

# Chair AI and Competition

## IP2

September 8, 2019

# The team

- ▶ Bruno Jullien - CNRS - TSE, Theoretical Industrial Organization
  - ▶ have worked on the economics of platforms (2 sided-markets), competition policy, reputation online
- ▶ Wilfried Sand-Zantman - UTC - TSE, Theoretical Industrial Organization,
  - ▶ have worked on privacy policy and data
- ▶ Daniel Ershof - UTC - TSE, Empirical Industrial Organization
  - ▶ have worked on consumer search and competition in app store
- ▶ Alexandre de Cornière - UTC - TSE, Theoretical Industrial Organization,
  - ▶ have worked on economics of Internet, digital platforms, market for data

# The program

The chair is focused on the implications of AI for competition policy.

The chair plans to cover three main topics:

- ▶ Collusion and algorithms: will the development of algorithmic pricing lead to less competitive pricing and if yes, how should anti-trust authorities and/or regulators deal with it.
- ▶ Recommendation systems, reputation and feedback systems: digital platforms uses data to improve efficiency of the service, but to which extent are they acting in the best interest of their customers?
- ▶ Consumer privacy and the market for data: Firms collect data that can be used internally or shared with third parties, consumers care about how the data is used and who has access to it. How should we organize and regulate the "market data"?

# Economic Theory and Algorithmic Pricing

- Economic theory provides no clear predictions on the effects of algorithmic pricing on competition
- Some papers predict that AI pricing will lead to collusion (Calvano et al 2019)
- Others predict that AI pricing *cannot* lead to collusion (Tadelis and Uwe-Kuhn 2017)
- Others are ambiguous (Miklos-Thal and Tucker 2019)

# AI in Gasoline Retail Pricing

- Danish company **a2i Systems** is a world-leader in gasoline retail AI pricing
- Sells ANN-based software called “PriceCast Fuel”
- Company experiments suggest 5% increases in station revenues with software

## PriceCast Fuel: Agent Based Fuel Pricing

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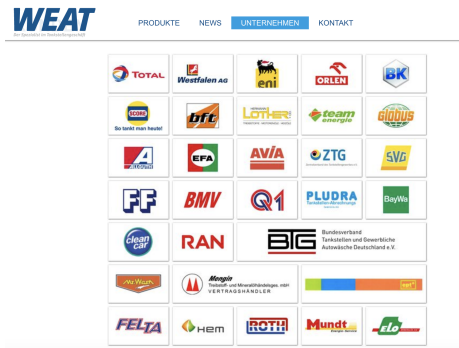
**Abstract.** Setting the right price at a gas station is a complex task involving numerous parameters. By using a hybrid agent architecture based on BDI and ANN we can model a gas station agent that can learn to model its consumers. The gas station agent can then use the learning from its consumer behavior to detect anomalies in the environment and autonomously set its own price to influence the consumer and thereby optimize e.g. gross margin without sacrificing volume.

# AI Adoption in German Gasoline Pricing

'Since [Summer 2017], "a2i systems A/S"...offers...filling station operators in Germany the highly innovative pricing system as an easy-to-use cloud solution... The consulting, the connection and the support of the system will be made by "WEAT Electronic Datenservice GmbH".'

Trade Publication *TANKSTOP* December 2017

- A partial list of WEAT's clients:

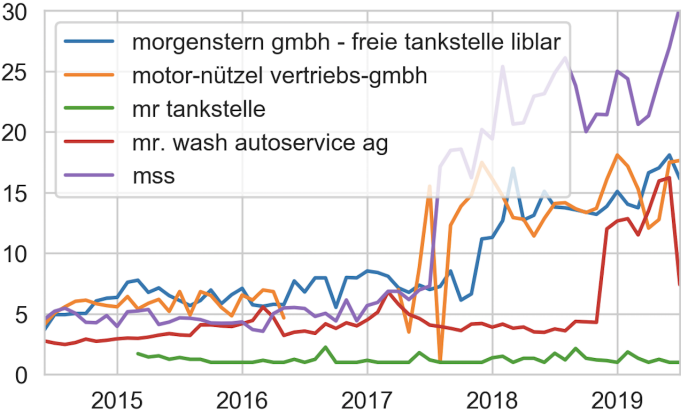


- Notably, not all German operators are there

## Empirical Project using German Data

- Germany has the worlds best gasoline price data thanks to the *Market Transparency Unit for Fuels* ("Markttransparenzstelle für Kraftstoffe")
- Since 2014, price updates for all filling stations in Germany in 5 minute intervals
- The plan is to use this data to test for structural breaks in pricing patterns around the summer of 2017 for WEAT clients
  - Increase in number of price changes
  - Reduction in response time to rival price changes
  - Increase in geographic responsiveness
  - Average price changes
- Use other stations as "controls"

# Avg. N Daily Price Changes by 5 Small Operators





# Recommender Systems

## The recommender problem

Estimating a utility function to predict how a user will like an item based on, past behavior, relation to other users, Item similarity, Context...

Xavier Amatriain

(Engineer - director of algorithm engineering at Netflix)

- ▶ Do firms systematically distort recommendations?
- ▶ If yes, in which direction?
- ▶ kickbacks, commissions, heterogenous. markups, vertical integration lead to biased recommendations.
- ▶ Reputational concerns act as a disciplining devices
- ▶ On-going: **Fear** of spoiling their reputation for being good recommenders induces **inefficient\* risk taking behavior**: recommendations are cautious, inefficiently so.

# Preliminary results

- ▶ We have preliminary lab evidence that:
  - ▶ Confirms that RS shape consumption choices
  - ▶ Suggests that a recommender can enhance retention by being cautious.
- ▶ We build a 2-player Bayesian game to understand when a recommender should be expected to be excessively cautious:
  - ▶ A consumer (C) must choose between 2 objects, a recommender (R) receives information about value to consumers and proposes one object
  - ▶ C is uncertain about the quality of recommender and learn from observation of the recommendation and the value realized by consuming the object
  - ▶ R cares about C's ex-post beliefs about its quality
  - ▶ **First conclusion:** R favours safe recommendations when its value is concave in C's beliefs

# Privacy policy and the market for data

- ▶ What are the incentives to share or not share the data with third-parties (reputation, risk of malware, mistargeting..)?
- ▶ Competition when firms use data to price-discriminate (and consumers are aware of it)
- ▶ How to sell data (exclusive or not, differentiated, partial)?
- ▶ Who should have property rights on data generated by a firm-consumer interaction?