

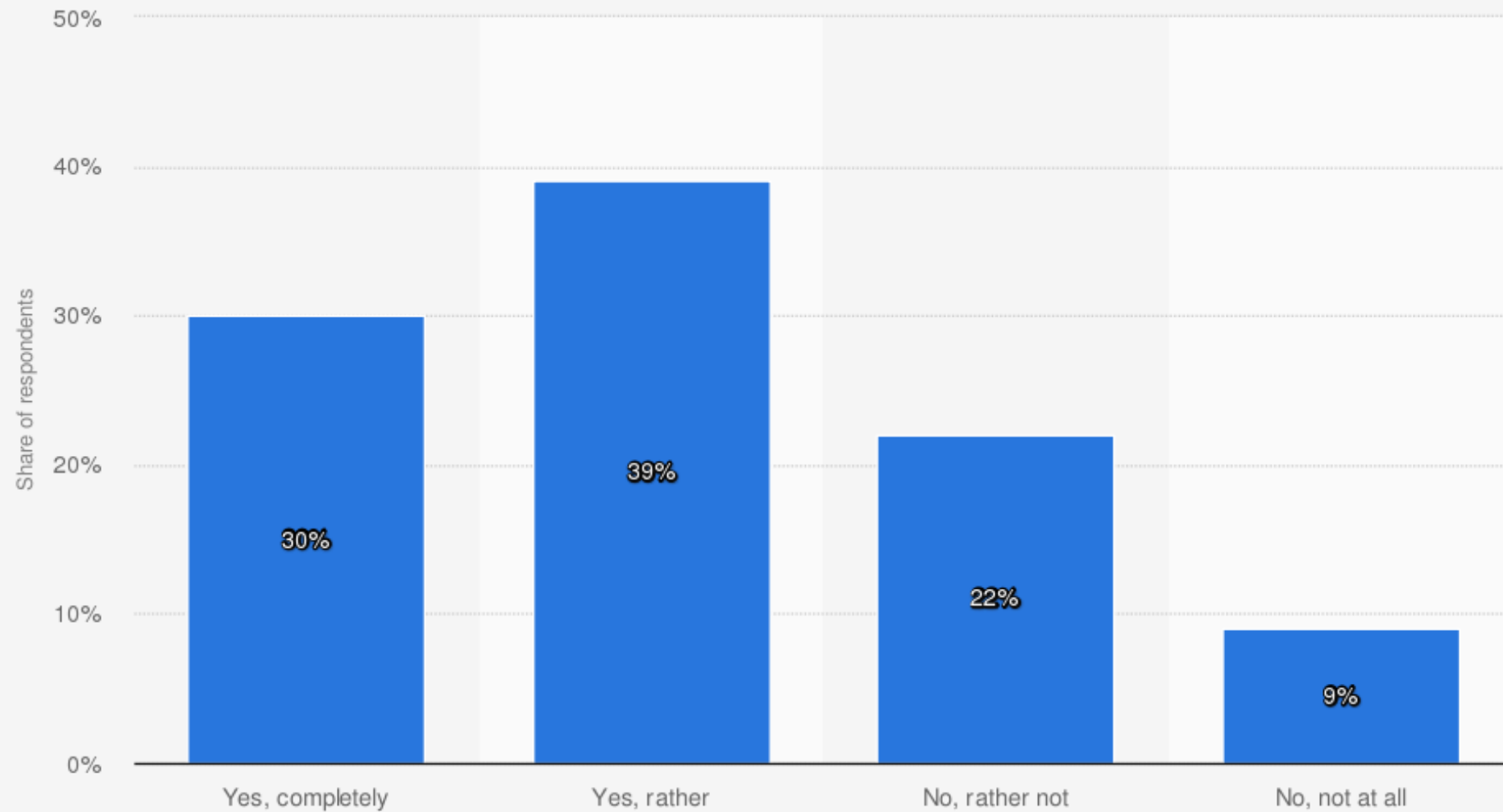
# The Economics of GAFAM

Pr. Pierre Fleckinger

ESCP, 28 February 2022



## Do you personally feel that you are forced to use the services GAFAM companies due to the lack of alternatives from other countries, especially from Europe?



### Sources

IFOP; Various sources (OVHcloud)  
© Statista 2021

### Additional Information:

France; IFOP; January 7-8, 2021; 1,028 respondents; 18 years and older; Computer-assisted web interviews (CAWI)

# Outline

1. [Introduction](#)
2. [Data](#)
3. [Platforms](#)
4. [Competition](#)
5. [Regulation](#)
6. [Takeaways](#)



1998



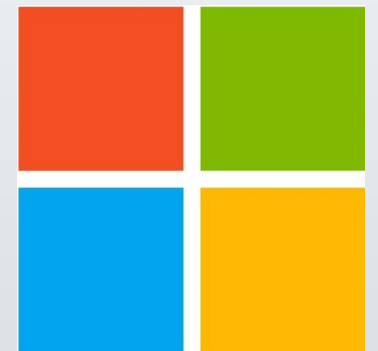
1976



2004



1994



1975



twitter

Uber



NETFLIX

Booking.com



ebay<sup>™</sup>

zoom

# Economic efficiency

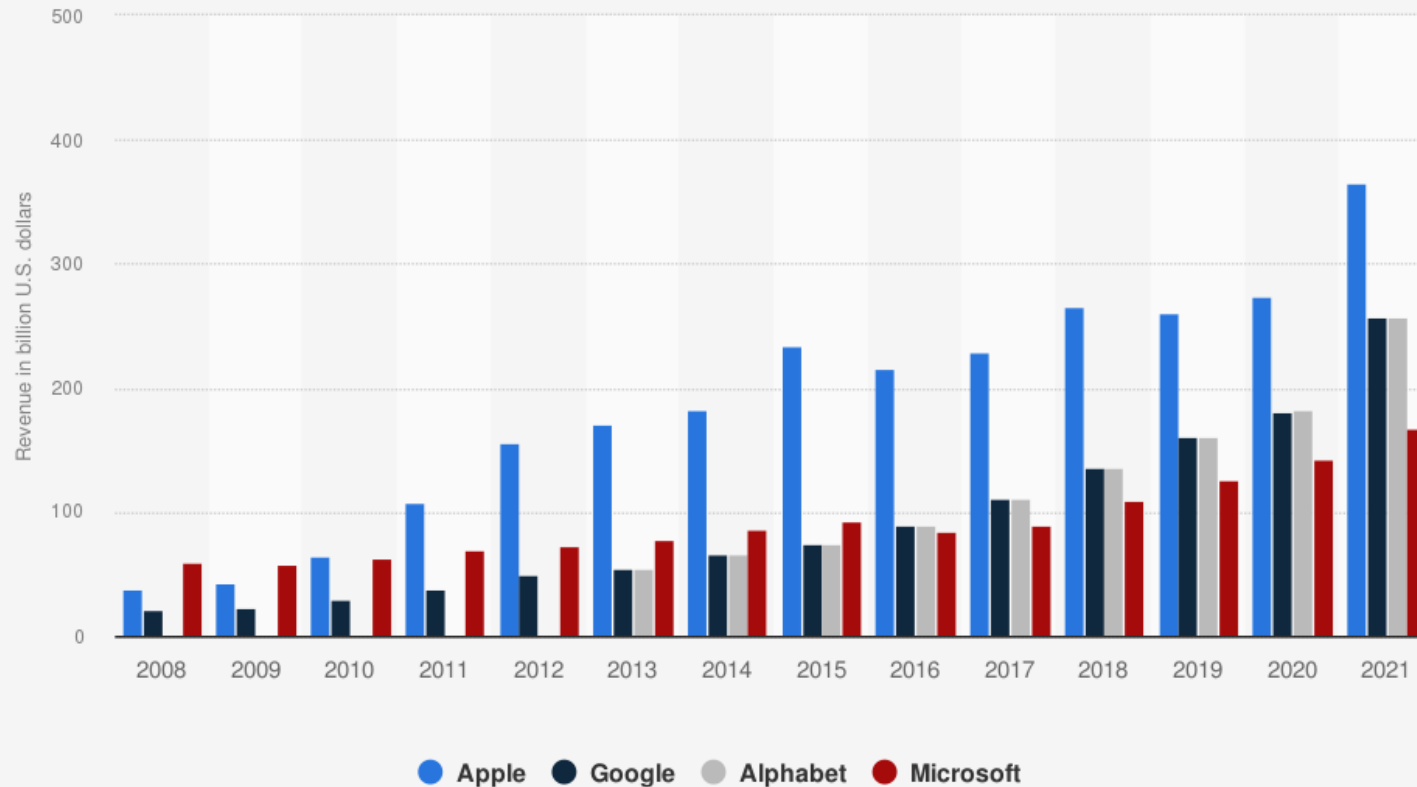
These platforms:

- › Open new possibilities and services through technology
- › Change market intermediation
- › Create a lot of winners, but also losers

A systemic change:

- › Digitization is neither an empty word nor is it only a microeconomic question, it does mean a new global economic organization
- › **Creating and sharing a new social value**

## Revenue comparison of Apple, Google, Alphabet, and Microsoft from 2008 to 2021 (in billion U.S. dollars)



### Sources

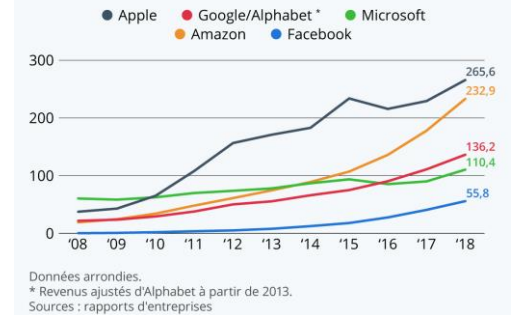
Apple; Google; Alphabet  
© Statista 2022

### Additional Information:

Worldwide; Apple; Google; Alphabet; Fiscal years 2008 to 2021

## L'ascension des GAFAM

Revenus d'Apple, Alphabet, Microsoft, Amazon et Facebook, en milliards de dollars (2008-2018)



Données arrondies.

\* Revenus ajustés d'Alphabet à partir de 2013.

Sources : rapports d'entreprises

NB:

France GDP 2019:  
€2.426 bn

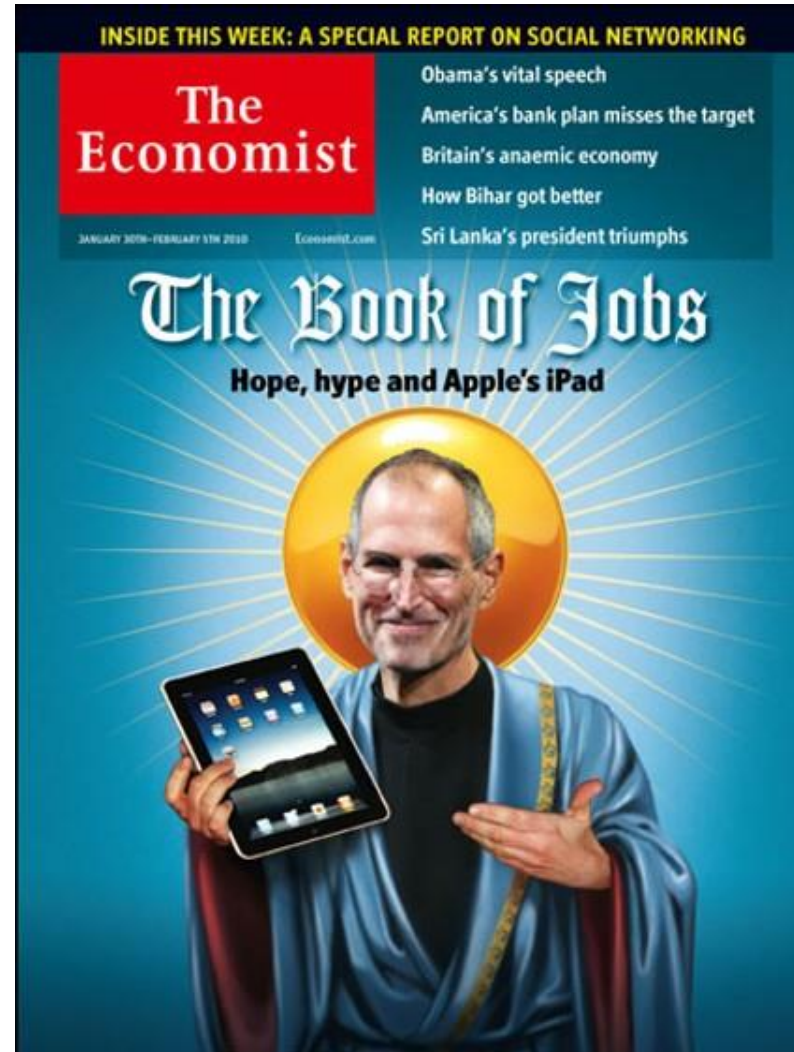
10 first tech profits 2020:  
€261 bn

Source: Statista, 2022

*The Economist*  
1 September 2007



*The Economist*  
30 January 2010



*The Economist*  
4 February 2012





*The Economist*  
21 June 2014



*The Economist*  
29 November 2014

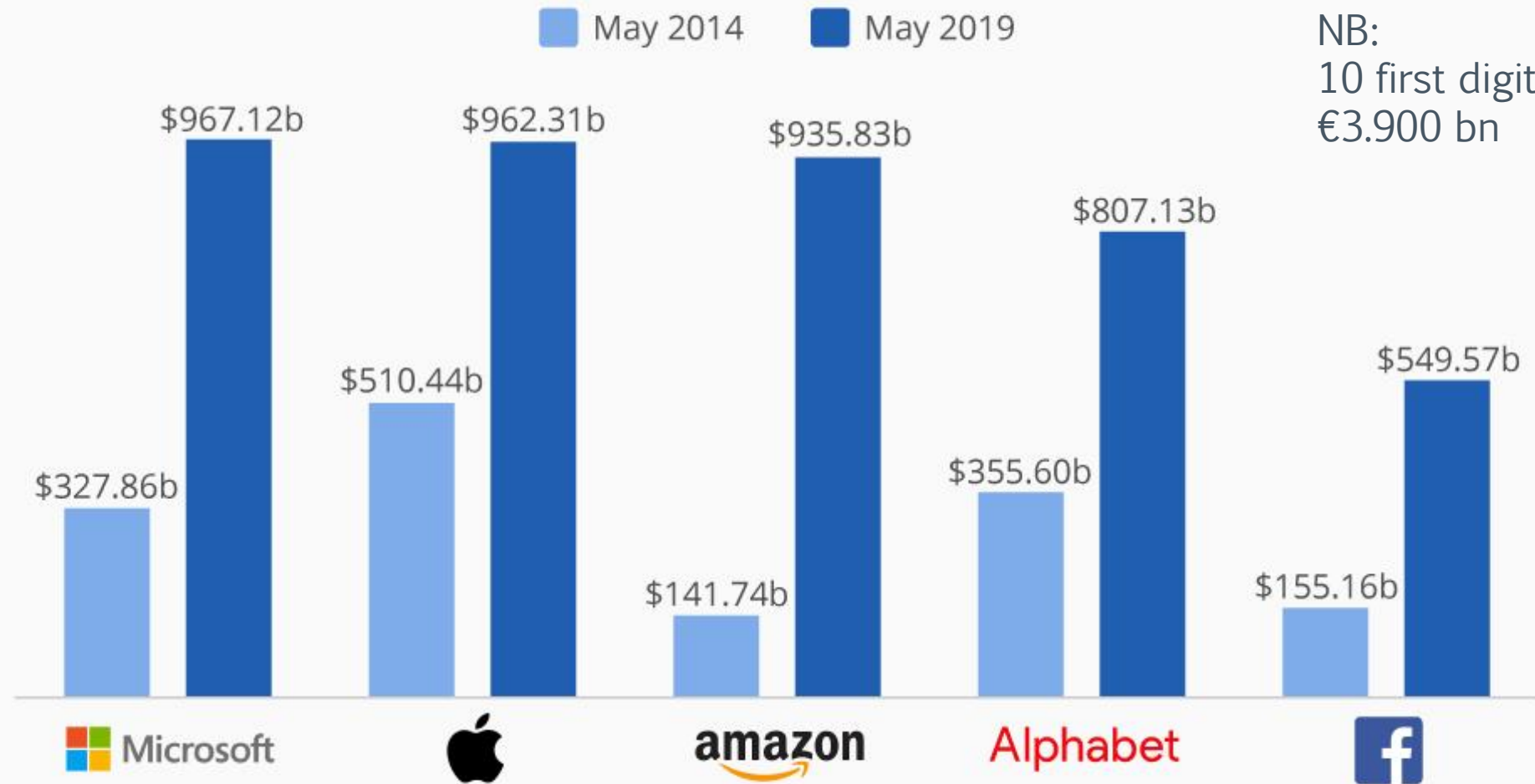


*The Economist*  
9 April 2016



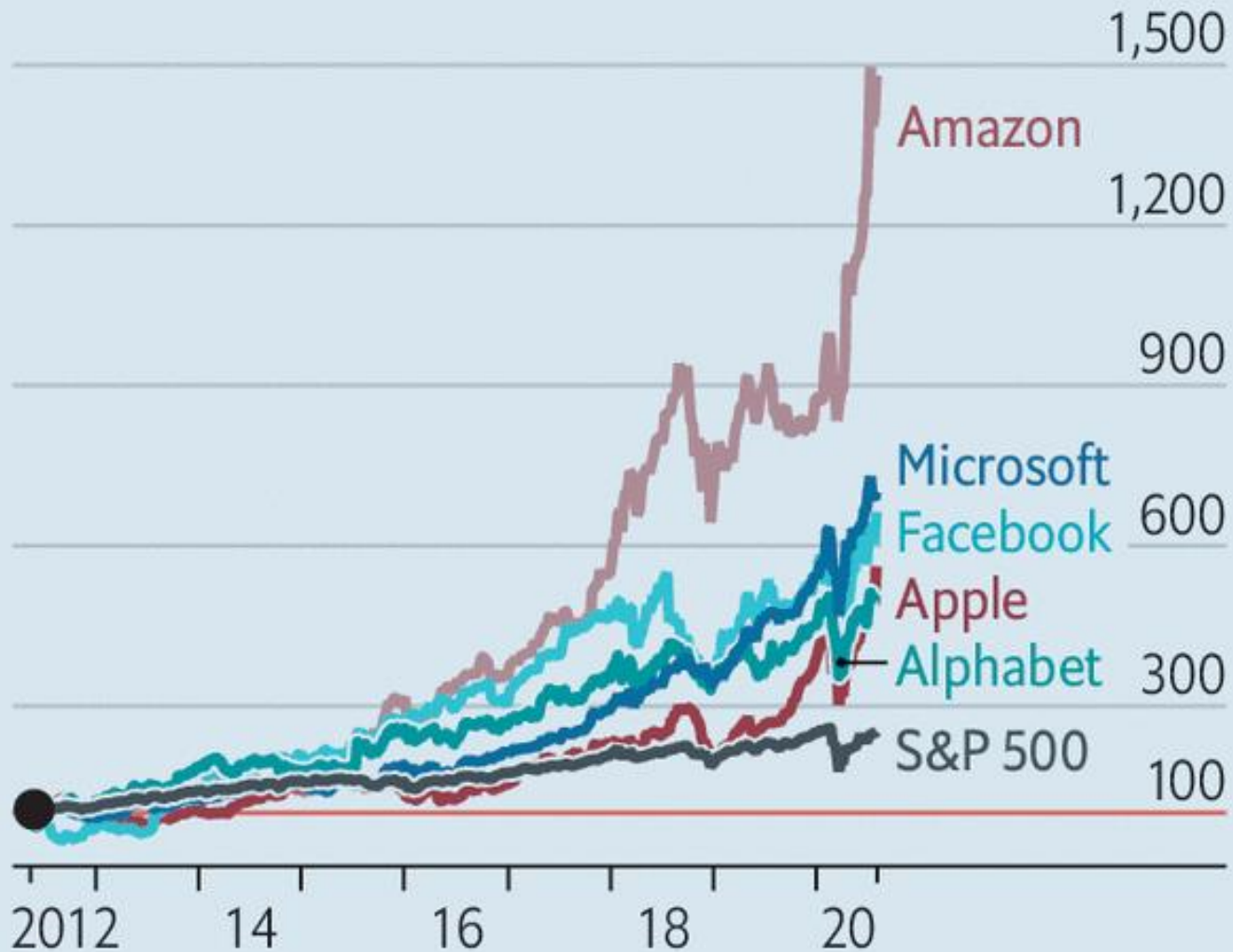
# GAFAM Market Cap Jumps \$2.7 Trillion Over Past Five Years

Market capitalization of selected tech companies in May 2019 and May 2014\*



NB:  
10 first digital 2020:  
€3.900 bn

Share prices, May 18th 2012=100



The  
Economist

How to prepare for a pandemic  
Shoot-to-kill in the Philippines  
Why the Bundesbank should relax  
Progress in the search for ET  
FEBRUARY 22ND-28TH 2020

## Big tech's \$2trn bull run



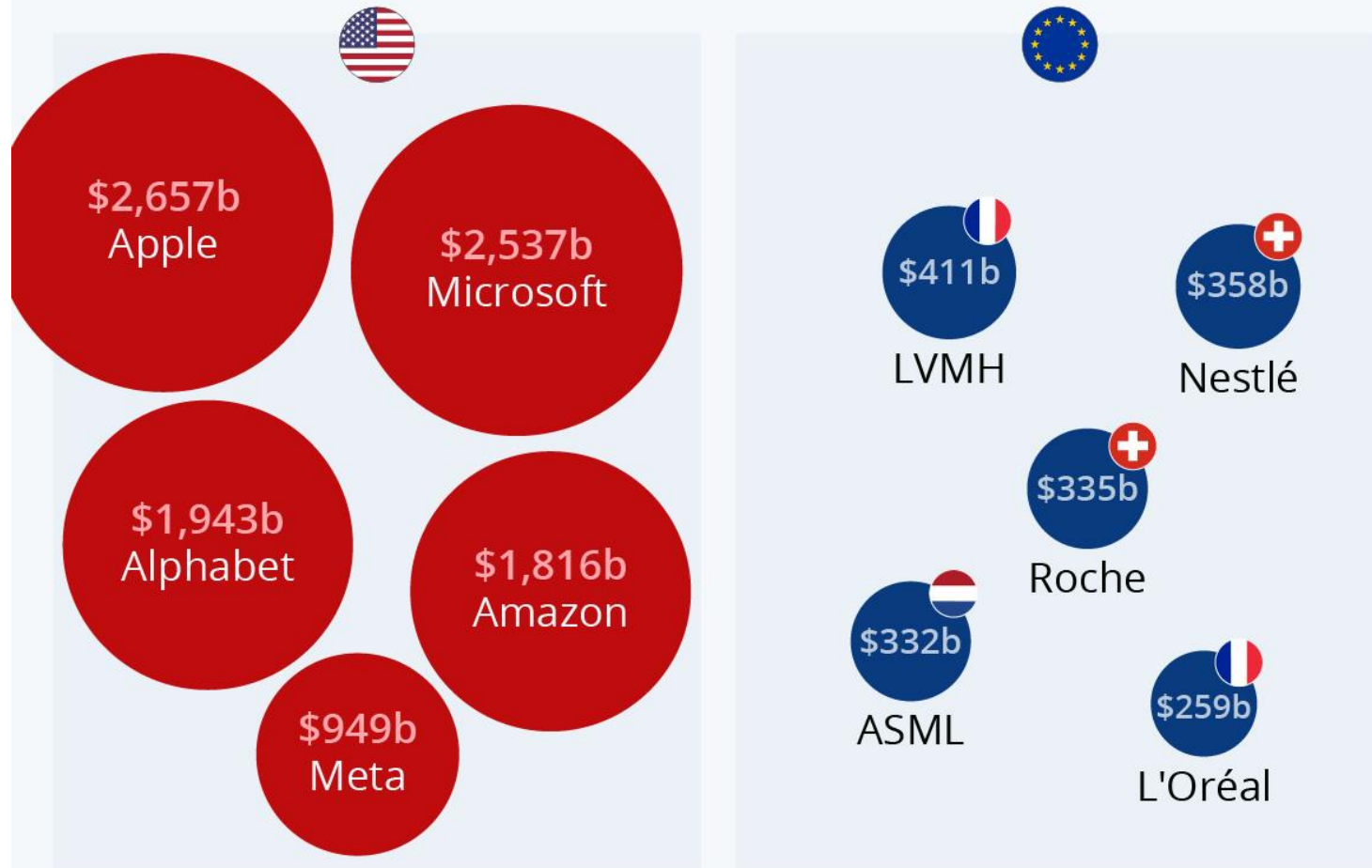
*The Economist*  
22 February 2020

*The Economist*  
8 August 2020



# Overseas Dominance

Market cap of U.S. tech giants compared to the most valuable European companies (as of Nov. 25, 2021)



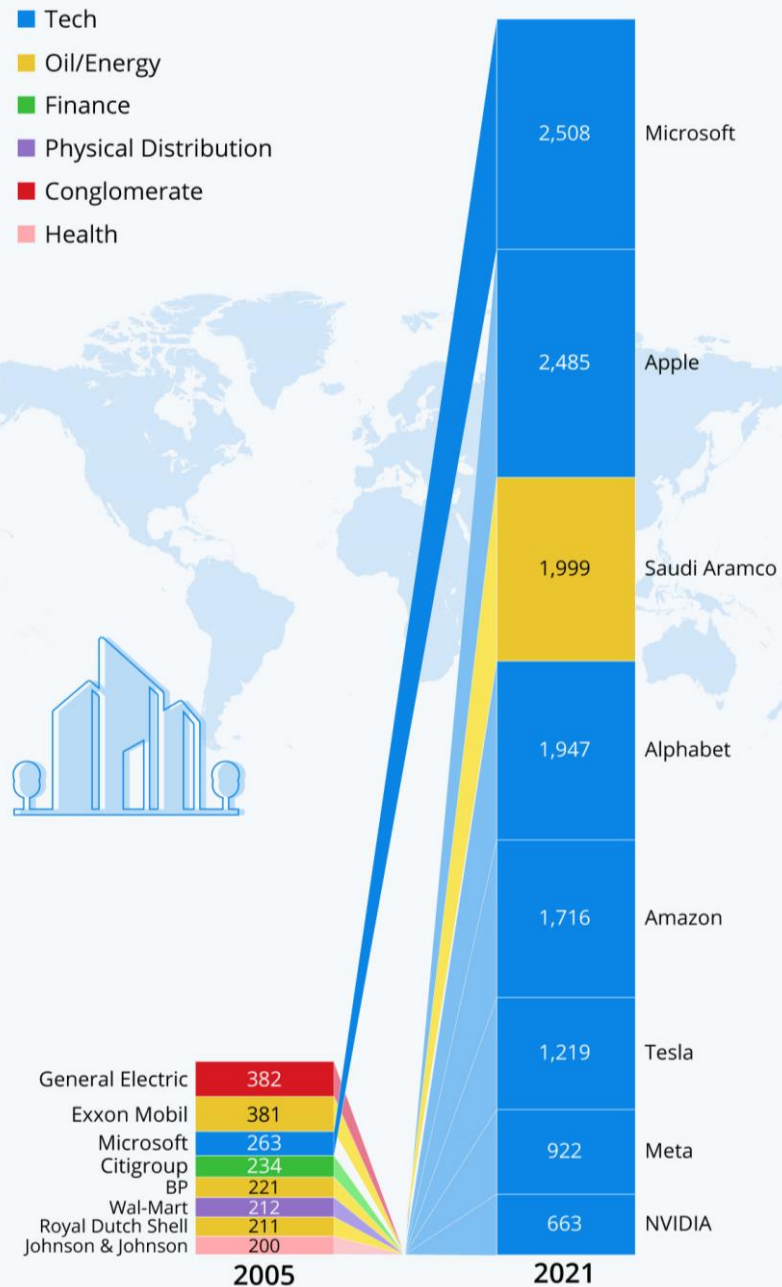
Source: Statista, 2022

# GAFAM power and Regulation

- › Market Power : GAFAM vs Standard Oil
  - History of antitrust: back to fighting Rockefeller's empire in the US at the end of the 19th century (dismantled in 1911)
- › Striking similarities :
  - Using a new network (train/internet)
  - New regulations, particularly in the EU, to tame the tech giants and other “platforms”
- › But GAFAM are global multinational companies
  - Several regulation jurisdictions
  - GAFAM are more and more present (or even represented) in international organizations such as the UN

# The Age of the Tech Giants

Companies with the world's largest market capitalizations in 2005 and 2021 (in billion U.S. dollars)\*



Source: Statista, 2021



Puck Magazine, 1906

Financial Times, 2016





1 December 2012



20 January 2018

23 March 2019





# Data: Economy 4.0

**The  
Economist**

FEBRUARY 27TH - MARCH 5TH 2010

[Economist.com](http://Economist.com)

Obama the warrior  
Misgoverning Argentina  
The economic shift from West to East  
Genetically modified crops blossom  
The right to eat cats and dogs

# The data deluge

AND HOW TO HANDLE IT: A 14-PAGE SPECIAL REPORT



*The Economist*  
27 February 2010

**The  
Economist**

MAY 6TH-12TH 2017

Theresa May v Brussels

Ten years on: banking after the crisis

South Korea's unfinished revolution

Biology, but without the cells

# The world's most valuable resource



**Data and the new rules  
of competition**

*The Economist*  
6 May 2017

# Is Data the new oil...?

- › Data are clearly the oil of the new digital economy
- › Like oil during the Second Industrial Revolution (1870-1910), Data are leading the Fourth Industrial Revolution
- › But the information codified is also at the heart of trade on final markets (between consumers and producers)

- › Data (codified information) as :
  - Essential production input
  - Essential “good” in GAFAM’s business model
  - Essential coordination device of the production system

 Print article

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Jul 11, 2018  
by Maryam Ghaddar

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## Hal Varian – Data, Like Oil, Needs to be Refined to be Useful

**Chief economist at Google explains what he believes the Fourth Industrial Revolution will look like and the effects of big data and robotics on education, labor, research, and demographics**



Hal Varian speaking at Salzburg Global Seminar

*Salzburg Global Seminar, 2018*

# Economic properties of Data

- › Like oil, countless applications
- › Transformation process from crude to refined, through a series of operations and transformations along many pipes
- › But as economic good, Data are characterized by two fundamental properties :
  - Almost freely replicable
  - Non rival

This makes a gigantic difference with oil!



# Data Value Chain

As any economic good, data belong to a value chain:

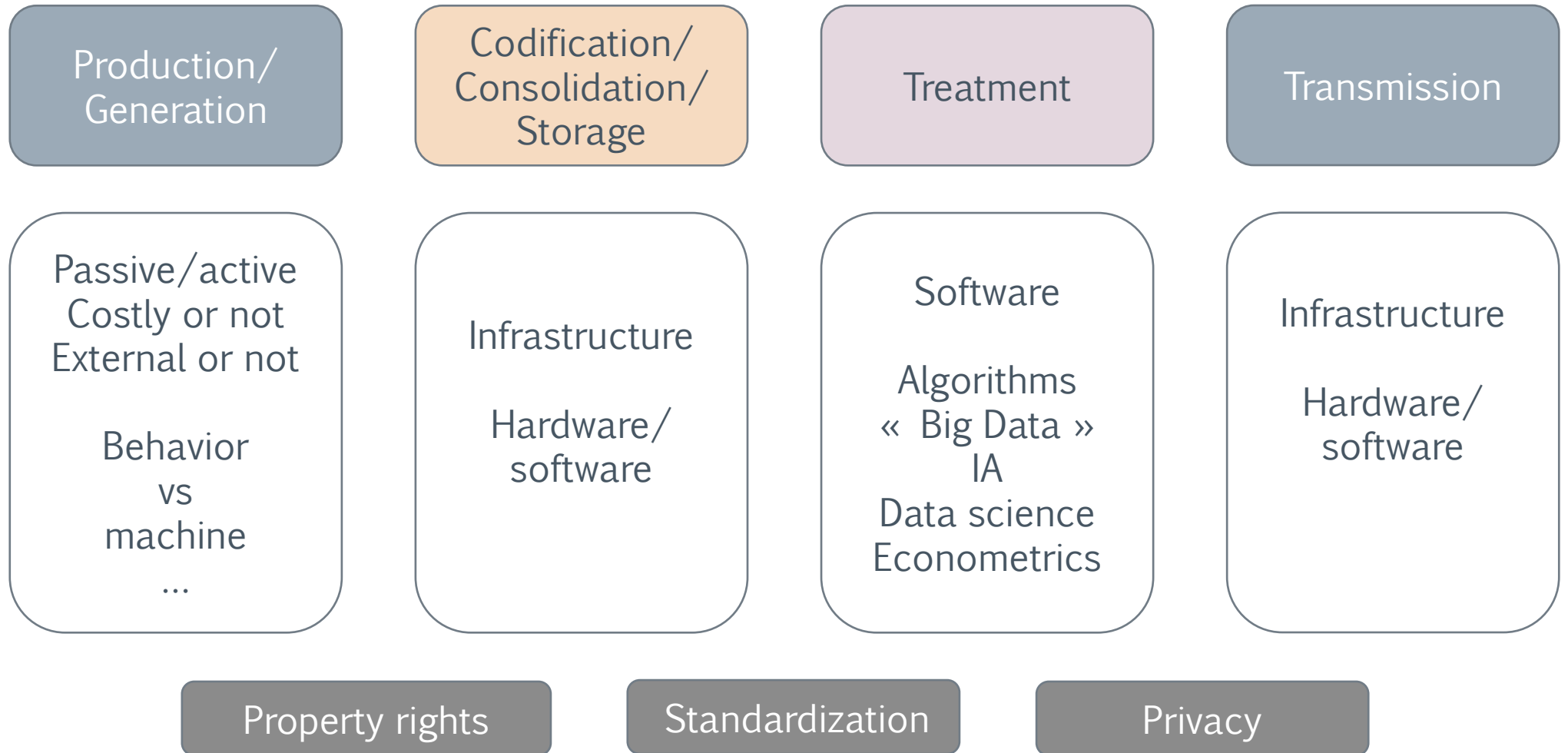
- › Production
- › Treatment
- › Distribution
- › Valuation



*« The algorithm without data is blind.  
Data without algorithms are mute. »*

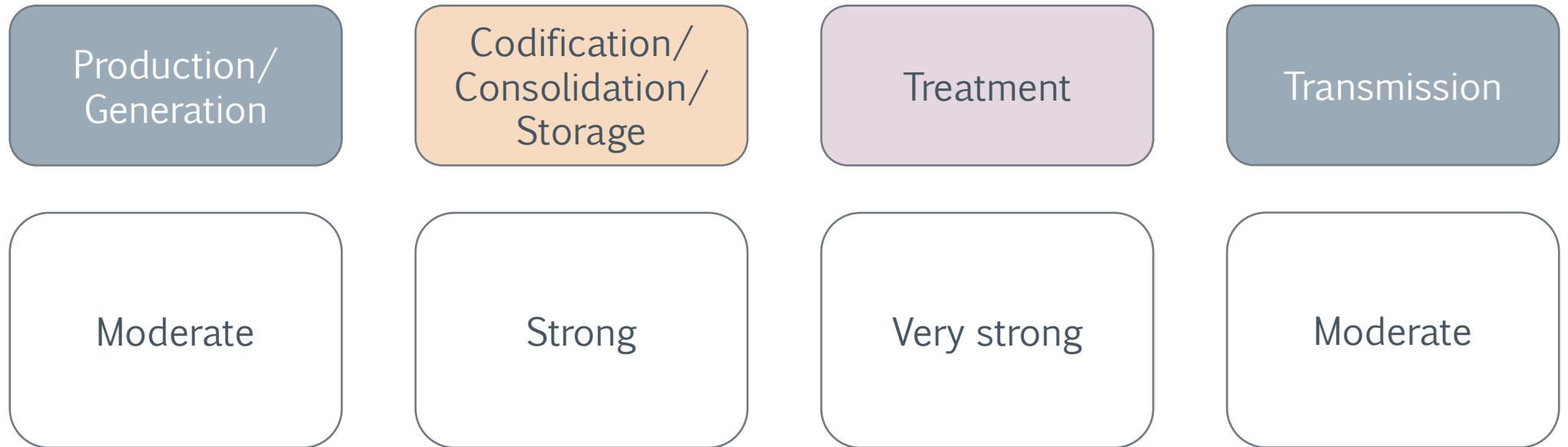
Report of the CNIL, December 2017

# Production



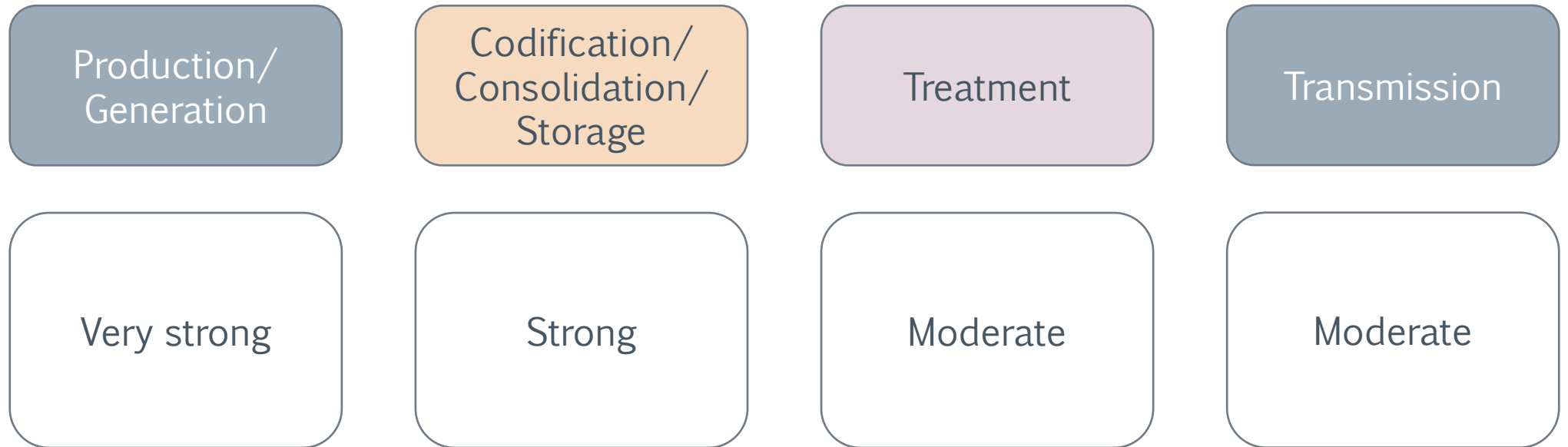


# Scale and scope economies



**Core GAFAM activities take place  
on segments with important scale economies**

# Network effects



Data accumulation and value of consolidation  
lean on strong network externalities

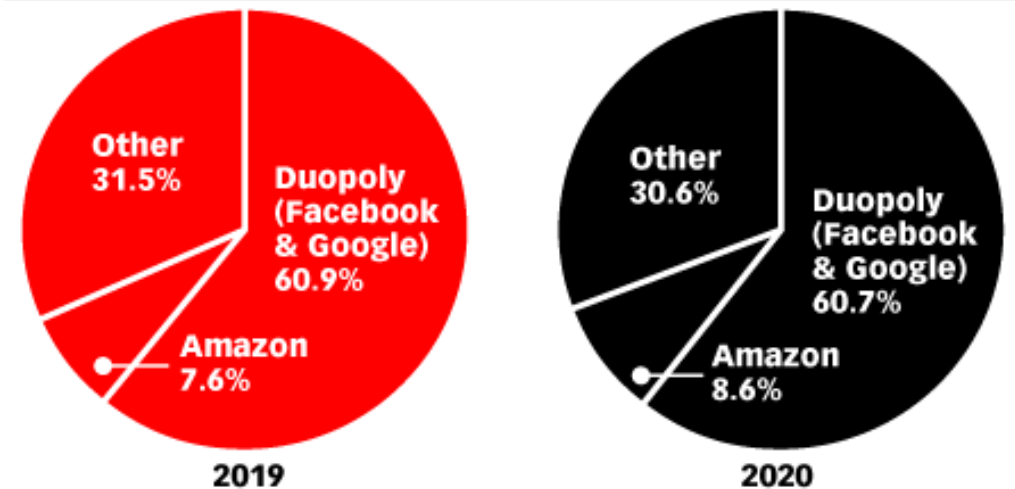
# Online advertising and the value of data: screening and price discrimination

- › Data are useful :
  - For reaching the right consumers
  - In calibrating transaction prices
  - To inform the development of new products and services

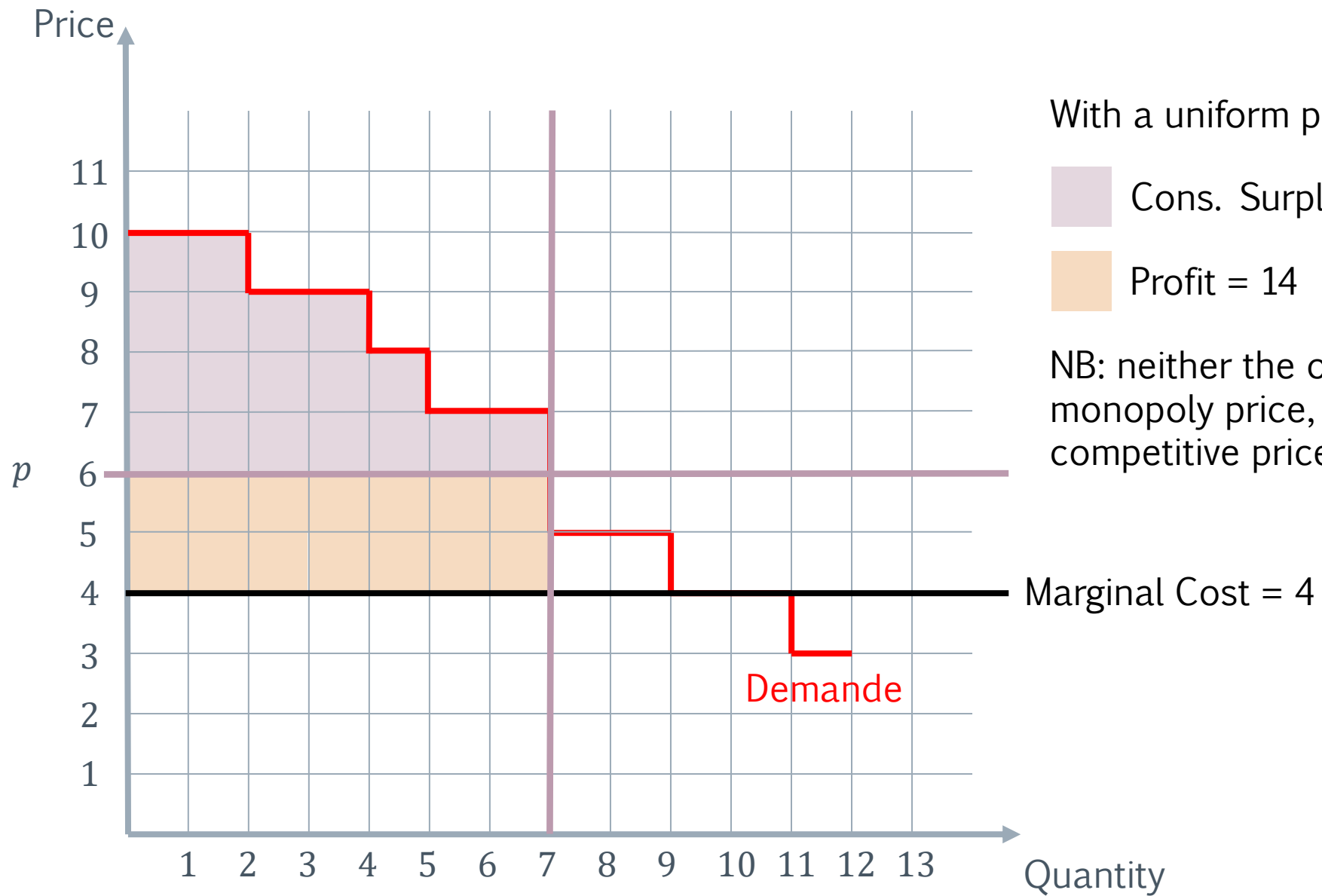
- › Google and Facebook are the two main actors of a \$220 bn market (2019)

NB: in practice, a complex intermediaries ecosystem

**Duopoly vs. Amazon Share of US Digital Ad Spending, 2019 & 2020**  
% of digital ad spending



Source: eMarketer, 2019

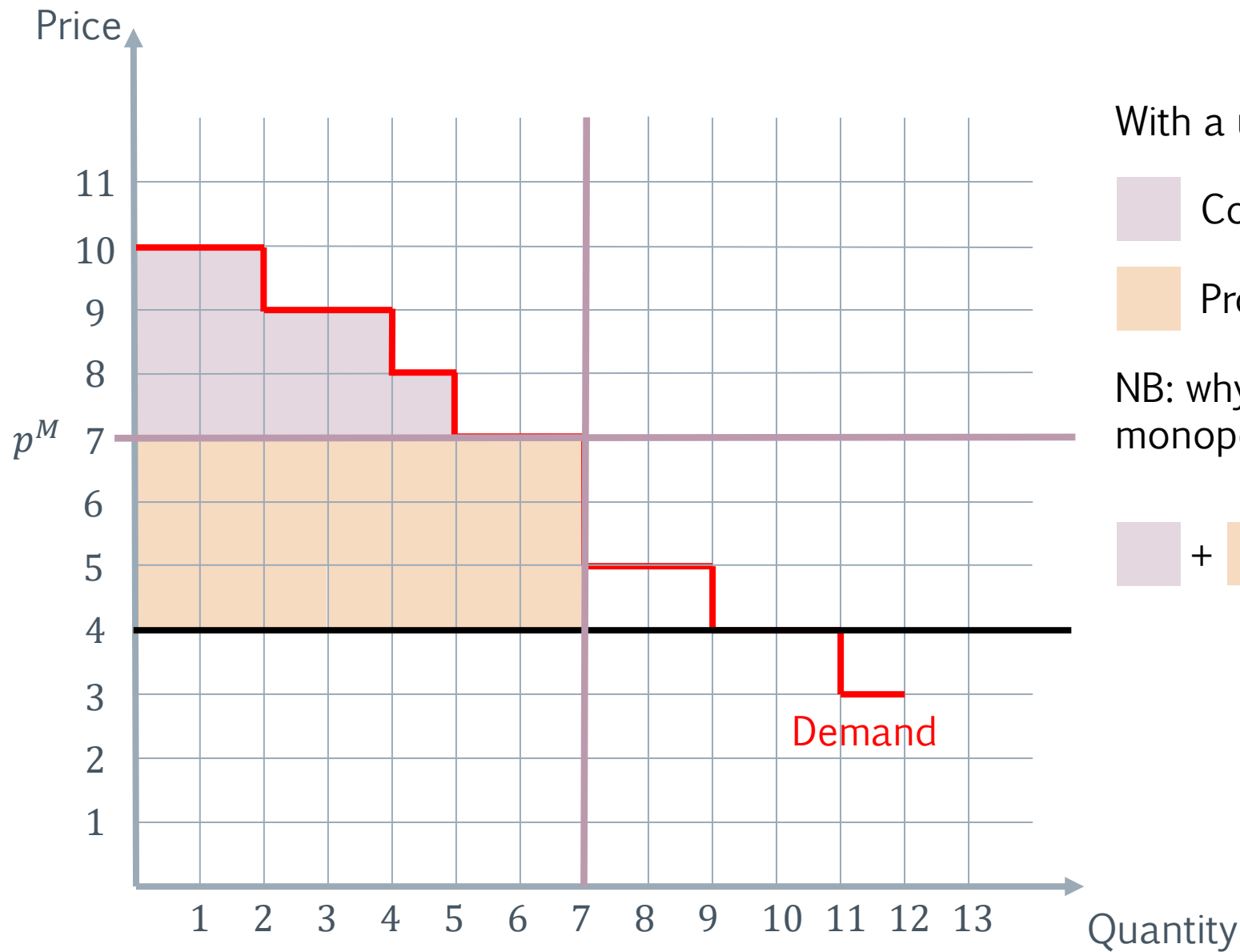


With a uniform price = 6 :

Cons. Surplus = 18

Profit = 14

NB: neither the optimal monopoly price, nor the competitive price.



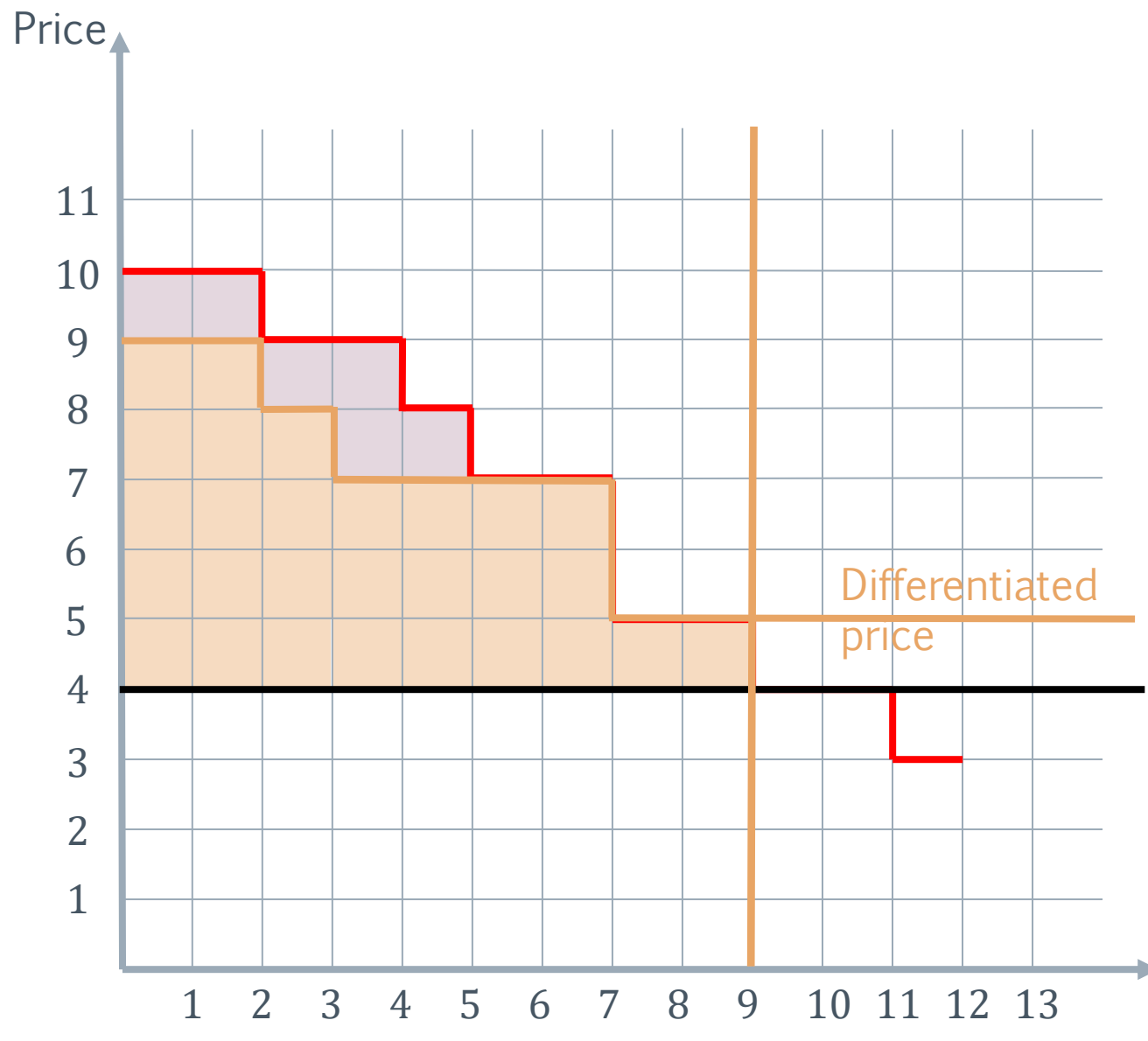
With a uniform price = 7 :

Cons. Surplus = 11

Profit = 21

NB: why is this the monopoly price?

+ Welfare = 32



Cons. Surplus = 6

Profit = 28

With different prices for different consumers (discrimination)

+ Welfare = 34

Profit and welfare are higher

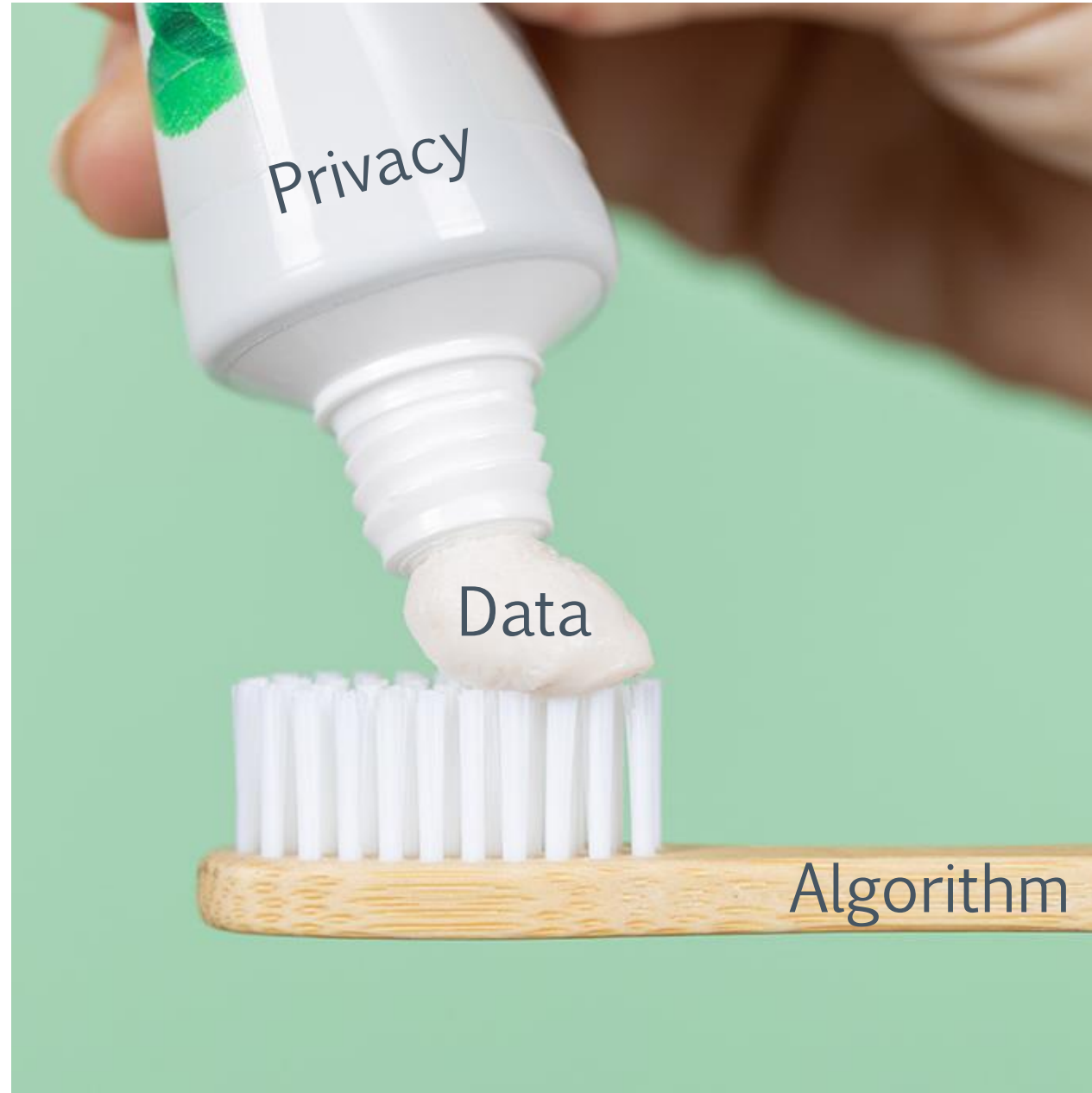
But consumers have lost surplus

# Users' cost/benefit analysis



- › Customization
- › Compatibility
- › Privacy







# Economics of platforms

# Direct Network Effects

- › The value for a user depends on total number of users
- › Communication networks:
  - Fax, phone, Office365, email, web, Whatsapp, Zoom...
- › Metcalfe's Law:
  - The value of a network is proportional to the square of its size
  - i.e., directly related to the number of links in the complete graph

# Demand with Network Effects

- › Snowball effect
  - A large installed base attracts new users

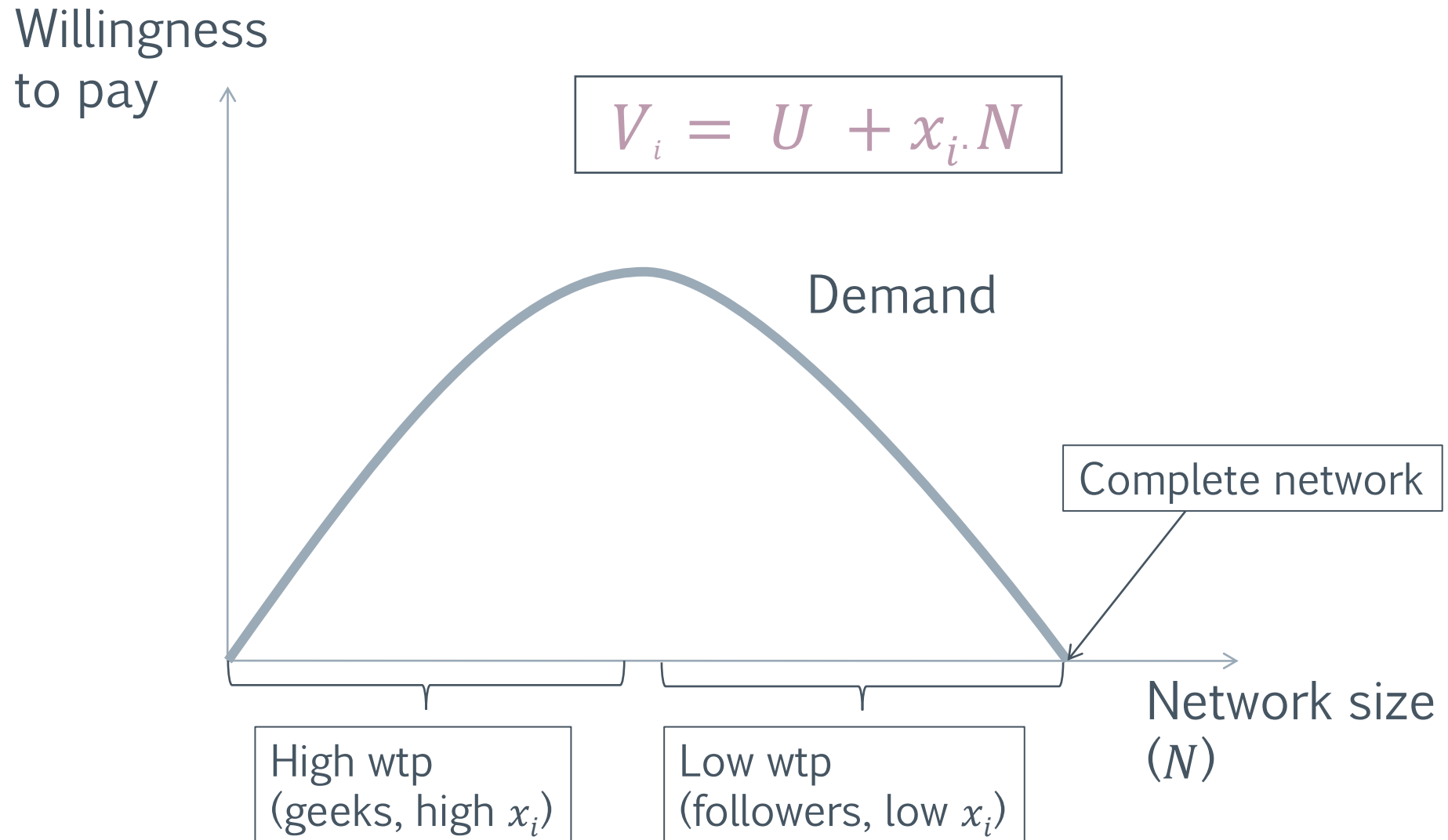
⇒ nonlinear, potentially unstable dynamics
- › Unusual demand curve
  - Opt-in decision depends both on price and demand level
  - Key role of expectations

⇒ Critical mass

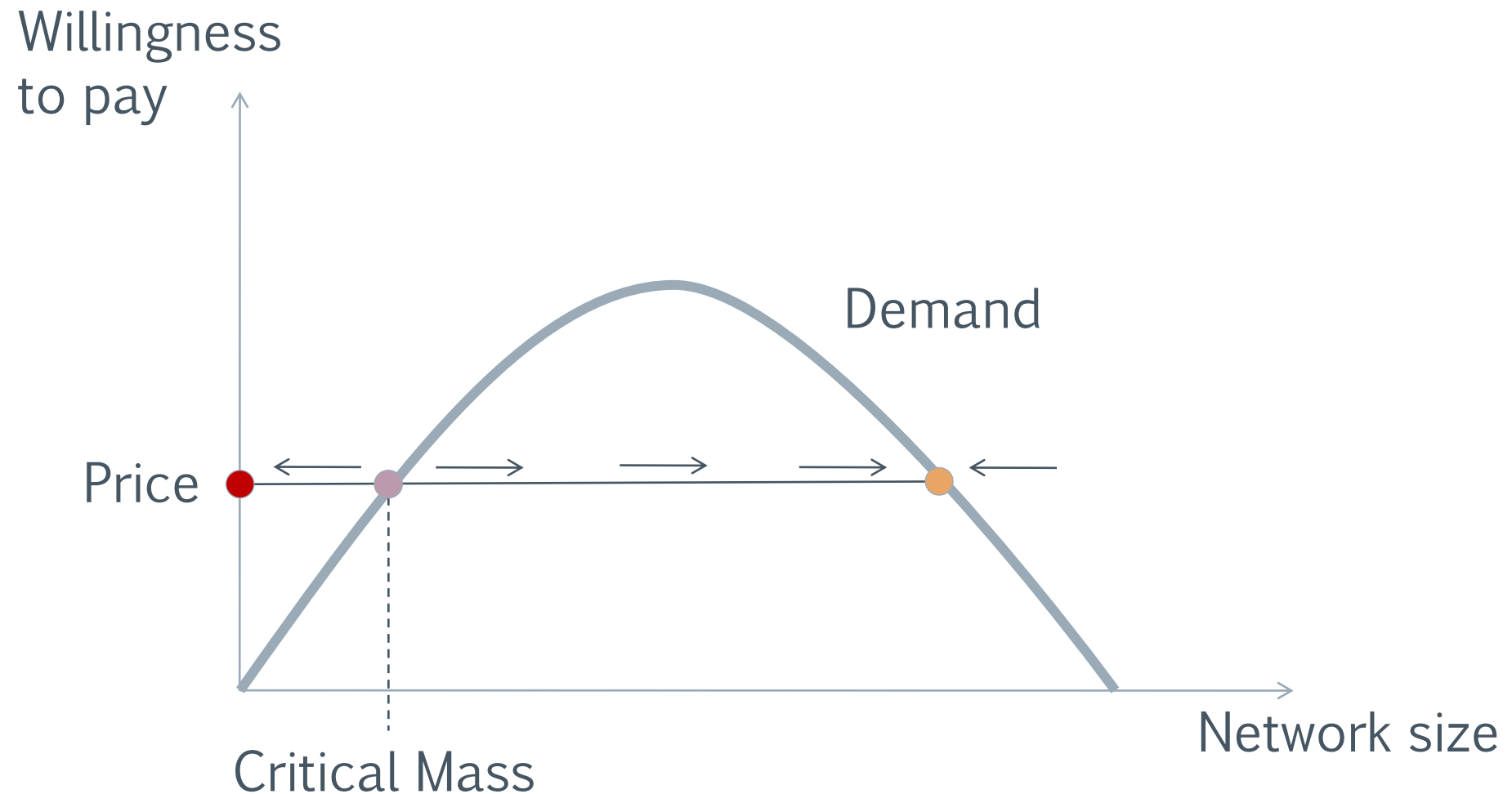
⇒ Tipping point

⇒ Game Theory : multiple equilibria

# Demand with network effects and heterogeneous consumers



# Critical mass and expectations



# Takeaways

- › Expectations drive demand :
  - Any price can lead to complete failure or complete success...
  - ...depending on users' expectations
- › Success is built on critical mass
  - Required for snowball effect
  - Critical mass is built with high willingness-to-pay early adopters
- › Facebook, WhatsApp, Skype (?)
- › And once **free users** are on board...?

# Two/multi-sided markets

› Markets on which a platform offers an interaction service to two (or more) categories of users

⇒ Indirect Network Effects across groups

# Examples

SOFTWARE		
Game console	Players	Developers
OS	Users	Developers
Browsers	Users	Websites

GAFAM		
Google	Users	Advertisers
Facebook	Users	Advertisers
Amazon	Buyers	Sellers
	Users	Advertisers



# Why two-sided markets?

A platform creates surplus by matching.

## 1. Reduces search costs

- Unique portal (ex: Google search)
- Brand, reputation
- Profiling and customization

## 2. Reduces transaction costs

- Easy and secure transactions
- Monitoring and guarantees

# The chicken-and-egg problem

- › How to attract both sides of the market?
  - Indirect network effects
  - Two-sided version of critical mass
- › Solutions:
  - Pricing policies
  - Integrating value-enhancing functions
- › Why were Facebook and Google valuations so high even before they generated any profit...?



# Pricing on two-sided markets

- › Google, Amazon, Facebook:
  - Free is the rule
  - ... for users

« If it's free, you're the product. »



# The Club Game

		Girl	
		Club	Home
Boy	Club	$(5, 1)$	$(-1, 0)$
	Home	$(0, -1)$	$(0, 0)$

- ›  $(\text{Club}, \text{Club})$  is a Nash equilibrium, and Pareto-dominates
- › There is however another, Pareto-dominated, equilibrium
- › **The chicken-and-egg problem: coordination failure**

# The club manager's problem

	C	H
C	$(5 - P_B, 1 - P_G)$	$(-1 - P_B, 0)$
H	$(0, -1 - P_G)$	$(0, 0)$

- › Choose (differentiated) prices to maximize profit
- ›  $P_B$  and  $P_G$

# Standard monopoly price

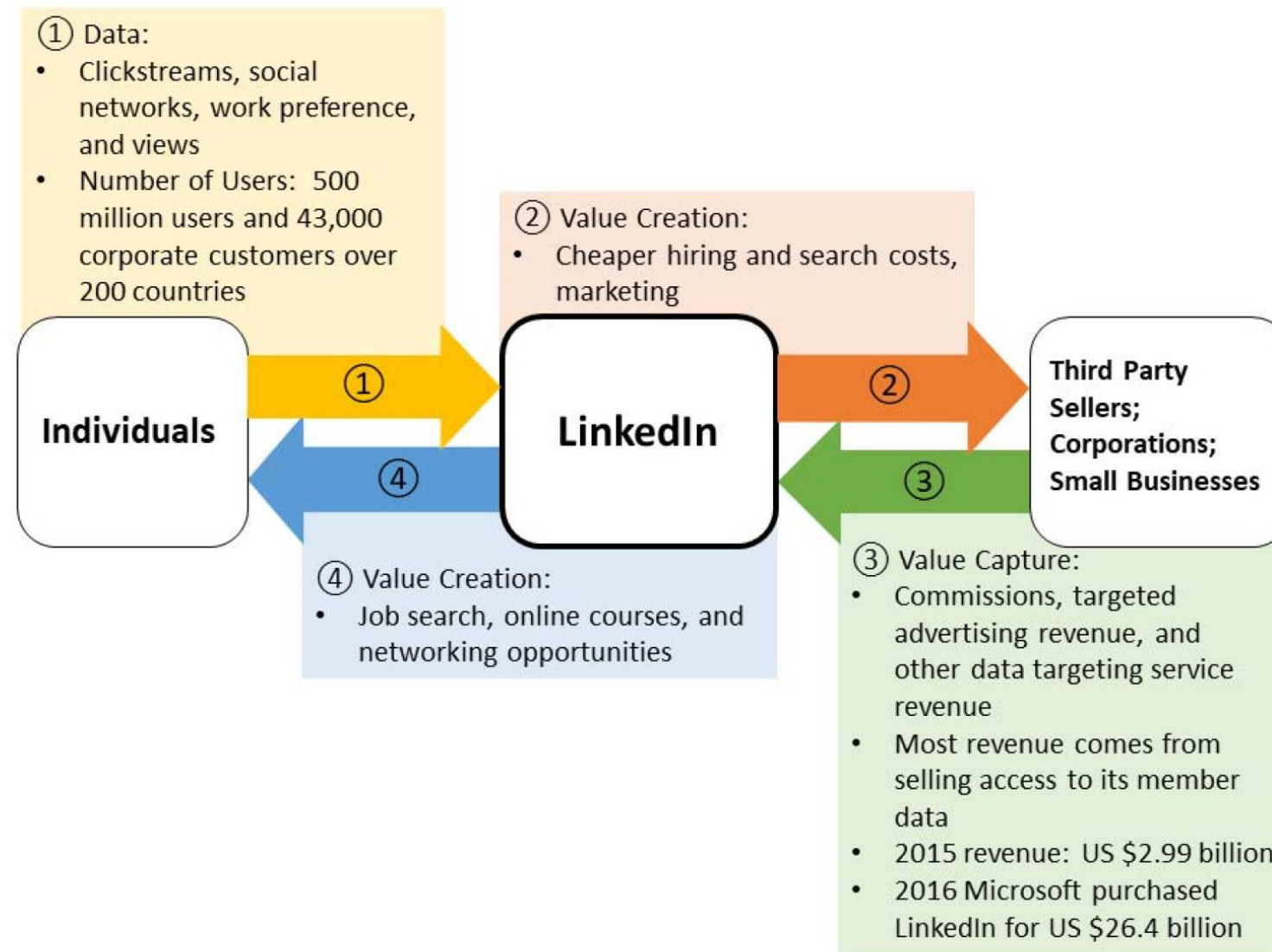
	C	H
C	$(0,01, 0,01)$	$(-5,99, 0)$
H	$(0, -1,99)$	$(0, 0)$

- › With optimal monopoly prices  $P_G=0,99$  et  $P_B=4,99$
- › Still two equilibria... Some nights, the club may be empty

## A better solution

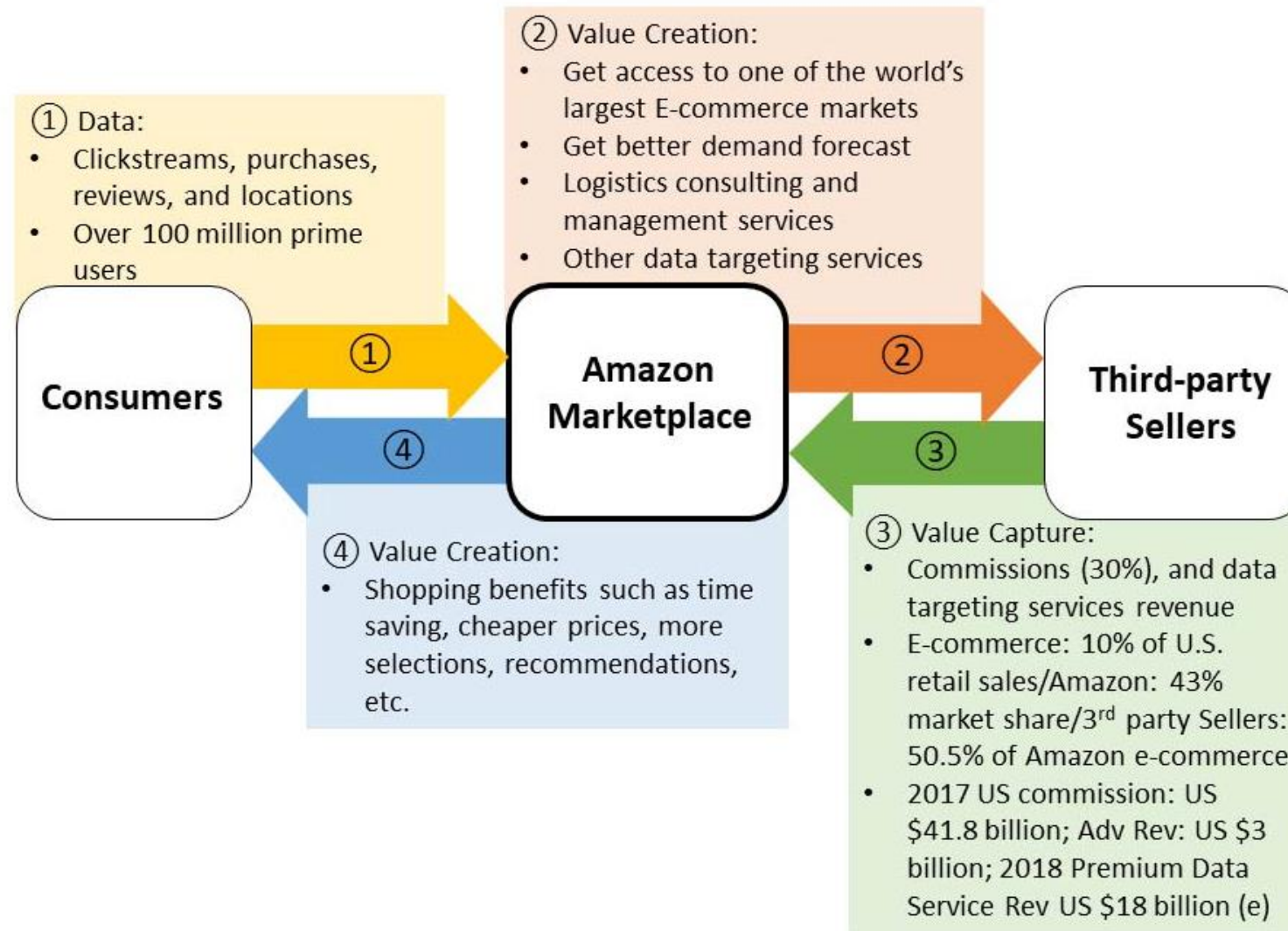
	C	H
C	( 0,01 , 2,01 )	( -5,99 , 0 )
H	( 0 , 0,01 )	( 0 , 0 )

- › Subsidize girls :  $P_G = -1,01$  (First drink for free!)
- › C(lub) is now a dominant strategy for Girl
- › Then Boy will in turn always choose Club

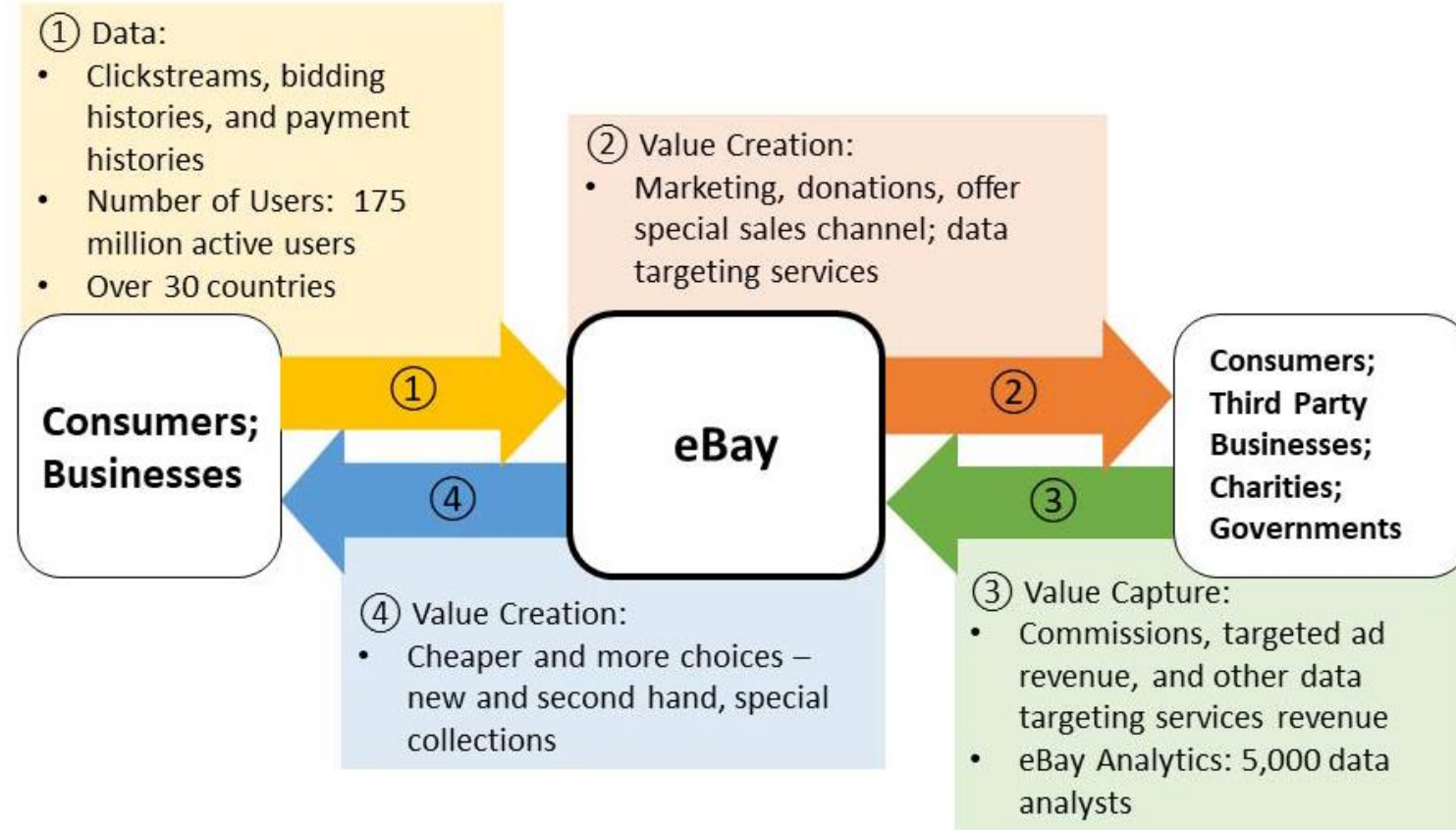


Li et al. (2019), *Value of Data: There's No Such Thing as a Free Lunch in the Digital Economy*, RIETI Discussion Paper Series 19-E-022.

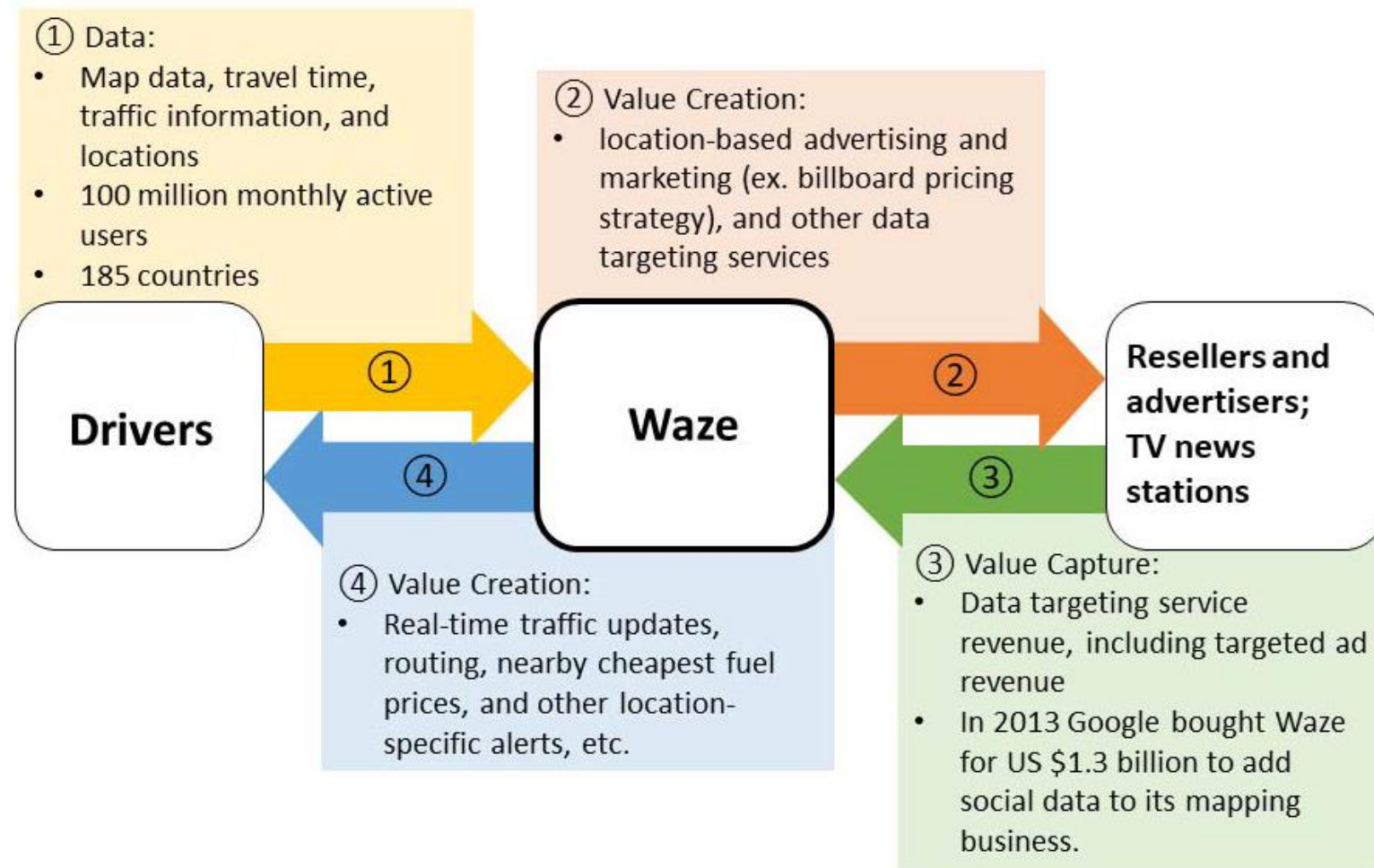




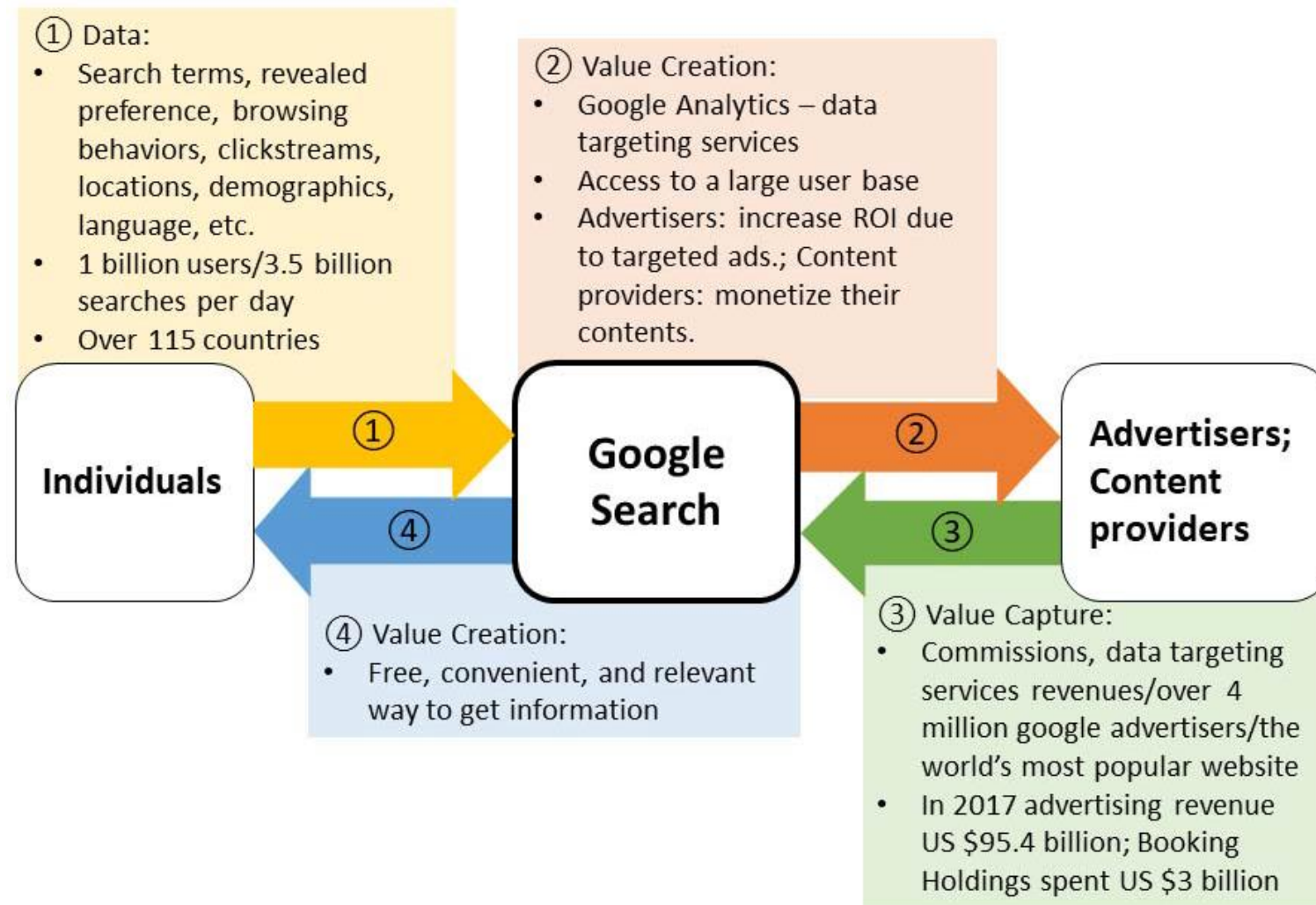
Li et al. (2019), *Value of Data: There's No Such Thing as a Free Lunch in the Digital Economy*, RIETI Discussion Paper Series 19-E-022.



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# Ads represent 84% of Google's revenues

## Alphabet annual Revenues (M\$)

	2017	2018	2019
Google Search & other	69 811	85 296	98 115
YouTube ads	8 150	11 155	15 149
[TOTAL] Google properties	77 961	96 451	113 264
Google Network Members' properties	17 616	20 010	21 547
<b>[TOTAL] Google advertising</b>	<b>95 577</b>	<b>116 461</b>	<b>134 811</b>
Google Cloud	4 056	5 838	8 918
Google other	10 914	14 063	17 014
<b>[TOTAL] Google revenues</b>	<b>110 547</b>	<b>136 362</b>	<b>160 743</b>
Other Bets revenues	477	595	695

NB: in 2020, 80% of revenues for Alphabet and 98% for Facebook.

# What competition for GAFAM?

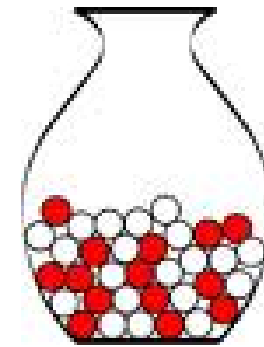
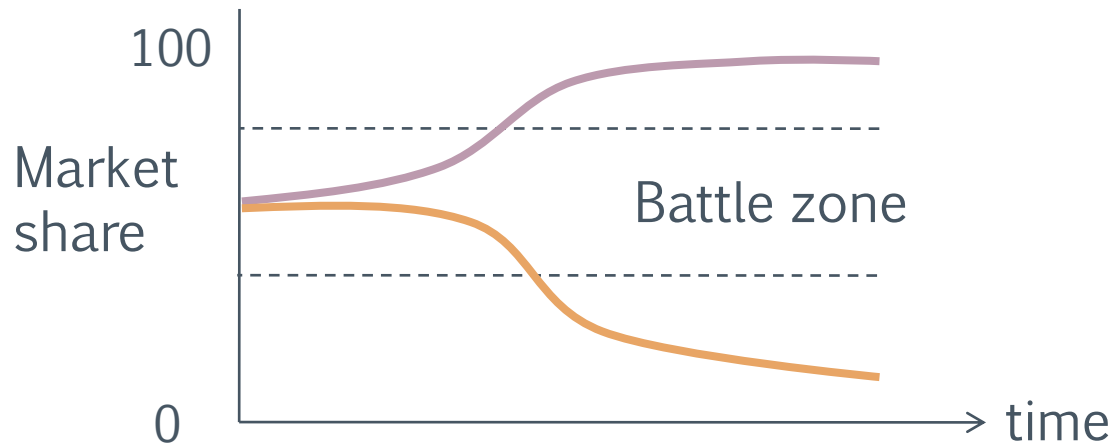
# What limits to the weight of GAFAM?

- › Global companies with almost-natural monopoly characteristics (increasing returns to scale)
- › What competitors could contest their power?
  - Innovative startups ?
  - Competing giants with similar user-base ?
  - Public initiative: industrial policy ?
    - › Open Data
    - › Open Source
    - › Regional Champions



# The issue: Competition with Network Effects

- › « Winner takes all » markets
  - Ex: Excel, Wintel vs Apple, eBay



A Pólya urn.

- › « Expectations matter more than quality »
- › A strong user-base blocks entry.

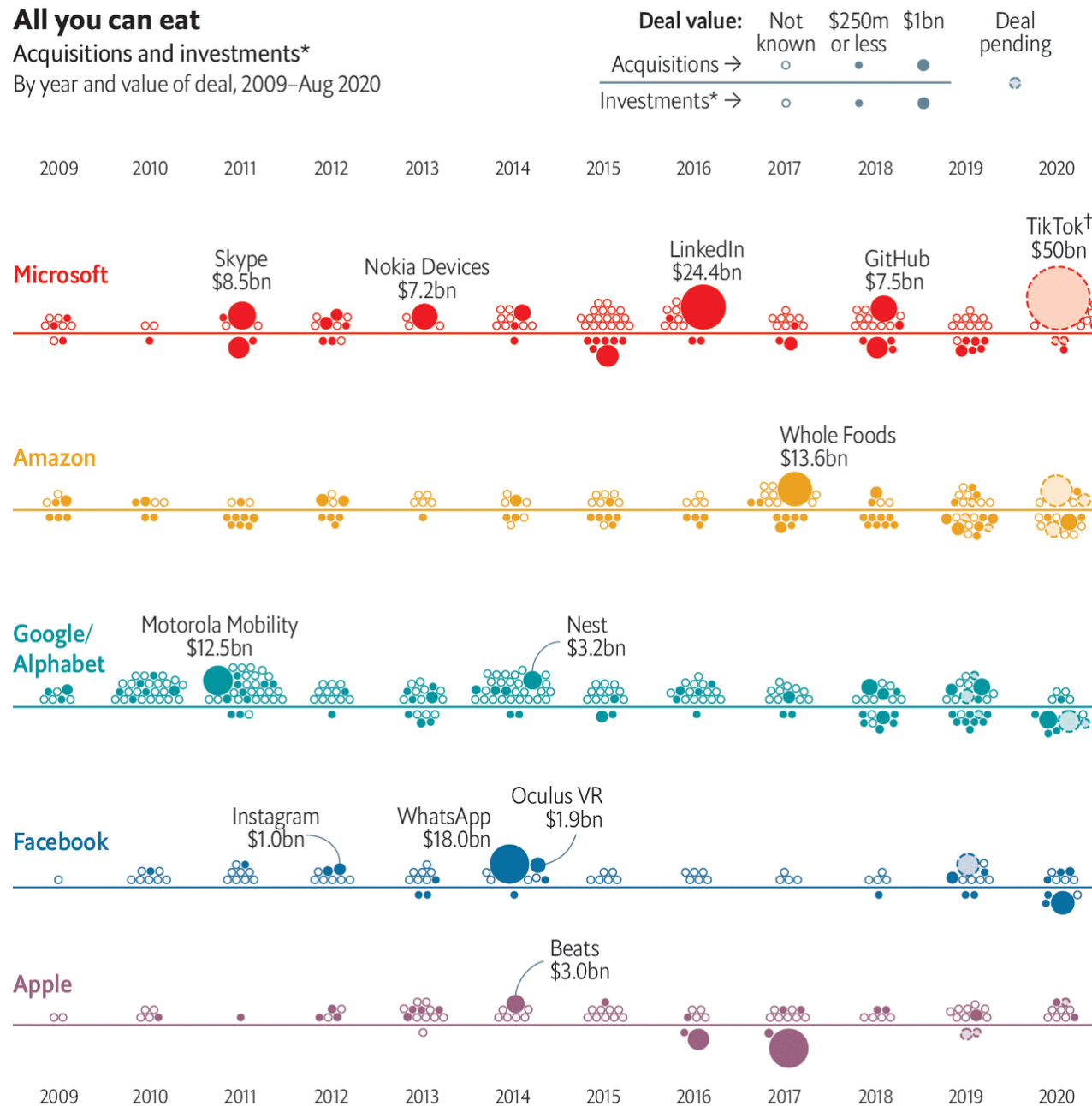
# Acquisitions and competition



## All you can eat

Acquisitions and investments\*

By year and value of deal, 2009–Aug 2020



Sources: Bloomberg; *The Economist*  
The Economist

\*Partial investment in a company, usually as part of a consortium; value shown is the total value of the acquisition, not the share owned by a particular company †Estimated value

*The Economist*  
4 August 2020

# Main acquisitions by Google

Year		Price	Price/Cap. Google	Sector	Goal
2006	YouTube	1,65 Mds\$	0,0124	Video sharing	Data
2007	DoubleClick	3,1 Mds\$	0,0212	Online advertising	Data Analytics
2012	Motorola	12,5 Mds\$	0,0692	Mobile phone	Data, terminal
2013	Waze	1,3 Mds\$	0,0044	GPS software	Data
2014	Nest Labs	3,2 Mds\$	0,0077	Domotique/ sécurité	IoT, Data
2018	HTC smartphone	1,1 Mds\$	0,0015	Mobile phone	Data, terminal
2019	Looker	2,6 Mds \$			Data Analytics

# Main acquisitions by Amazon

Year		Price	Price/Cap. Amazon	Sector	Goal
2009	Zappos	1,2 Mds\$	0,0228	Online shoes store	Data
2014	Twitch	0,97 Mds\$	0,0062	Streaming	Data
2017	Whole Foods	13,7 Mds\$	0,0281	Supermarkets	Diversification, Data
2018	Ring	1,8 Mds\$	0,0023	Video bell	IoT, Data
2018	PillPack	1 Mds\$	0,0011	Pharma	Data

# GAFAM acquisition—continued

- › Not only big companies (in particular Apple)
- › On the contrary : « killer acquisitions » ?
  - Buying small competitors, for tech
  - ... or to stop their development
- › Buying below control thresholds (turnovers or market shares) of competition authorities
- › International acquisitions ?

# Relevant market : a tricky definition

- › GAFAM compete on some services
- › ... but cooperate on other market segments.
- › **Data** as a starting point for definition...?
- › **Consumer attention** as key scarce resource...?
- › A headache for competition authorities (numerous reports)



*The Economist*, 27 February 2021



# The emergence of BATX

- › Baidu, Alibaba, Tencent, Xiaomi
- › Main leverage: Chinese domestic demand
- › A protected market: GAF(AM) blocked

Also:

- › Huawei/Apple
- › DIDI/Uber

2000

Baidu 百度

1999

Alibaba Group  
阿里巴巴集团

1998

Tencent 腾讯

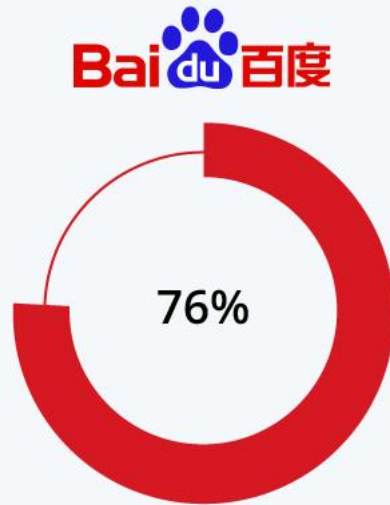
2010

Xiaomi



# China's BAT Companies Have Grip on Markets

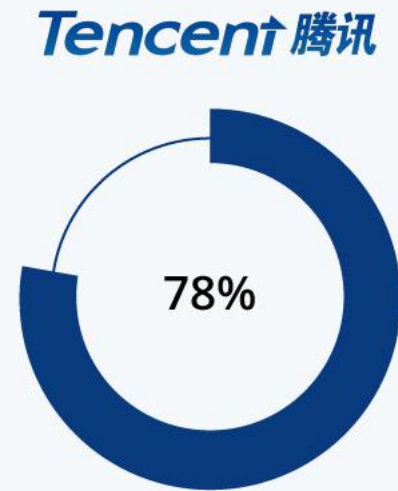
Selected figures on the reach of Baidu, Alibaba and Tencent in the Chinese market in 2020



Share of search engine market



Share of retail ecommerce sales



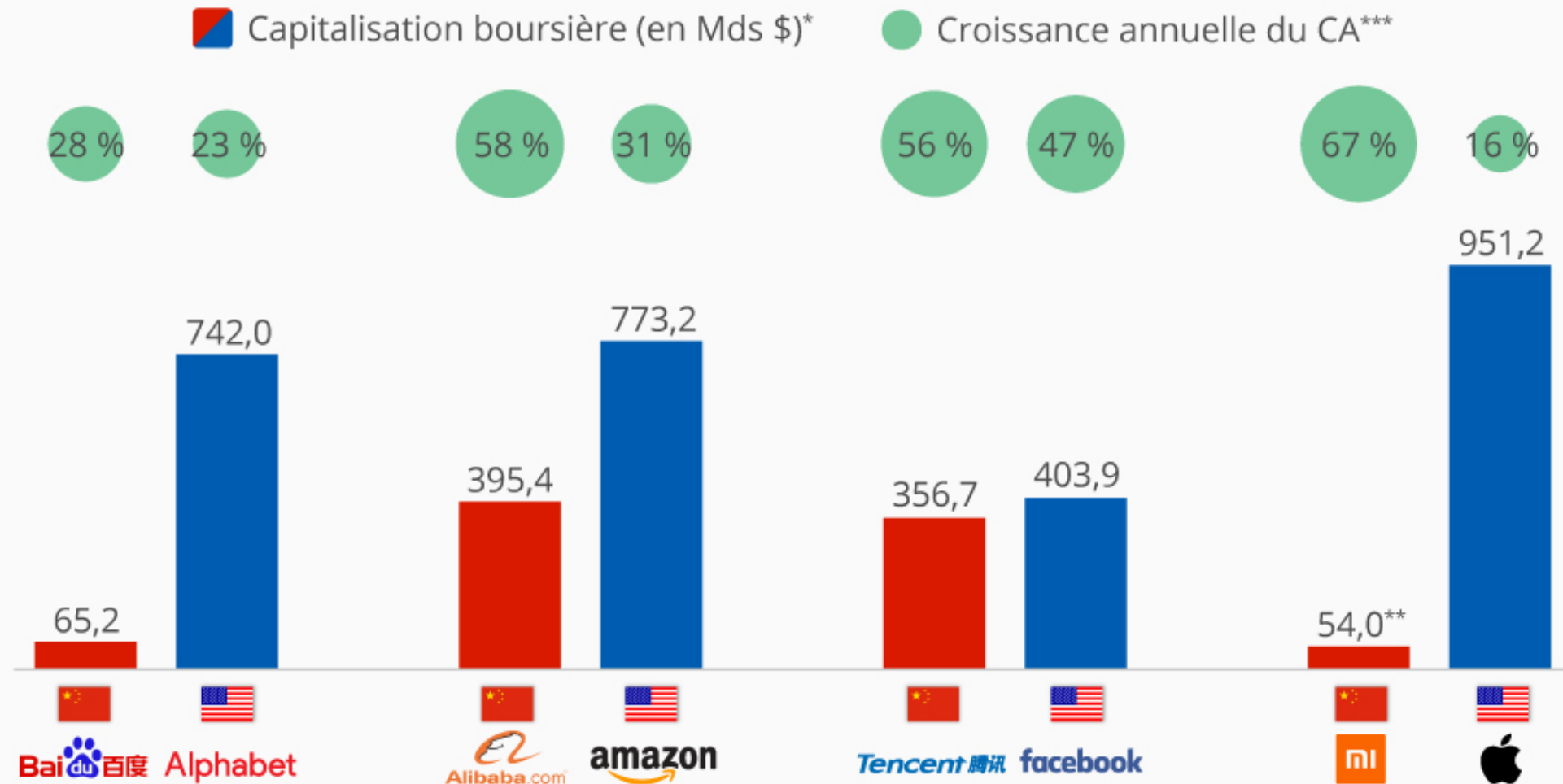
Share of internet users\* on WeChat

\* 16-64 years old

Sources: StatCounter, eMarketer, Global Web Index via DataReportal

Source:  
Statista, 2020

# Les BATX font trembler les GAFA



\* En date du vendredi 16 novembre 2018.

\*\* Entreprise encore non cotée en bourse : dernière estimation disponible en 2018.

\*\*\* Sur les deux derniers exercices annuels disponibles.

Sources : WolframAlpha, Bloomberg, recherches Statista

# Regulating GAFAM?

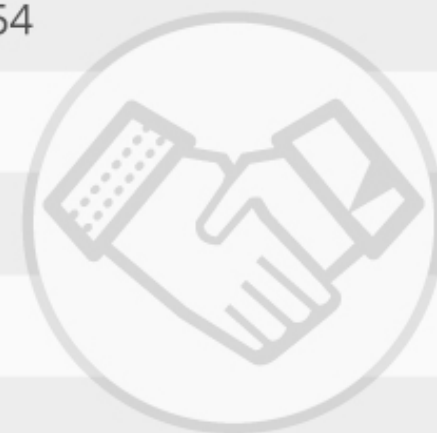
# How to regulate GAFAM

- › Give back property rights to users
  - Ex: GDPR, Apple privacy policy (?)
  - Portability of personal data
- › Mediate and moderate information flows
  - Ex: Fake News, Cambridge Analytica scandal
- › Make them pay taxes
  - Taxation in immaterial markets?
- › Limit their market power
  - Instruments from competition policy

# Les plus lourdes amendes infligées par l'UE

Amendes infligées par l'UE pour pratiques anticoncurrentielles

Infraction	Entreprise(s) concernée(s)	Amende en M €
<b>Abus de position dominante (OS Android)</b>	Google	<b>2018</b> 4 340
Cartel des camions	Daimler, DAF, Renault/Volvo, Iveco, MAN	2016 2 930
Abus de position dominante (Google Shopping)	Google	2017 2 420
Scandale du Libor	Deutsche Bank, Société Générale, Royal Bank of Scotland, JPMorgan, Citigroup, RP Martin, Barclays, UBS	2013 1 712
Cartel des tubes cathodiques	Philips, LG Electronics, Panasonic, Samsung SDI, Thomson, Toshiba, MTPD, Chunghwa	2012 1 470
Cartel des vitres de voitures	Saint-Gobain, Pilkington, Asahi Glass, Soliver	2008 1 354
Partage des marchés du gaz	E.ON, Gaz de France	2009 1 106
Abus de position dominante	Intel	2009 1 060
Abus de position dominante	Qualcomm	2018 997
Cartel des fabricants d'ascenseurs	ThyssenKrupp, Otis, Schindler, Kone, Mitsubishi	2007 992



# Google Hit With Another Antitrust Fine in Europe

Selected antitrust fines imposed by the European Commission against U.S. tech companies





# European framework: DMA/DSA

- › Digital Markets Act & Digital Services Act
  - Controlling information flows, **contents**
  - Curb anticompetitive behavior, **infrastructure**
- › Proposition : late 2020 by the Commission
- › Guidelines adopted by the Council in November 2021
- › Implementation in 2022...?
- › Actually much lighter than dismantling proposals (US)
- › The current frontier

# Conclusions and perspectives

# Conclusions and perspectives (1/3)

## Emergence of digital giants and platforms

- › Economies of scale and networks effects due to Data
- › Competitive consequences: concentration and gigantism
- › Growth strategy
  - Leaning on scale economies and snowball effect
  - Sur la financiarisation (et le lien entre marché et données)
  - Vers d'autres secteurs d'activités, directement liés ou non
  - Acquisitions
  - Captation des talents

# Conclusions and perspectives (2/3)

## Information and markets: the Economy 4.0

- › Digital intermediation is a major source of **efficiency**
  - But the **social value created is appropriated by a small number of actors**
  - ...who are becoming the true market-makers
- › The digital giants, paid on commission, have raised to an unprecedented power, sometimes surpassing that of Governments—who cannot fight on equal tech footing
- › While this fosters competition at the standard market level this comes with a huge market power for GAFAM.

# Conclusions and perspectives (3/3)

## Further directions to explore

- › The economics of Data
  - A complex microeconomic ecosystem
  - A macroeconomic change of paradigm?
- › The business model of online advertising
  - Price discrimination, behavioral aspects
  - Auction formats
- › Regulations currently being discussed
  - DMA/DSA in the EU
  - Followups on the 2020 trials in the US
- › Post-COVID digital world