

CRESSE 2017

Heraklion – June 30-July 2, 2017

Algorithmic Collusion Myth or Reality?

Discussion

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Kühn-Tadelis' and Harrington's algorithms



Remedy: No Cretan Raki tonight



Context

- Report on the state of competition in the U.S.
 - White House, April 2016
 - Main facts
 - Competition is decreasing in many sectors
 - Industries are getting more concentrated
- Digitalization of the economy
 - Big data and analytics
 - Computer algorithms
 - Artificial intelligence

An ideal suspect: The algorithms

- Cold (i.e., not human)
 - Sophisticated (i.e., not like human ???)
 - Fast
 - No feeling
 - No trust
 - No fear to go to jail

Guilt Index: Reality of algorithmic collusion?

- U.S. DOJ against Topkins
 - Conspiracy with competitors to fix prices of posters sold on Amazon
 - Implemented through an algorithm
- U.S. District Court against Uber's CEO
 - Vertical contract between Uber and each drivers
 - Horizontal coordination due to the parallel use of the same algorithm

Alibis of algorithms

- Report on the E-commerce Sector Enquiry
 - EC, May 2017
- Increase
 - Price transparency
 - Price competition
 - Access to information
 - Access to consumers

Relevant questions

- Do algorithms converge to collusion ?
- What to do if they do so ?

Algorithmic Collusion: Myth

- See Kühn – Tadelis (2017)
 - Transparency and frequent contacts are not sufficient conditions for collusion
 - Critical analysis of Salcedo (2015)'s paper
 - Ad-hoc assumptions
 - Some kind of explicit coordination is required

Back to “Human” Collusion !

Algorithms in reality

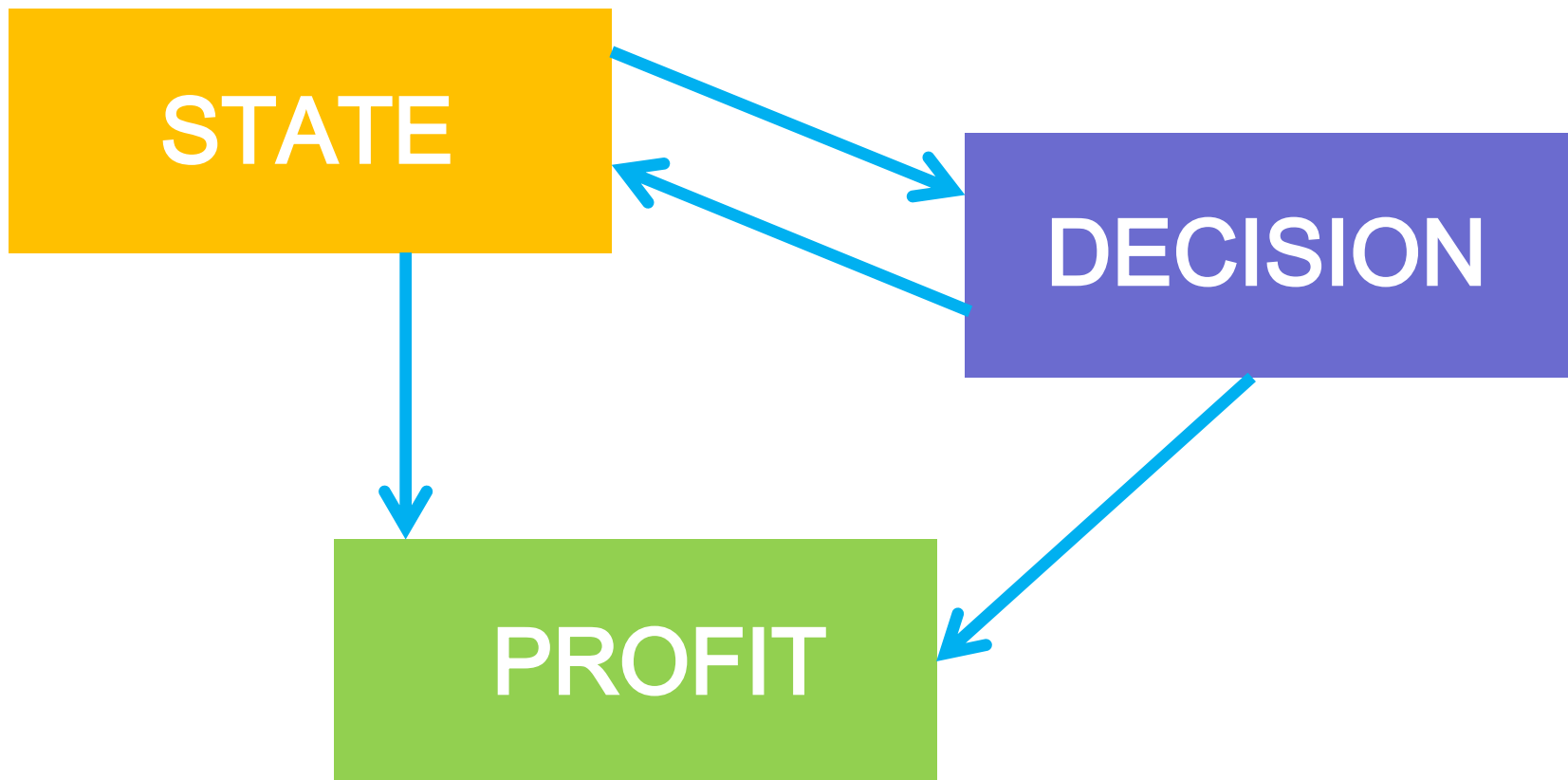
- Types of algorithmic pricing
 - Heuristic rules
 - Increase prices when very few seats available
 - Analytical models
 - Demand analysis
 - Autonomous models
 - Machine learning
 - Auctions

Use of algorithmic pricing

- **Online retail**
 - Heuristic rules, analytical and autonomous models
 - Price matching
- **Insurance**
 - Analytical and autonomous models
 - Risk matching
- **Airlines and hotels**
 - Autonomous models
 - Dealing with perishable goods

How do algorithms work ?

- In general



How do algorithms work ?

- In practice
 - Demand analysis (Amazon, Patrick Bajari)
 - Marketing: select the right customers to sell the right products to them

$$\ln Q_{jhmt} = f(p_{mt}, a_{mt}, X_{mt}, D_{mt}, \epsilon_{jmt});$$

$$\ln Q_{jhmt} = \alpha' p_{mt} + \beta_1' X_{mt} + \beta_2' D_{mt} + \gamma' a_{mt} + \lambda' \mathcal{I}(X_{mt}, D_{mt}, p_{mt}, a_{mt}) + \zeta_{hm} + \eta_{mt} + \epsilon_{jmt}$$

How do algorithms work ?

- Conclusion
 - No game theory models inside !!
 - Will they automatically converge to collusion in these conditions?
 - How to detect that they have converged to collusion?
 - How to compute the competitive equilibrium?
 - Disclosing and exchanging the codes?

Algorithmic Collusion Debate = A Market Failure Question

- The value of algorithms comes from the data
- From decreasing to increasing marginal value of data
- People don't know the value of data
- Lack of a price for digital data
 - Risk to restrict innovation
- If digital data were priced, the risk of collusion would be lower
 - Increase downward competition

Remedies

- A regulation issue
 - Building a market for data
 - Mandatory data sharing
 - Data Portability
 - Restricting the use of data
- An antitrust issue
 - Tacit collusion incumbators (Ezrachi and Srucke)
 - Data co-operatives
 - Breaking up big data compilers

HARD TO IMPLEMENT !

Algorithmic Collusion: The tree that hide the forest

- The working of the digital economy
 - Network effects
 - Barriers-to-entry
 - Asymmetric competitors
- The real question: Market dominance
 - Collusion is not an issue !

Thank you !