

# The Value of Data Resources in Algorithmic Competitions

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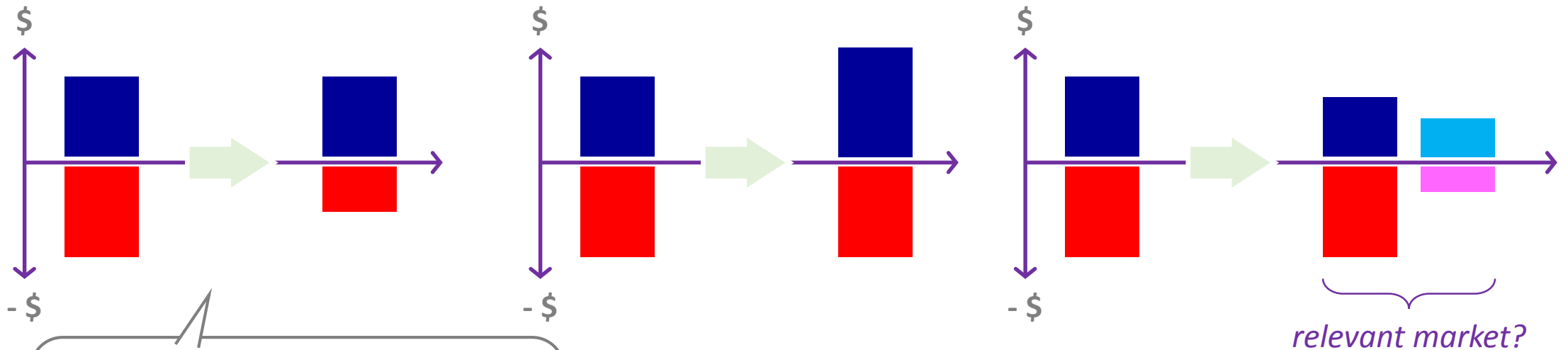
# Outline

- Big Data & Algorithm Economy
  - ✓ Disruptive innovations and GPT (General Purpose Tech) -- e.g.) competing AI platforms
- Issues
  - ✓ Competing business models (& relevant market)
  - ✓ Perspectives on data resource
- Theoretical Framework: Resource-Based View -- a novel point of view and implications to competition policy in the data-driven economy
  - ✓ Hypothetical monopolist from the supply-side perspective
  - ✓ Resource complementarities & barrier to mobility

# Big Data & Algorithm Economy

- Big Data & Algorithm: Accelerator of Platform Economy

- ✓ Platforms → Transaction costs ↓ → Efficiency ↑ &/or Market size ↑ + New markets emerge (with replacing legacy ones)



GPT (General Purpose Technology  
Bresnahan & Trajtenberg (1995):  
Helpman, Landes, Lipsey, Rosenberg etc.)

disruptive innovations

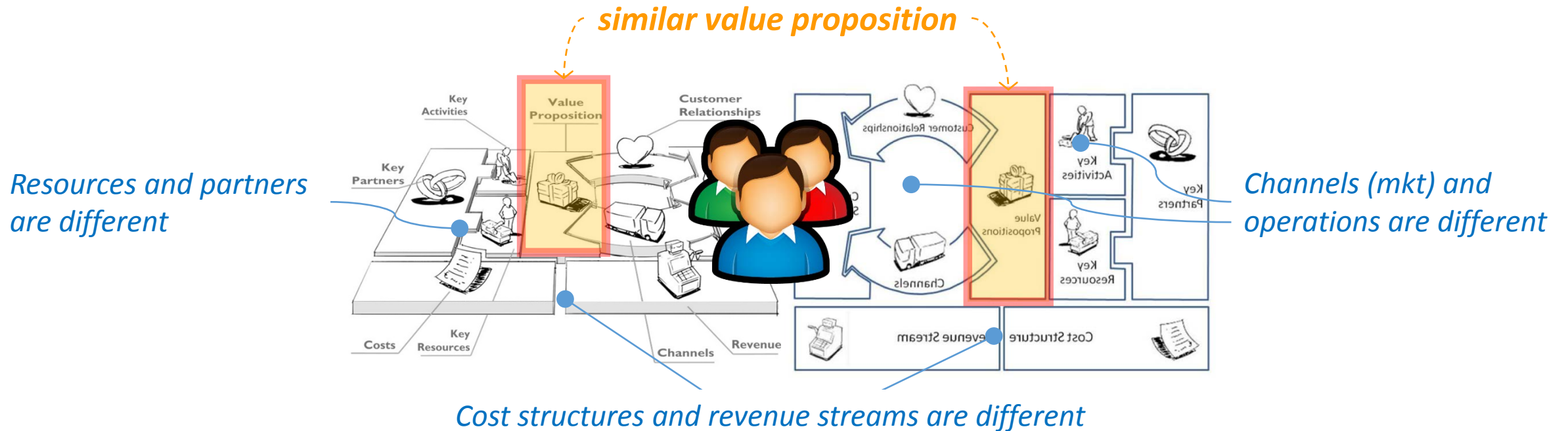
# Big Data & Algorithm Economy

- AI platforms for the sake of the supply-side
  - ✓ Bots
  - ✓ Perfect dynamic pricing (& zero menu costs)
  - ✓ Consumer information (anonymous information) can be reconstructed at a low cost, allowing the differentiated price to each consumer
    - 2<sup>nd</sup>- & 3<sup>rd</sup>-degree price discriminations may be a piece of cake ... even the 1<sup>st</sup>?
- AI platforms for the sake of the demand-side
  - ✓ Algorithmic consumers
- AI platforms for the sake of the third party?
  - ✓ Legal tech, Legal science, Regulatory tech?

# Issues – business model

- Competing Business Models

- ✓ Different business models for the same service (customer group)



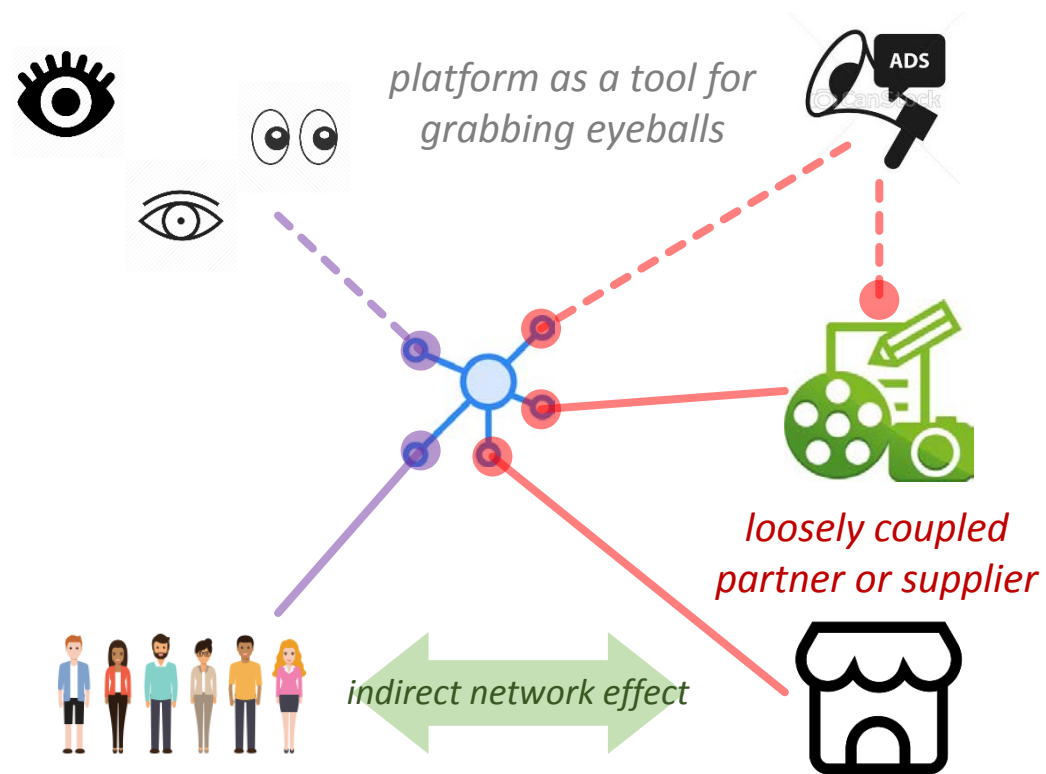
- ✓ The relevant market in the perspective of the supply-side (cf. SSNIP)

# Issues – data resource

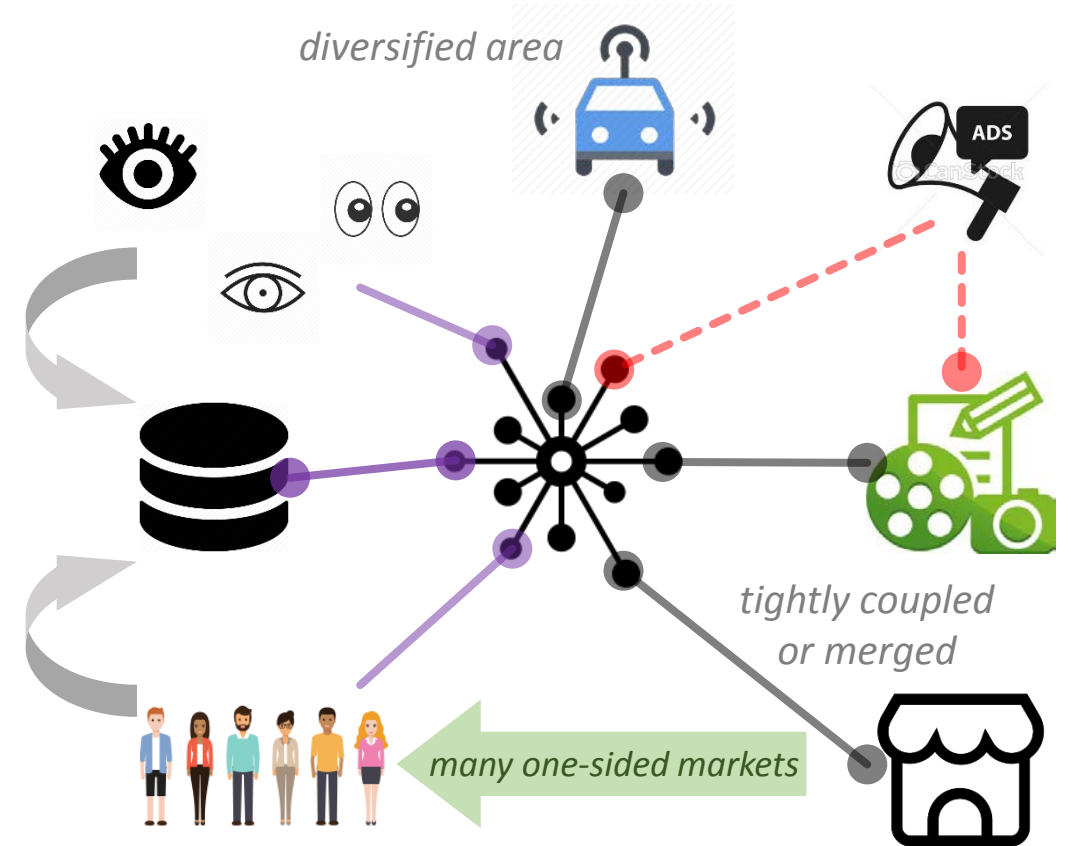
- Data Resource: idiosyncratic asset or just input factor?
  - ✓ Data ↑ → AI performance ↑ : Bajari et al. (2018: Internet search & recmd e-commerce), Scafer et al. (2018: retail forecasting), etc.
    - Personalized information is particularly valuable (+ algorithm design)
- Not a surprise? – The use of data as an input to the production function dates back to the emergence of modern industrial firms in 19C (Chandler, 1977: The Visible Hand)
  - ✓ Bresnahan, Brynjolfsson & Hitt (1994), Tambe & Hitt (2012), etc.
- Concerns? – Data Feedback Loop (Newman, 2014; Grunes & Stucke, 2015; Lerner, 2014; Lambrecht & Tucker, 2017; etc.)

# Beyond the Multi-Sided Platform

## Simple MSP BM



## Diversification of MSP



# Issues more

- Tacit collusion between competing bots?
  - ✓ The equilibrium (i.e., tacit collusion) will be fragile and unstable since the capabilities of predicting the behaviors of the others are different
  - ✓ However, due to the fast learning capability of algorithms (especially, deep learning), there is a possibility that collective behaviors (e.g., herding) form after a certain period of time
- Concerns (McSweeney & O’Dea, 2017; Salcedo, 2015):
  - ✓ Tacit collusion beyond the reach of Section 1 of the Sherman Act
  - ✓ Section 5 of the FTC Act to prosecute “unfair methods of competition” may be the only tool available to police algorithmic collusion



# Theoretical Framework

- Resource-based View (RBV) -- a novel point of view (Foer, 2002 & 2003; Costa-Cabral, 2017; Monteiro & Foss, 2017)
  - ✓ Heterogenous resources controlled by firms should be taken into account in developing competition policy
- RBV: another tack of the firm theory – developed in business area (Penrose, 1959; Barney, 1991; Peteraf, 1993; Peteraf & Bergen, 2003)
  - ✓ Heterogeneity leads different productivity, innovation, growth, and profit
  - ✓ Competitive capability & core competence – how they form?: business model

# RBV: Implications to Competition Analysis

- Hypothetical monopolist from the supply side perspective
  - ✓ Capability equivalence (Peteraf & Bergen, 2003) → supply-side substitution (application of voluntary matching game from Roth & Sotomayor, 1992)
    - Given the preferences of firm  $f_i$  in relation to the resource profiles of the other firms that meet the consumer needs (assumed to be well defined), if  $r_j$  (the resource component that firm  $f_j$  has) is suitable for firm  $f_i$ , then firm  $f_j$  will be incorporated in the hypothetical monopolist (Monteiro & Foss, 2017)
  - ✓ may complement the SSNIP test -- to present an upper bound in defining a relevant market

# RBV: Implications to Competition Analysis

- Resource complementarities (Milgrom & Roberts, 1995)
  - ✓ combined with the notion of the barrier to mobility (or immobility) → to explain whether to preserve the monopoly rent?
    - ... possible when each resource in isolation is characterized by causal ambiguity (Lippman & Rumelt, 1982) or when each resource profile is a path-dependent source of core competence (Barney, 1991)
  - ✓ Then, data is a complementary resource? How about immobility?
    - In a data-driven (or AI) platform, a bundle of resources that are dissimilar in type, but similar in use can be put to work together in an integrated fashion
    - These resources cannot be assessed in isolation → The core competence of the platform depends on the individual contribution of each resource profile, along with the complementarities among it