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Economic and Financial Consulting and Expert Testimony

# The Economics of Big Data and Market Power

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# [Not very] New Economics: Two Sided Markets

## PLATFORM COMPETITION IN TWO-SIDED MARKETS

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### Abstract

Many if not most markets with network externalities are two-sided. To succeed, platforms in industries such as software, portals and media, payment systems and the Internet, must "get both sides of the market on board." Accordingly, platforms devote much attention to their business model, that is, to how they court each side while making money overall. This paper builds a model of platform competition with two-sided markets. It unveils the determinants of price allocation and end-user surplus for different governance structures (profit-maximizing platforms and not-for-profit joint undertakings), and compares the outcomes with those under an integrated monopolist and a Ramsey planner. (JEL: L5, L82, L86, L96)

### 1. Introduction

Buyers of video game consoles must play on; game developers pick platforms that are or will be popular among gamers. Cardholders value credit or debit cards only to the extent that these are accepted by the merchants they patronize; affiliated merchants benefit from a widespread diffusion of cards among consumers. More generally, many if not most markets with network externalities are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform. Platform owners or sponsors in these industries must address the celebrated "chicken-and-egg problem" and be careful to "get both sides on board." Despite much theoretical progress made in the last two decades on the economics of network externalities and widespread strategy discussions of the chicken-and-egg problem, two-sided markets have received scant attention. The purpose of this paper is to start filling this gap.

The recognition that many markets are multisided leads to new and interesting positive and normative questions. Under multisidedness, platforms must choose a price structure and not only a price level for their service. For example, video game platforms such as Sony, Sega and Nintendo make money on game

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The American Ec... / Vol. 75, No. 3... / Network Externa...



### JOURNAL ARTICLE

## Network Externalities, Competition, and Compatibility

Michael L. Katz and Carl Shapiro

The American Economic Review

Vol. 75, No. 3 (Jun., 1985), pp. 424-440

Published by: [American Economic Association](#)

<https://www.jstor.org/stable/1814809>

Page Count: 17



## Network Interconnection in Telecommunications

fark Armstrong

first published: 27 December 2001 | <https://doi.org/10.1111/1468-0297.00304> | Cited by: 231

PDF TOOLS SHARE

### Abstract

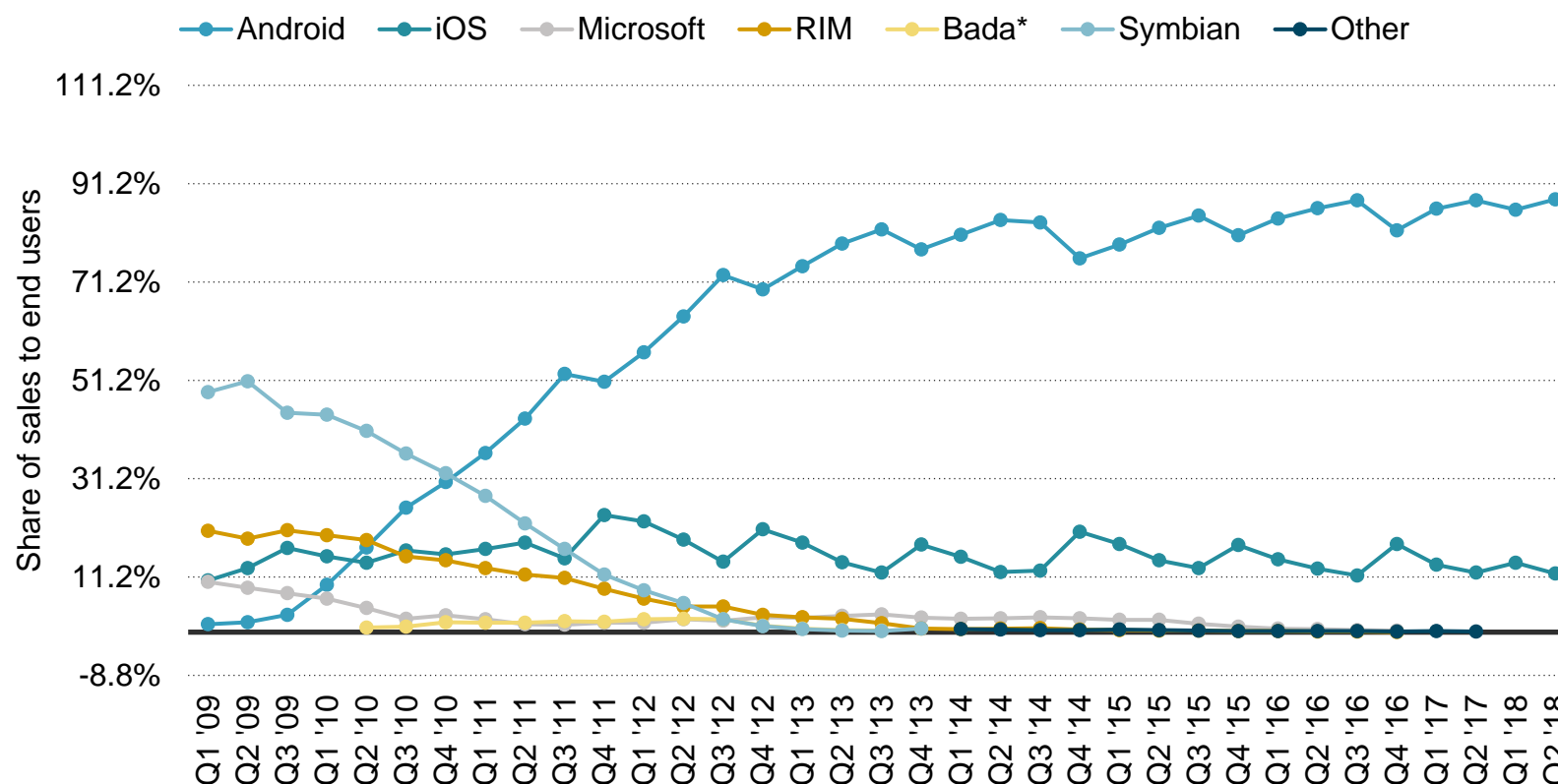
This paper discusses industries such as telecommunications where firms each have their own customers and must interconnect with other firms to provide a comprehensive service. Two scenarios are considered: (i) the case of a symmetric, unregulated industry, and (ii) the case of an industry with a dominant, regulated incumbent. In the first, provided there is sufficient product differentiation, it is shown that firms agree to set interconnection charges above associated costs in order to obtain the joint profit-maximising outcome. In the second a formula for the welfare-maximizing interconnection charge is derived. Relations with the 'efficient component pricing rule' are discussed



Source: Wall Street Journal, 1<sup>st</sup> Jan 2000

# Market shares of leading firms in some markets have risen: e.g., Global market shares for smartphone OSs

Global market share held by smartphone operating systems 2009-2018, by quarter



Source: Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 2nd quarter 2018

Telecommunications, Statistica.

Note: Worldwide; 2009 to 2018

Source(s): Gartner; [ID 266136](#)



# Numerous Reports on Digital Platforms

## *Increased Focus on the Role of Data*

- **France** [FCA] March 2018: On the Exploitation of Data in the Internet Advertising Sector.
- **Germany** [Econ Affairs and Energy Ministry] April 2018: Modernising the Law on Abuse of Market Power.
- **Japan** [Ministry of Economy, Trade, & Industry] December 2018: Fundamental Principles for Rule Making to Address the Rise of Platform Businesses.
- **Australia:** [ACCC] December 2018: Digital Platforms Inquiry.
- **UK:** [Furman et al.] March 2019: Report of the Digital Competition Expert Panel.
- **EU:** [Cremer et al.] April 2019: Competition Policy for the Digital Era.
- **US:** [Scott Morton et al.] July 2019: Stigler Center Report.



March 2019



# Data as a Source of Economic Power



“Data are to this century what oil was to the last one: a driver of **growth** and **change**. Flows of data have created new infrastructure, new businesses, new monopolies, new politics and—crucially—**new economics**. Digital information is unlike any previous resource; it is extracted, refined, valued, bought and sold in different ways. It changes the rules for markets and it demands **new approaches from regulators**. Many a battle will be fought over **who should own, and benefit from, data**.”

The Economist, “Fuel of the future” May 6<sup>th</sup> 2017

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## 01

# Big Data in Digital Markets

- Increasing importance and availability
- Various business models
- How firms use big data

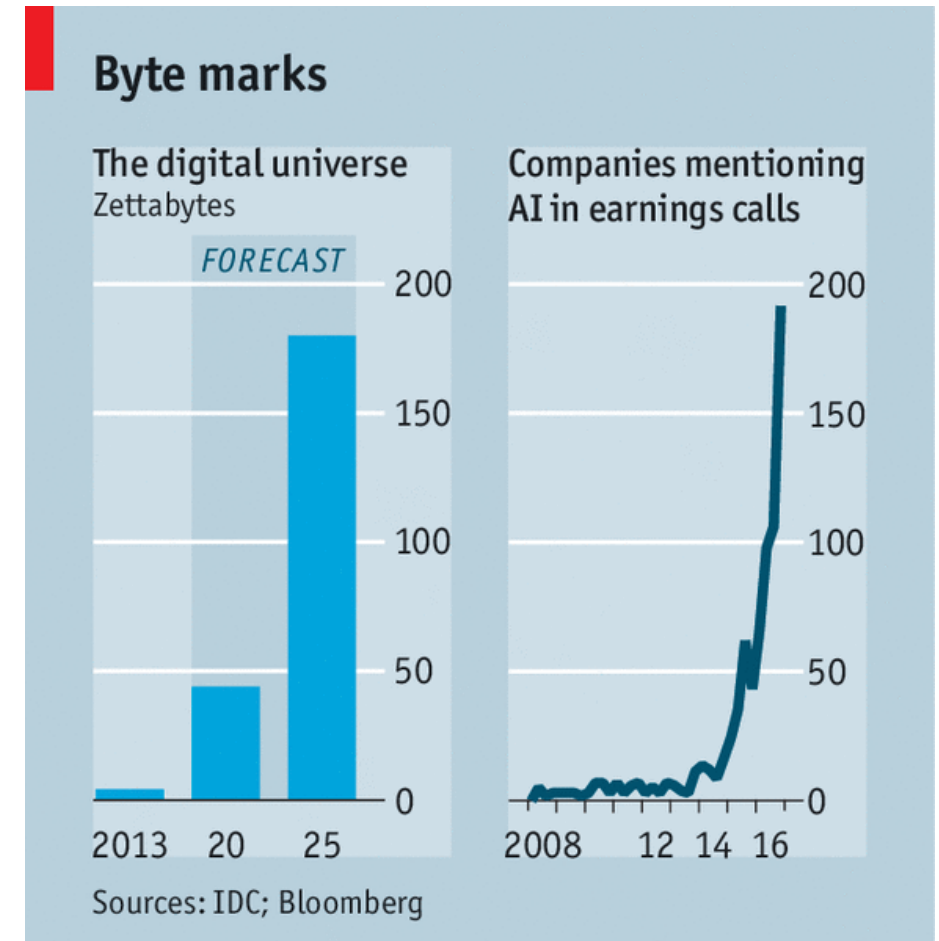
# Data Are Increasingly Available and Important

“Digital universe will reach 180 zettabytes (180 followed by 21 zeros) in 2025 (see chart). Pumping it all through a broadband internet connection would take over 450m years.”

The Economist, “Fuel of the future” May 6<sup>th</sup> 2017

“Annual global data center IP traffic will reach 20.6 Zettabytes (ZB) (1.7 ZB per month) by the end of 2021, up from 6.8 ZB per year (568 exabytes [EB] per month) in 2016.”

Cisco 2016-2021 white paper, updated November 19, 2018



Economist.com



# Very Different Business Models In Digital Markets

Platforms differ in their monetization methods

*Example 1:* Earn money from advertisements while generate user base by offering “zero” price



*Example 2:* Charge users



# Very Different Business Models In Digital Markets

Platforms differ in their monetization methods

*Example 3: Participate also as a seller in own platform directly*



# Digital Market Giants Have Different Data Sets

## WHAT FIRMS KNOW



Uber

where users go to  
and what users eat...



NETFLIX

what users watch...



facebook

who users know  
and what users like...



amazon

what users buy, watch,  
read and listen to...



Google

what users search,  
where users eat,  
when users wake up...



Apple

similar to Google  
(no ads)

# Big Data-Driven Expansion

## New Products and Services

### OWN DATASET

- *Google, Amazon:* AI or “cognitive” services such as translation, visual recognition (Google Assistant or Amazon Alexa).
- *Tesla:* collect driving data from electric car users, and use the data to perfect self-driving algorithms and launch an autonomous ride sharing network in 2020.

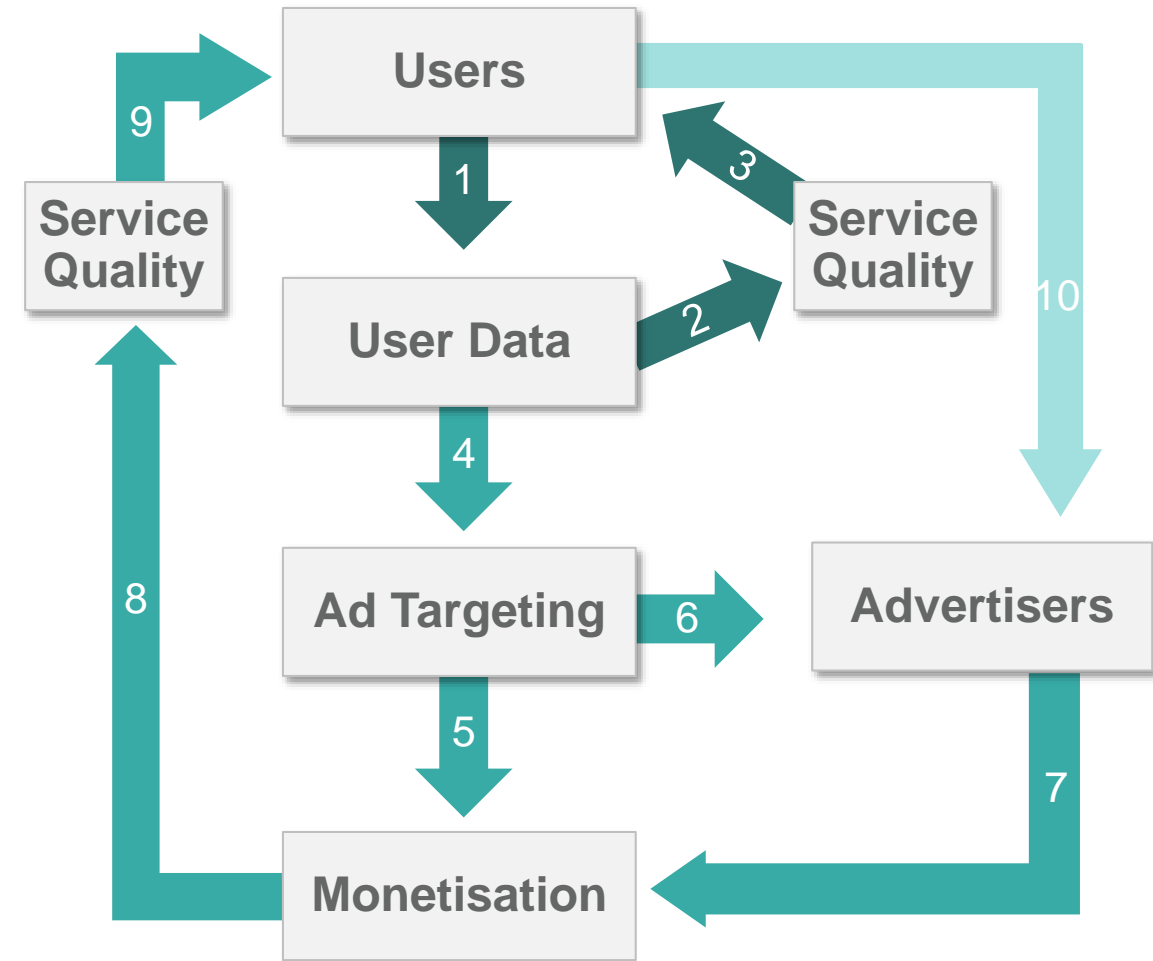
### COMBINING DATASETS THROUGH ACQUISITION

- *Acquisition of LinkedIn by Microsoft:* “walking into a meeting and getting a snapshot of each person in the meeting based on their LinkedIn profile” (Microsoft CEO Satya Nadella).
- *Acquisition of The Weather Company by IBM:* AI-based tool to predict fluctuation in business performances due to the weather.



# Big Data Help Quality Improvements

- Network externalities:
  - *Direct*: Within one type of user—e.g., social media users value presence of other users (we used to say telephone owners).
  - *Indirect*: Across types of user—e.g. more users of an smartphone OS, the bigger incentives to for software developers (we used to say PC OS).
- Role of data:
  - *Direct*: more users provide more data to train the algorithm leading to higher quality search results (1-3)
  - *Indirect*: more users provide greater value for advertisers (10) and more data that allow better ad targeting lead to higher monetisation (4-7) some of which may be invested to improve service quality (8-9)



## 02

# From Big Data to Dominance

- Data as an essential input
- Switching costs
- Network effects
- Increasing returns to scale

# Dominance Concerns Around Platforms and Big Data

Economists highlight different channels through which digital platforms with big data may acquire market power.

- *Concern 1: Big data as an essential input*
  - Proprietary datasets may mean limited access, but data can be ubiquitous and non-rivalrous.
- *Concern 2: Switching costs and lock-in*
  - Search costs, behavioural biases (status quo bias, addiction) or manipulations (dark patterns), but also multi-homing.
- *Concern 3: Network effects and higher barriers to entry*
  - Feedback loops, concentrated markets, large investments may be required to launch competitor products/services, but also global reach and high rewards.
- *Concern 4: Economies of scale and scope*
  - High upfront sunk costs, large minimum scale required and close-to-zero marginal costs, increasing returns to scale, but not necessarily unlimited.

## Concern 1: Will Data Always Be an Essential Input?

- There can be limits to how useful data are.
  - Data alone are often not valuable (**Lambrecht and Tucker (2013)** show ‘retargeting’ of ads for previously viewed products are less effective than generic brand ads).
  - Not all data are equal. Many cookies will get stale quickly.
- Data are ubiquitous and may be widely available.
  - **Lambrecht and Tucker (2017)** argue that big data is not inimitable nor rare.
    - Data can be non-rival (e.g., multiple cookies), cheap to collect and distribute.
    - Data may be easily available (e.g. through data brokers).



## Concern 2: Switching Costs May Lock Customers In Largest Incumbent Firm May Collect Most Data

- Debate about factual position on switching costs for users in smart mobile OS:
  - **Tucker (2019)** argues low and reducing costs for smart mobile OS, highlighting:
    - Move to storing in the cloud made porting data between devices easy. Changes in software pricing made switching easier (Office 360 vs Office for Windows or Mac). Easy for users to port data between mobile operating systems (iOS, Android).
  - **Commission's Google Android Decision (2018)** argues otherwise, highlighting:
    - Cost of replacing (or losing) apps, potential loss of network externalities used jointly with others on same eco-system, data and contacts may be lost in a transfer.
    - Commission raises concerns that “status quo” bias means users mainly stick with pre-installed apps.
- Switching costs associated with “free” services to acquire customers who then provide value to the platform in the form of data.

## Concern 3: Big Data May Fortify Network Effects that May Increase Entry Barriers

- Digital platforms are multi-sided with network effects.
- Network effects may result in entry barriers by making it more difficult for entrants to generate user base (so-called “**chicken and egg**” problem). More users (e.g., social media users):
  - provide more data that allow a platform to improve quality, attracting more users.
  - may attract more users on the other side of the platform (e.g., advertisers) allowing investment in improving quality.
- No guarantee that incumbent will defeat entrants. **Possessing data unlikely to be sufficient—must use it well.**
  - Yahoo lost to Google and MySpace lost to Facebook, despite being incumbents.

## Concern 4: Empirical Evidence on Economies of Scale and Scope

- **Chiou and Tucker (2017)** argue limited evidence of scale (and scope) economies in digital data.
  - Customization of search
  - Search is long-tail so secret sauce is the algorithm not data
  - Also found a shorter data retention length did not deteriorate search accuracy as measured by user repeating the search.
- **Bajari et al. (2018)** predict the weekly sales of each product belonging to 36 different product lines (books, apparel, electronics and so on). Longer time for relevant product helps forecasting demand with diminishing returns. Data across products do not.
  - NB: Pat Bajari is Amazon's Chief Economist.
- **Neumann et al. (2019)** examine accuracy of digital profiles maintained by large data brokers. In one of the studies they performed, they find data broker accuracy for gender prediction to be worse than random guessing.

### Google: 15% Of All Queries Are Still Never Seen Before

May 14, 2018 • 8:06 am | (2)  
by [Barry Schwartz](#) | Filed Under [Google Search Engine](#)

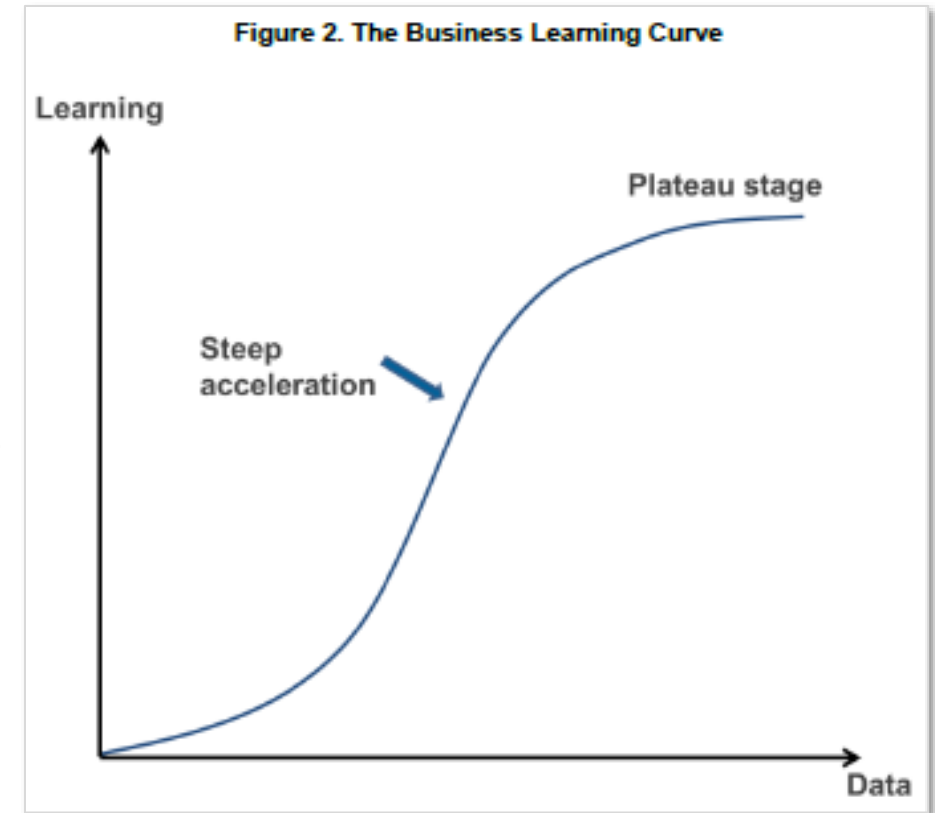


Since 2013, Google has been saying 15% of queries are new and never seen before by Google. The interesting part, this is five years later and the stat has not changed. In 2007 it was 25% of queries, so it took a big bump down from 2007 to 2013, but since then, at least according to the Google speak, it is still at 15%.

Search Engine Roundtable, 14 May 2018

# Would Limits on Increasing Returns to Data Kick In at a Point Which Can Sustain Multiple Competitors?

- Theoretically prediction accuracy has a limit and can reach a **plateau**.
- Network effects work both ways and can destabilize market power (MySpace).
- Network effects may be localized.
  - Localised in geographic terms (ZipCar/StreetCar merger).
  - Localised in terms of users only caring about a subset of other users (Dropbox).
- Users may prefer fewer other users (negative externalities).
  - On the same side (drivers ride-sharing service may prefer fewer other drivers).
  - On the other side (social media users may prefer fewer advertisers).



OECD, "Big Data: Bringing Competition Policy to the Digital Era", 2016, Figure 2



## 03

# Potential Harms Arising in Digital Markets

- Non-competition concerns
- Exclusionary and exploitative harms
- Need for a case-by-case analysis

# Non-competition concerns: “our challenge as a society is to help shape an internet that is open and vibrant but also protects its users from harm”



Table 1: Online harms in scope

Harms with a clear definition	Harms with a less clear definition	Underage exposure to legal content
Child sexual exploitation and abuse.	Cyberbullying and trolling.	Children accessing pornography.
Terrorist content and activity.	Extremist content and activity.	Children accessing inappropriate material (including under 13s using social media and under 18s using dating apps; excessive screen time).
Organised immigration crime.	Coercive behaviour.	
Modern slavery.	Intimidation.	
Extreme pornography.	Disinformation.	
Revenge pornography.	Violent content.	
Harassment and cyberstalking.	Advocacy of self-harm.	
Hate crime.	Promotion of Female Genital Mutilation (FGM).	
Encouraging or assisting suicide.		
Incitement of violence.		
Sale of illegal goods/ services, such as drugs and weapons (on the open internet).		
Content illegally uploaded from prisons.		
Sexting of indecent images by under 18s (creating, possessing, copying or distributing indecent or sexual images of children and young people under the age of 18).		

Source: UK Online Harms White Paper, 2019

<https://www.gov.uk/government/consultations/online-harms-white-paper/online-harms-white-paper#the-harms-in-scope>

# Competition Concerns: Exclusionary Conduct to Protect or Enhance a Dominant Firm's Position

- **Foreclosure:**

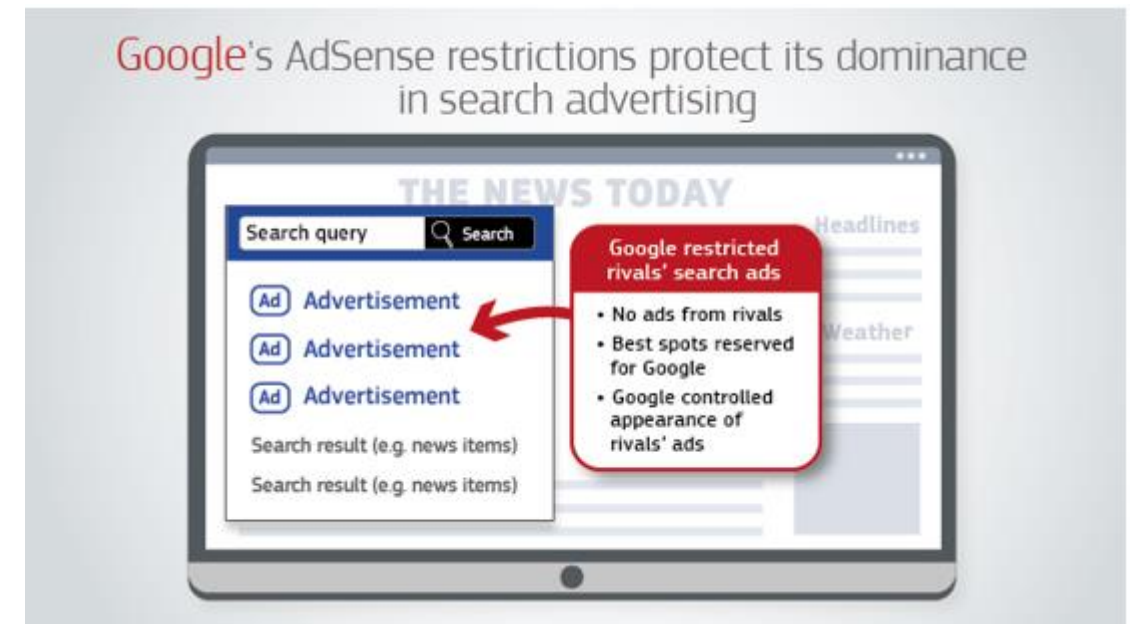
- Loyalty Rebates, exclusionary contracts (c.f. allegations in Google Android).
- Raising Rivals Costs: Allegations that dominant firms degrade competitors through self-preferencing.
  - Allegations in Google Shopping and Google AdSense.
  - Allegations against Amazon's access to competitor data through its dual role (c.f. but also note supermarkets and own-labels).
  - Gatekeeper concerns for voice assistants which may try to recommend a single item rather than present options to the user.

- **Leverage:**

- Use market power to promote products and services in adjacent markets (Tying, c.f. Google Android).

- **Predation:**

- To achieve dominance in presences of network externalities.
- Perhaps through the use of AI.



**Source:** Commission's Press Release in AdSense. See [https://europa.eu/rapid/press-release\\_IP-19-1770\\_en.htm](https://europa.eu/rapid/press-release_IP-19-1770_en.htm)

# Competition Concerns: Exclusionary Conduct to Protect or Enhance a Dominant Firm's Position (cont.)

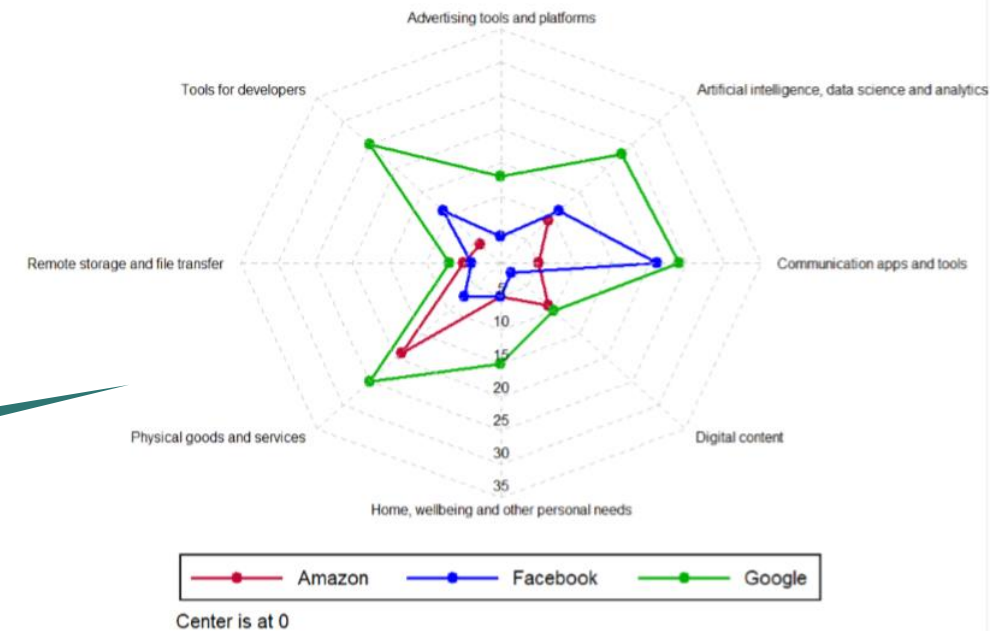
- **Killer acquisitions:**

- Remove innovating nascent competitors through M&A activity
- Big 5 tech firms made more than 400 acquisitions over the last decade,
- NB: Only academic evidence on nascent acquisitions so far is from US Pharmaceutical sector, not tech.

Google's acquisitions do not follow a recognizable pattern and seem to be spread evenly across years and clusters

**Source:** Paragraph I.60, CMA Report on “Ex-post Assessment of Merger Control Decisions in Digital Markets”, Lear

Figure I.1: Distribution of past acquisitions by cluster



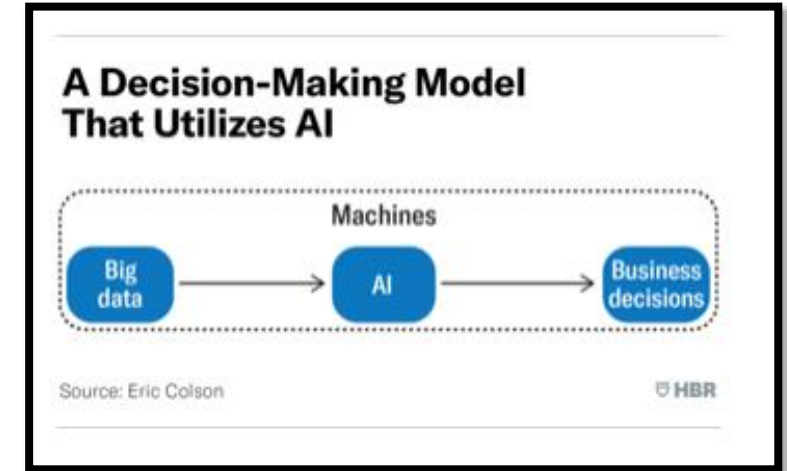
Source: Lear based on Crunchbase data

**Source:**

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/803576/CMA\\_past\\_digital\\_mergers\\_GOV.UK\\_version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/803576/CMA_past_digital_mergers_GOV.UK_version.pdf)

# Competition Concerns: Coordination and Exploitative Conduct

- **Tacit Coordination**
  - AI algorithms may coordinate firms' behaviour.
- **Abuse of dominance – unfair pricing**
  - Charge “prices” that are excessive to the point of being unfair.
    - App developers may be overpaying (c.f. Spotify's allegations – a 30% 'Apple tax').
    - Users pay in kind by providing data and are required to accept T&Cs (Facebook).
- **Non-competition allegations about violations of privacy rights**
  - Consumers may have provided data without their consent (Lloyd v. Google).
  - Allegations that Recordings from voice-assisted services are reviewed by humans (Alexa, Google Assistant inquiries).



**Source:** <https://hbr.org/2019/07/what-ai-driven-decision-making-looks-like>

## Apple's 30% app store commission unfair, Spotify claims

**Music service files complaint with European commission over subscription 'tax'**

**Source:** <https://www.theguardian.com/technology/2019/mar/13/spotify-claim-apple-30-percent-app-store-commission-unfair-european-commission-complaint>



# From Theories of Harm to Competition Infringement Decisions

## Economics Strongly Suggests Cases must be evaluated on a *case-by-case* basis

- Whether the source of a network externality is ultimately from data or not, there is no result in economics that says all markets where there are network externalities will “tip” inevitably towards a single supplier.

### PLATFORM COMPETITION IN TWO-SIDED MARKETS

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#### 1. Introduction

Buyers of video game consoles want games to play on; game developers pick platforms that are or will be popular among gamers. Cardholders value credit or debit cards only to the extent that these are accepted by the merchants they patronize; affiliated merchants benefit from a widespread diffusion of cards

PlayStation 5 release date: Upcoming console supposedly codenamed Prospero; Will have dynamic AI assistant, patent filing suggests



Photo via Screenshot of ReviewTechUSA's Youtube

Thursday, October 3, 2019 6:15 AM UTC

0 comments

The PlayStation 5 is expected to launch in 2020, but leaks about the device have proliferated on the web for months. Now, it appears that its very design has been leaked as well.

Nintendo Co Ltd + Add to myFT  
Nintendo to launch new 'Switch' games console in March

Japanese games maker makes bold attack on smartphones and Sony's PlayStation



Leo Lewis in Tokyo and Tim Bradshaw in San Francisco OCTOBER 21 2016

4

Nintendo on Thursday revealed its newest games console, the Switch, in a three-minute online video, pitching the product as the world's first hybrid of a handheld and home console.

The Switch represents a bold bid by the Japanese games maker to take on both smartphones and Sony's PlayStation.

In now slightly old-fashioned examples, multiple large firms have survived for long periods. For example in telecoms or video games consoles (NB: In latter, no inter-operability).



Following a worldwide celebration, Xbox One launched in 15 markets on Nov. 22 to great fanfare. The team is excited to confirm the launch of Xbox One was the biggest launch in Xbox history.



## 04

## Potential Solutions

- A Combined Approach
- Remedies
  - The potentially bad
  - The potentially good
  - The potentially ugly

# Recent Reports Recommend a Combined Approach

- **Regulation:**

- Code of conduct;
- Address the “unfair” tactics (dark patterns); and
- Creating market tools
  - Micro-payments for content/attention
  - Micro-payments for private data?

- **More aggressive antitrust:**

- More intervention by competition agencies, earlier; and
- Reforms to merger control.

## TYPES OF DARK PATTERN

### Trick Questions

While filling in a form you respond to a question that tricks you into giving an answer you didn't intend. When glanced upon quickly the question appears to ask one thing, but when read carefully it asks another thing entirely.

### Sneak into Basket

You attempt to purchase something, but somewhere in the purchasing journey the site sneaks an additional item into your basket, often through the use of an opt-out radio button or checkbox on a prior page.

### Roach Motel

You get into a situation very easily, but then you find it is hard to get out of it (e.g. a premium subscription).

### Privacy Zuckering

You are tricked into publicly sharing more information about yourself than you really intended to. Named after Facebook CEO Mark Zuckerberg.

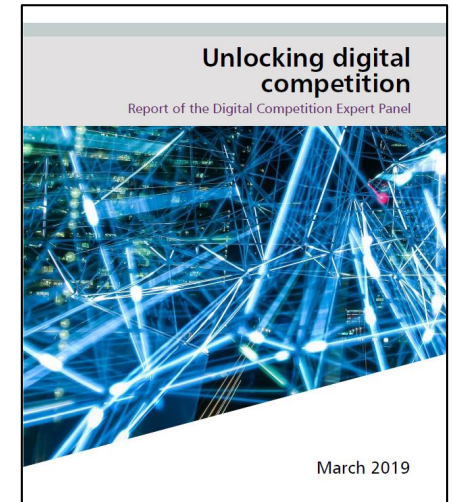
### Price Comparison Prevention

The retailer makes it hard for you to compare the price of an item with another item, so you cannot make an informed decision.

### Misdirection

The design purposefully focuses your attention on one thing in order to distract you attention from another.

**Source:** <https://www.darkpatterns.org/types-of-dark-pattern>



# The Potentially Bad: Structural Remedies

**Structural remedies** in the form of break-ups may not preserve the advantages of network externalities.



# The Potentially Good: Remedies that Preserve Network Effects

- Reduce switching barriers
  - Facilitate multi-homing.
  - Facilitate data-portability – e.g., by Clearly defining users’ property rights over their data.
- Interventions to reduce the “winner-takes-all” results of network effects
  - **Access remedies:** Dominant firm to provide datasets to entrants (perhaps anonymized via regulator). For example, could provide data to train algorithms in areas like search. Common APIs would improve interoperability and reduce advantages of network externalities.
  - **Interoperability Remedies:** Aim to keep advantages of network externalities (e.g., telephones – can still call others) without the disadvantages (all customers on one network).

# The Potentially Good: Reforms to Competition System

## Remedies that Preserve Effectiveness of Merger Control

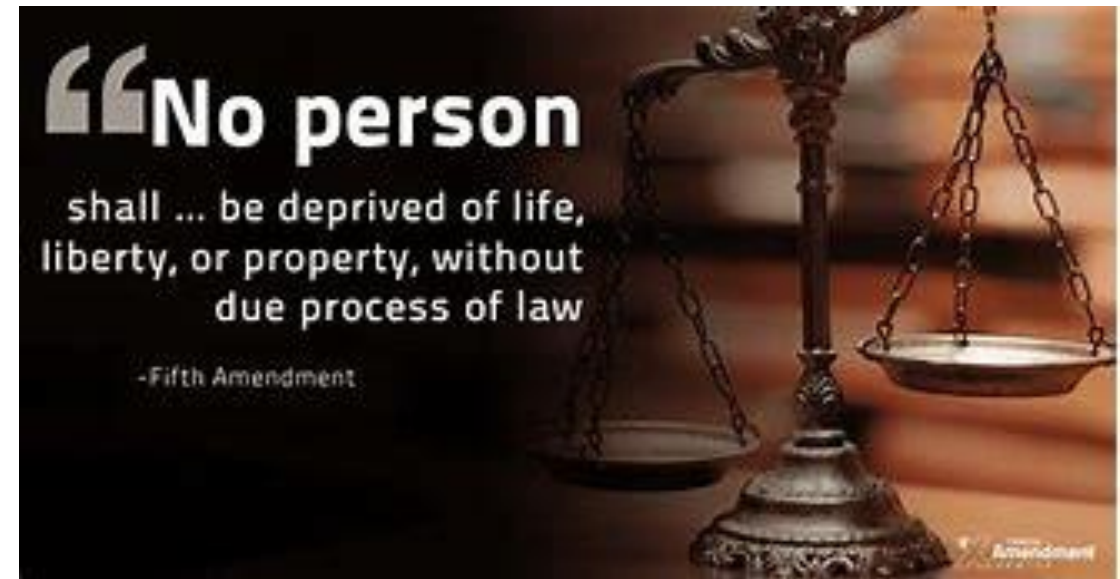
- Revise merger regulation, so high value but low current revenue nascent acquisitions are within the scope of merger control.
- Place more focus in practice on the harm to innovation and impact on potential competition.

## Allow Proportionate Intervention in Advance of an Infringement

- Adoption of temporary interim measures aimed at preventing damage to current and future competition in early stages of potential cases.
- But note:
  - Interim measures have their own risks of introducing distortions.

# The Potentially Ugly

- **Temptations from “too much” agency discretion in decision making**
  - Temptation to emphasize speed at all costs but we care most about entrenched market power, not temporary market power.
  - Temptation to introduce presumptions of harm for dominant firms (unless genuinely rebuttable in practice)
- ***De facto* diminution of rights of defence**
  - Rights of defence help ensure evidence led, robust decision making that affected parties are more likely to accept.
  - High quality, evidence led decisions allow robust intervention where required.





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