Antitrust Policy and Industry 4.0
- Keeping the Market Competitive in a Digital Economy -

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Industry 4.0

Characteristics of Industry 4.0

Computerization, automation and data exchange in manufacturing technologies. Goal are smart factories characterized by adaptability, resource efficiency and ergonomics as well as the integration of customers and business partners in business and value processes. Technological basis are cyber-physical systems that communicate and cooperate with each other and with humans in real time, and both internal and cross-organizational services are offered and used by participants of the value chain.

- Specific factors that could be a threat to competition in industry 4.0 that are not present in the current industry?
  - **Internet of Things**
  - Reliance on **Big Data** - also machine generated data as an important part.
  - **Machine learning** - algorithmic pricing
- Which impact could these aspects have on competition within the Industry 4.0?

Internet of Things – Efficiencies

What is the Internet of Things (IoT)?

Network of physical objects – devices, vehicles, buildings, machines and other items – embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data.

- IoT generates a huge amount of data.
- First, **data from connected consumer goods** provide information about the preferences, habits etc. of consumers.
- Secondly, **data are generated by M2M communication** within a firm, between firms in a supply chain but also between firms in the same market.
- **Customized products** can be offered to customers - their needs and preferences are better served, small batches.
- **Efficiency** within a smart factory and also within a smart supply chain **is increased** (less idle capacities, high load factors, more efficient storage management, improved maintenance and quality control).
- Higher efficiency leads to **cost reduction** and/or **quality improvement** and thereby to **lower prices** and **increased consumer welfare**.

Internet of Things - Competition Problems I

- IoT could lead to an increased **information exchange between competitors** (in particular in production networks) either directly or through a common hub.
- Individualised and current information about competitors by sharing IoT-data is improved (e.g. about technologies, cost structures, inventories, customers served, pricing and other important aspects).

$\Rightarrow$ Reduced uncertainty about competitors, higher market transparency and easier detection of a deviation from a collusive agreement or tacit collusion.

$\Rightarrow$ Information exchange and increased transparency could make **collusive behaviour** between firms more likely.

- Coordinated behaviour without any explicit agreement between firms could lead to **higher prices** and **reduced consumer welfare**.

$\Rightarrow$ Control of information exchange between competitors.

- But: trade-off between higher static and dynamic efficiency and increased risk of coordinated behaviour.

Internet of Things - Competition Problems II

- **Proprietary systems** of data exchange vs. **open systems**.
- Smart products are based on a large number of patents, including patents on communication standards.
- Proprietary systems: only smart products using the same proprietary platform can exchange data.
- Also: possible **network externalities** could lead to the dominance of one proprietary standard.
- Potential **hold-up strategies**: no access to communication standards, no licences on fair, reasonable and non-discriminatory (FRAND) terms.

$\Rightarrow$ With open standard or licences competitors are able to connect to the IoT and also profit from network externalities.

Big Data

Definition of Big Data

Large set of unstructured, semi-structured and structured data with sizes beyond the ability of commonly used software tools to capture, curate, manage, and process data within a tolerable time. They are characterized by high Volume, Velocity and Variety and require specific technology and analytical methods for its transformation into value.

- Important input for products and services – information about customers' preferences.
- Improved marketing and better customer relationships.
- Improvement of existing products and development of new products.
- Cost savings by more precise information.
- Competitive pricing.

Big Data - Competition Problems I

Big Data as a barrier to entry

- Improved and new products and services (positive feedback loop)
- Lock-in of customers because of personal information.
- Economies of scale of information.
- Big Data as an essential facility?

$\Rightarrow$ Unjustified refusal to grant access to Big Data to competitors could be considered as a violation of competition law.

Big Data - Competition Problems II

Big Data and mergers

- Problems due to data fusion (superadditivity of data).
- Horizontal merger of firms with low turnover - not captured by competition law.

$\Rightarrow$ Value of the transaction as additional criterion.

- Data acquisition by mergers of firms in different markets, e.g. Google/Nest merger.

$\Rightarrow$ Should **Big Data** be considered as a **separate market** and should all mergers that involve Big Data be examined in more detail?

Data Analytics and Machine learning

- Big Data lead to large amounts of unstructured data that have to be analyzed.
- This is accomplished by methods of data analytics (machnie learining, deep learning)

Definition of data analytics and machine learning

Data analytics and machine learning are methods used to devise complex models and algorithms that lend themselves to prediction. These analytical models allow for reliable, repeatable decisions and results and uncover hidden insights through learning from historical relationships, patterns and trends in the data.

Efficiency enhancing effects

- Smart advertising and online marketing – individualised products.
- Improved demand estimation, identification of new trends and fashions (pattern recognition).
- Pricing according to demand and supply to clear the market.

Data Analytics and Machine learning

Possible anticompetitive effects

- Price discrimination by personalized pricing (could also be welfare enhancing).
- Deep learning / algorithmic pricing could lead to collusive behaviour of firms.
- Autonomous algorithms **learn to behave in a collusive way** as one of many possible outcomes and charge higher price, e.g. the monopoly price.
- Is this a concerted practice, a violation of Art. 101 TFEU?
- Redefinition of concept of agreement or concerted practice - or checks and balances in the pricing algorithms?
- Explicit cartel agreements are explicitly ruled out in the programming of the algorithm.
- Tacit collusion is the result of deep learning .
- How to deal with AI in competition law?
- Ethical questions and AI – can law-abiding behaviour be guaranteed in self-learning machines?

Thank you for your attention!

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