Even if entry cannot be deterred, if collusion is sustainable among large number of firms, long-run equilibrium profit may be driven down to zero,

$$\frac{\pi^M}{n}-c=0,$$

without benefiting consumers.

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#### Additional implications (if pricing algorithms facilitate collusion)

- When pricing software companies merge, it's more likely competitors are served by the same company's pricing algorithm
  - Even if the merger does not raise the prices for pricing software, it may lead to more collusion among users of the software

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### Further research on effect of pricing algorithms

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- Whether pricing algorithms actually facilitate collusion is not settled
  - Skeptics: Schrepel (2017), Crandal et al. (2018), Schwalbe (2019)
  - Recent study by Calvano et. al (2019): In experiments with two Q-learning algorithms, the algorithms arrive at the collusive state in 63% of the periods
- Will antitrust authorities reconsider antitrust policies if it is validated that pricing algorithms indeed facilitate tacit collusion?
- If not, research to validate pricing algorithms' abilities to facilitate collusion runs the risk of speeding up the development of an anticompetitive tool

## Part I: Conclusion

- Theoretical analyses imply it is a concern that pricing algorithms can facilitate collusion, although this is not empirically confirmed
- If this is true, there are important antitrust implications
  - Horizontal mergers are less beneficial
  - Free entry will drive firm profits to zero but consumers may not benefit
  - Merger among pricing software companies has additional anticompetitive effect
  - Would antitrust authorities reconsider antitrust policies if pricing algorithms promote tacit collusion?