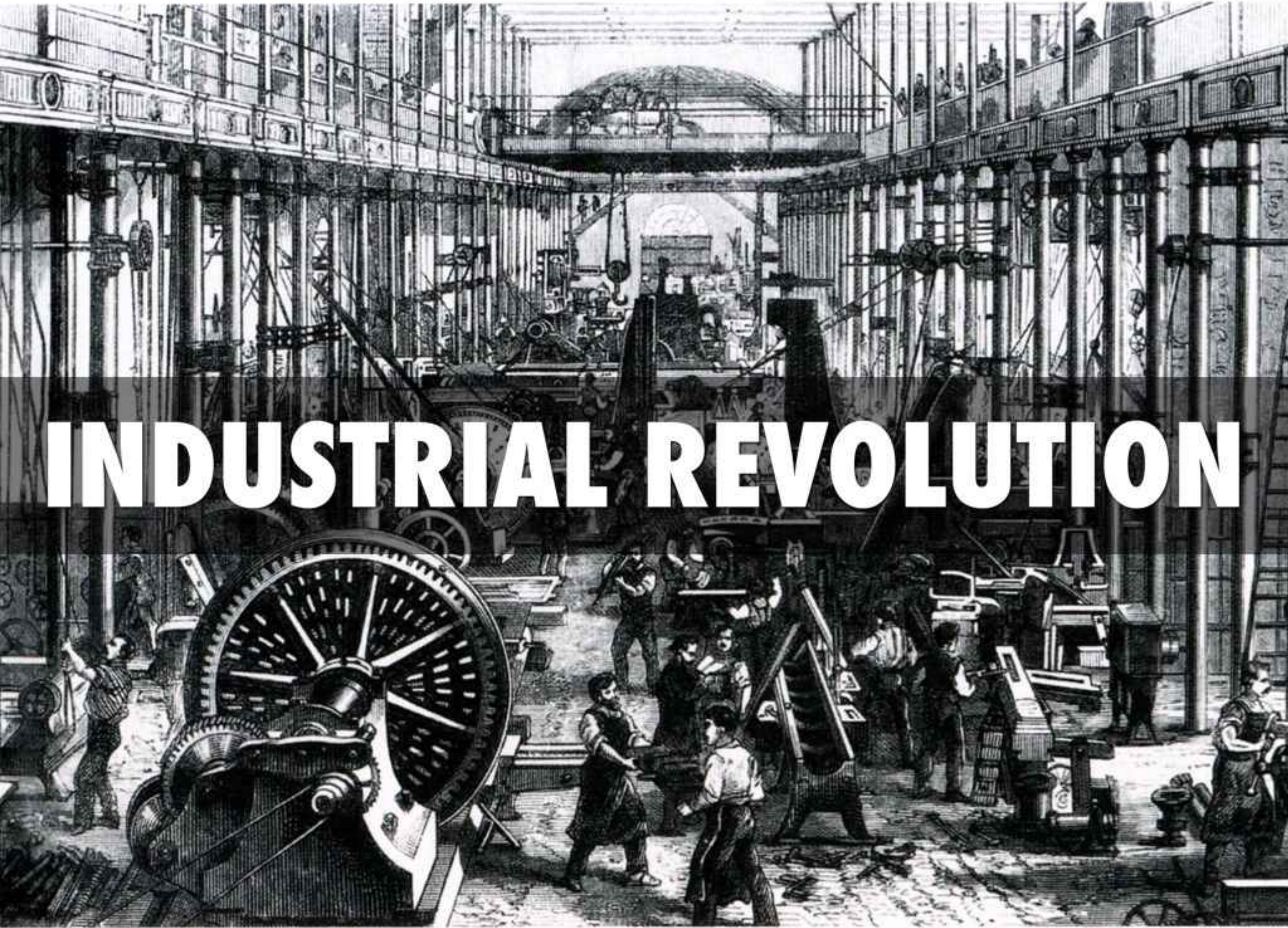# 산업혁명과 기본소득

INDUSTRIAL REVOLUTION

Q: 새로운 산업혁명의 시작?

Q: 산업혁명의 특징?

작은 발견 ▶ 거대한 연쇄 반응

증기기관 → 산업 생산 → 구조 변동

농민 사회 → 산업 노동자 사회

30년 - 40년

technological progress
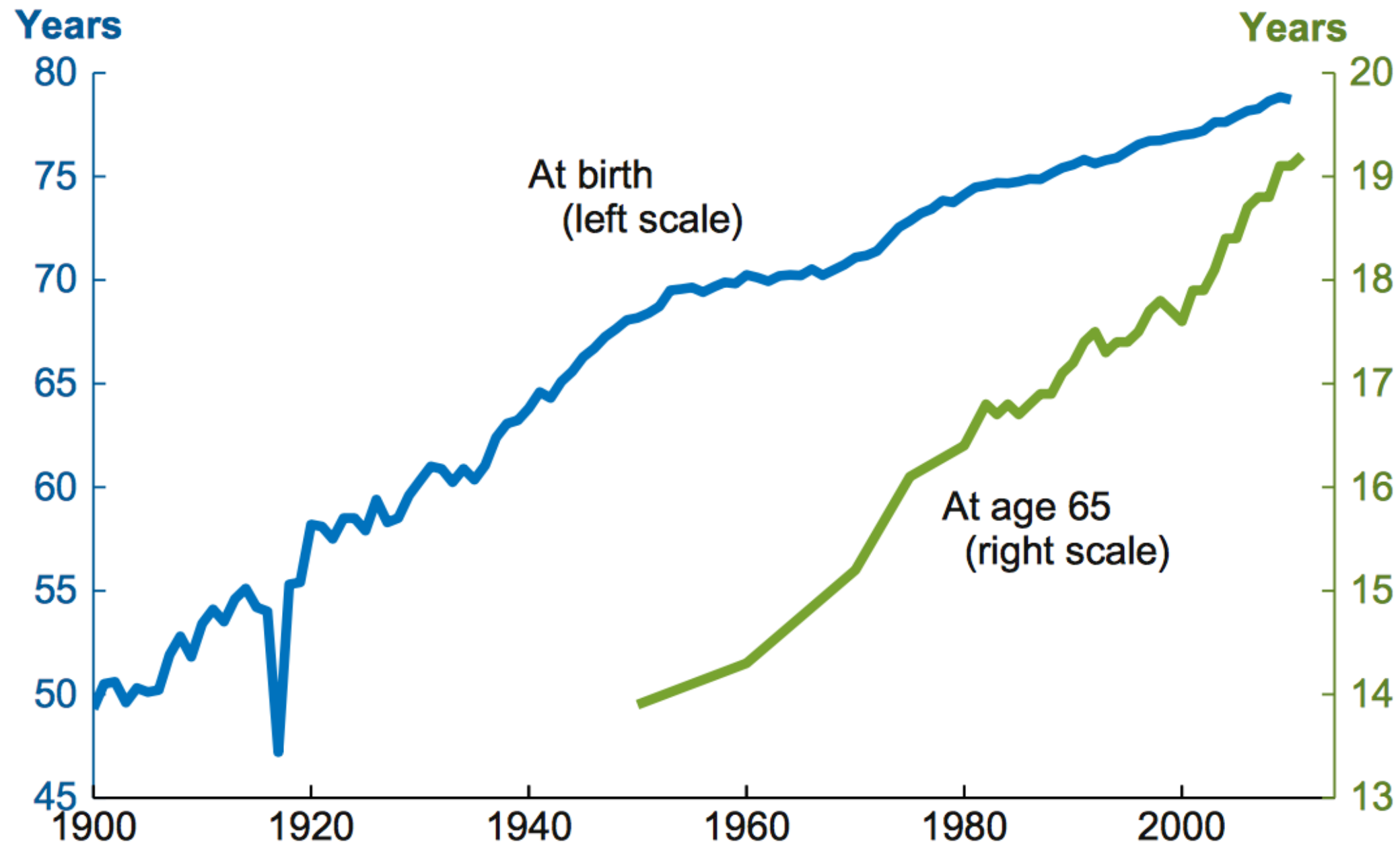# ▶ **economic progress**
▶ social progress

1750년 런던

1830년 베를린

Fig. 14 Life expectancy at birth and at age 65, United States. Source: *Health, United States 2013 and* *https://www.clio-infra.eu*.

전기없는 집

화장실?

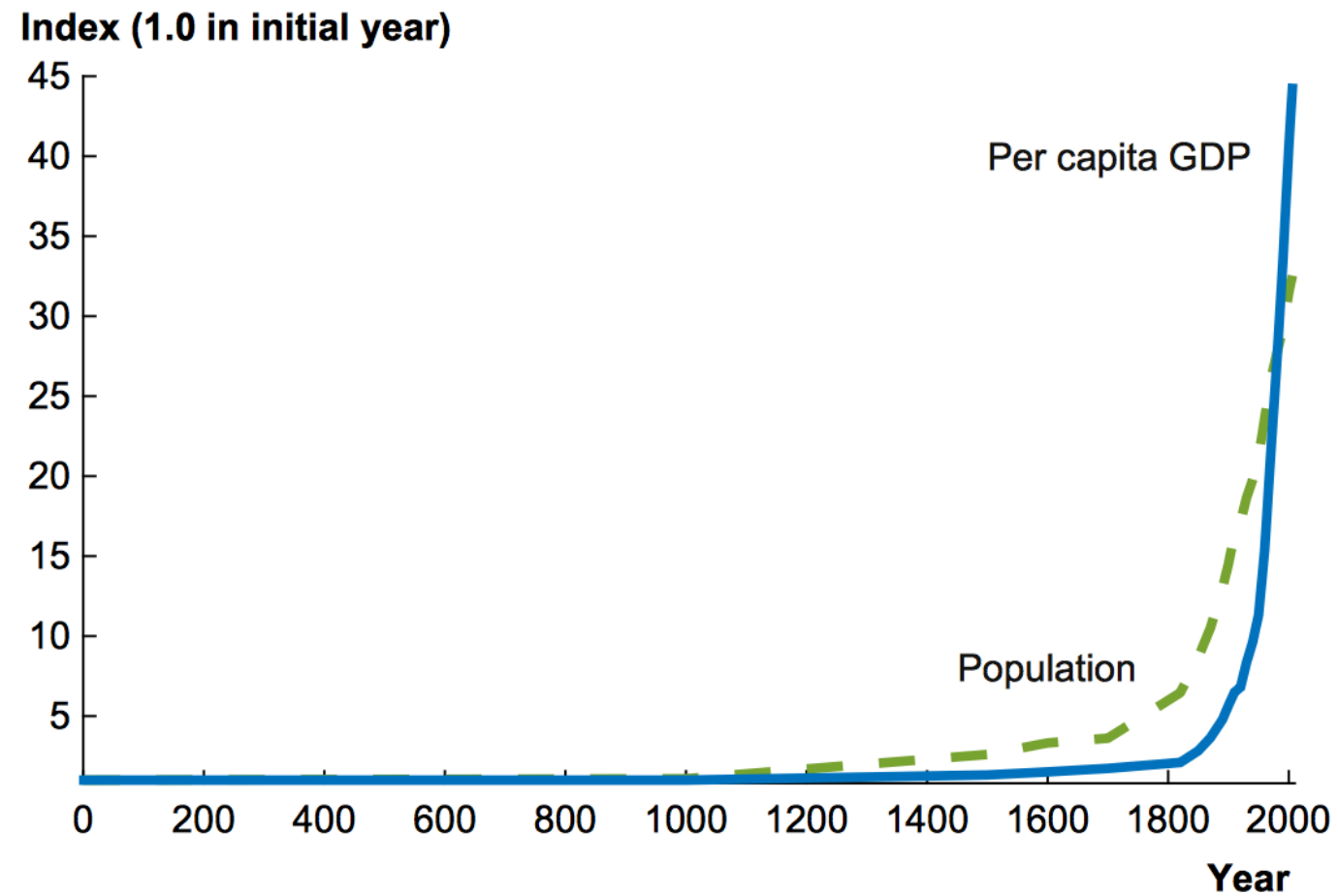해결할 수 없는 수 많은 문제들

no 사회보장제도 → 노동자운동

경제 성장의 시작

Fig. 2 Economic growth over the very long run. Source: *Data are from Maddison, A. 2008. Statistics on world population, GDP and per capita GDP, 1-2006 AD. Downloaded on December 4, 2008 from http:// www.ggdc.net/maddison/ for the "West," ie, Western Europe plus the United States. A similar pattern holds using the "world" numbers from Maddison.*

인구 팽창
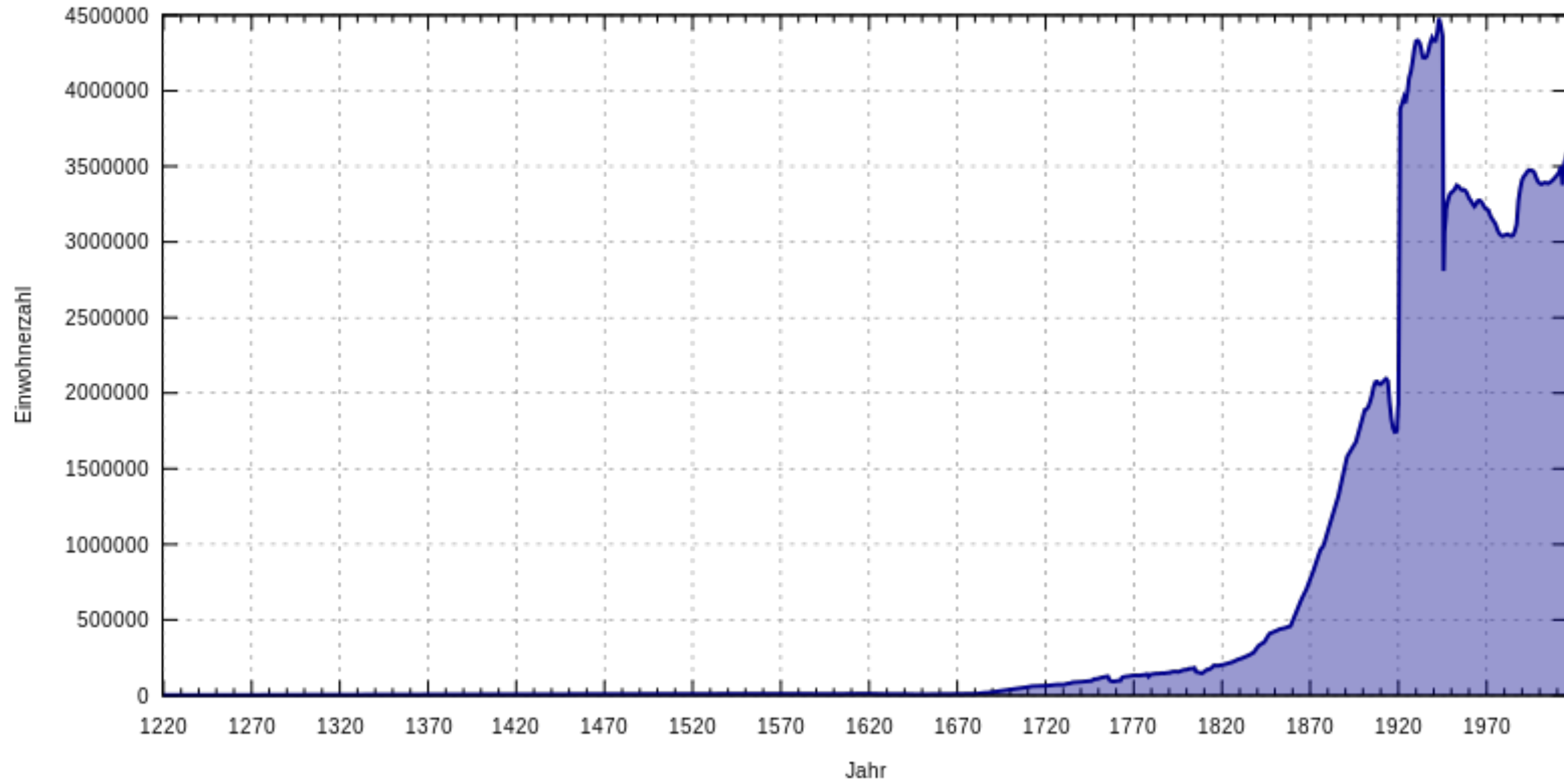
아동 노동

1900년대

electrification → 대량생산

Scientific management by Taylor

Fordism

노동생산성 증대

BOOM!

1941년 미국 자동차 생산 중단

Rations!

"Do with less,
so they'll have enough"

2차 대전 이후

optimism

"unlimited"

"un-rationed"

Car Boom

1941: 29.5

1950: 49.3 million

Baby Boom

1946: 3.4 million

1947: 3.8 million

1952: 3.9 million

1954 – 1964: > 4 million

assurance in the future

optimism!

triumph!

efficiency

규모의 경제

Economies of scale

instrumentelle Vernunft by Horkheimer & Adorno

Zweckrationalitat by Max Weber

Verdinglichung by Lukacs

Thomas Aquinas
a World without Growth

Francis Bacon

efficiency-think

소득 증가

GDP per person (multiple of 300 dollars)

- United States
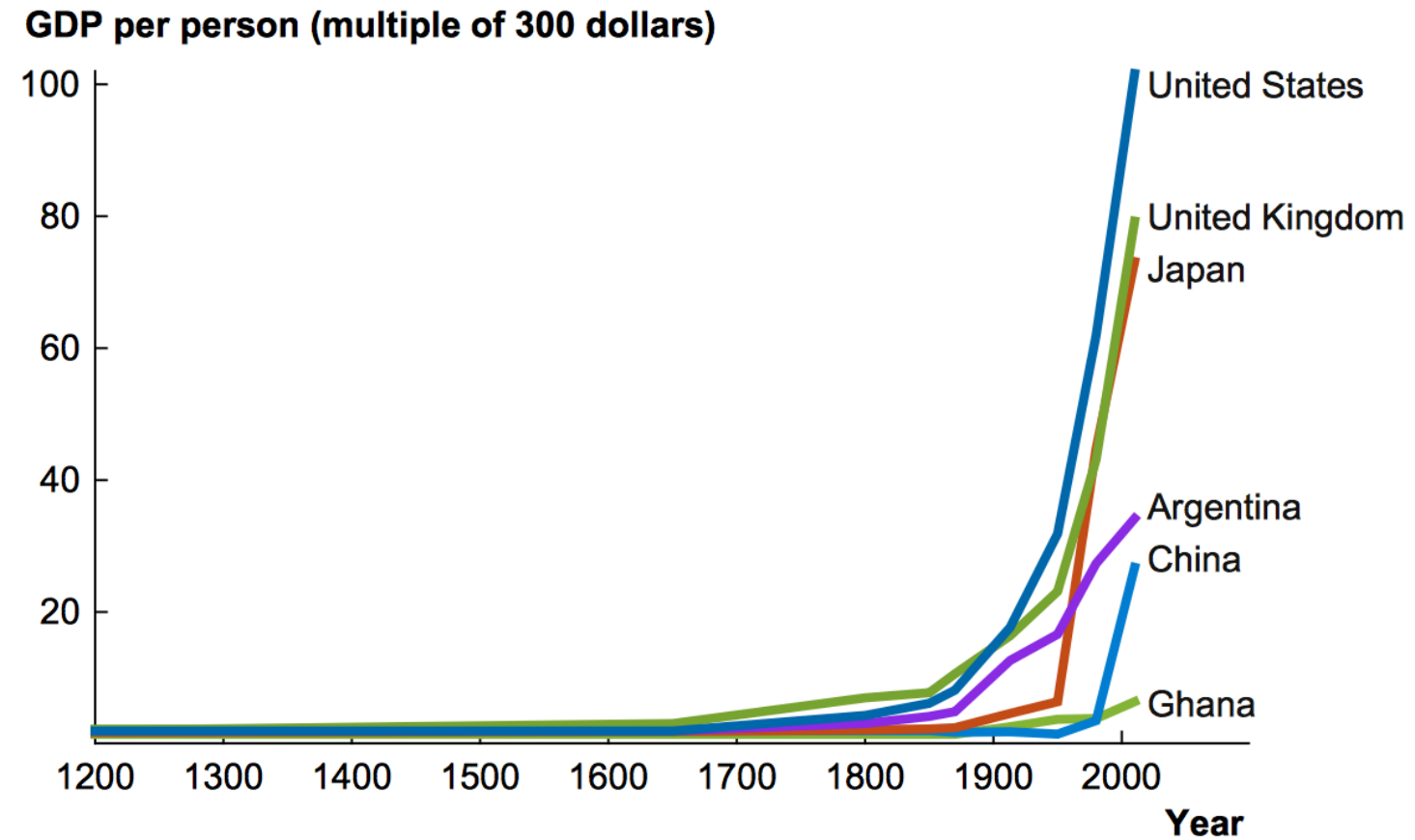- United Kingdom
- Japan
- Argentina
- China
- Ghana

Year

Fig. 21 The great divergence. *Note*: The graph shows GDP per person for various countries. The units are in multiples of 300 dollars and therefore correspond roughly to the ratio between a country's per capita income and the income in the poorest country in the world. Source: *Bolt, J., van Zanden, J.L. 2014. The Maddison Project: collaborative research on historical national accounts. Econ. Hist. Rev. 67 (3), 627–651.*
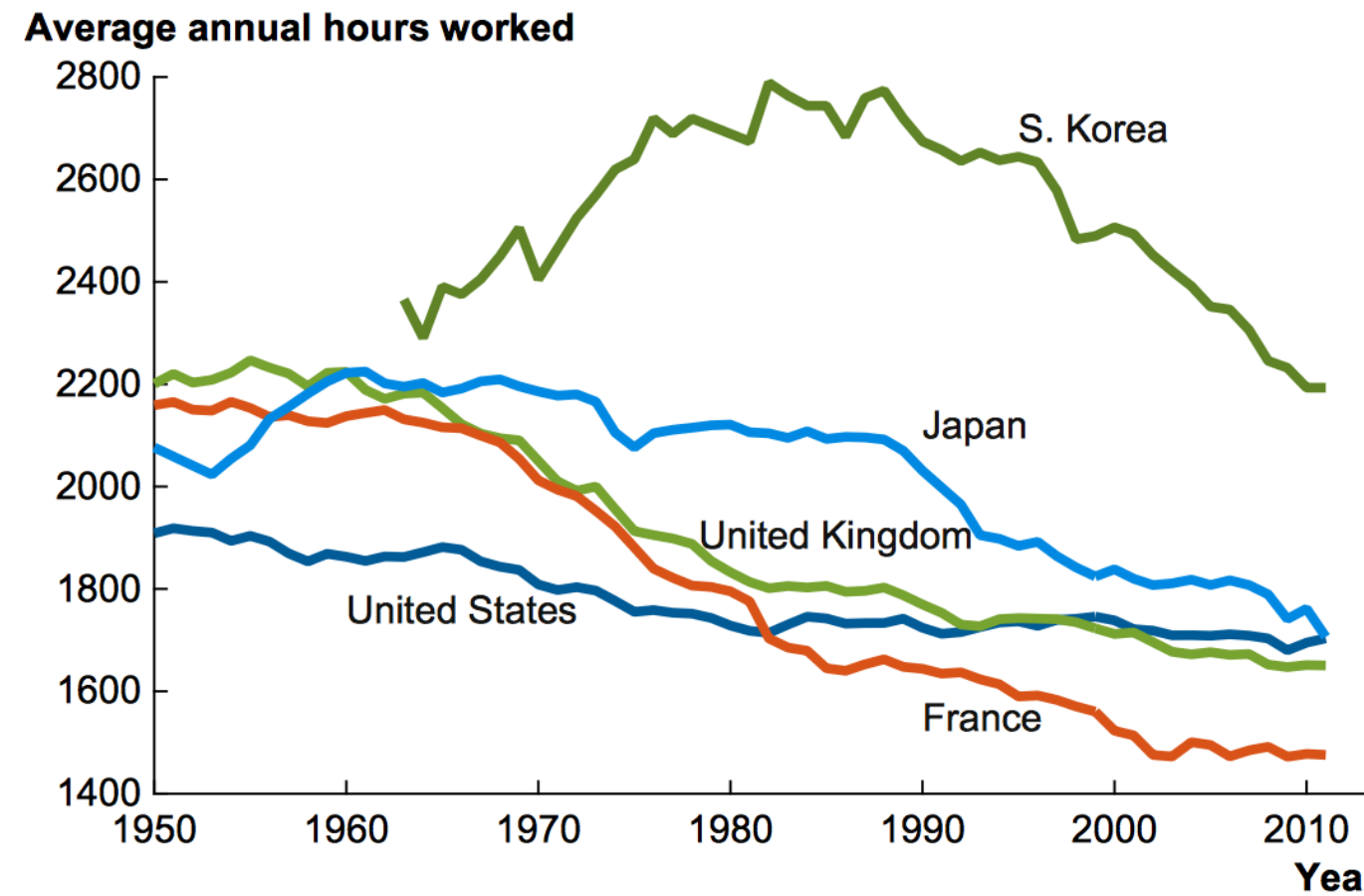
노동 시간 단축

Fig. 15 Average annual hours worked, select countries. Source: *Average annual hours worked per person employed, from the Penn World Tables 8.0. See Feenstra, R.C., Inklaar, R., Timmer, M.P. 2015. The next generation of the Penn World Table. Am. Econ. Rev. 105 (10), 3150–3182. doi:10.1257/ aer.20130954 and their excellent data appendix for details on the data.*
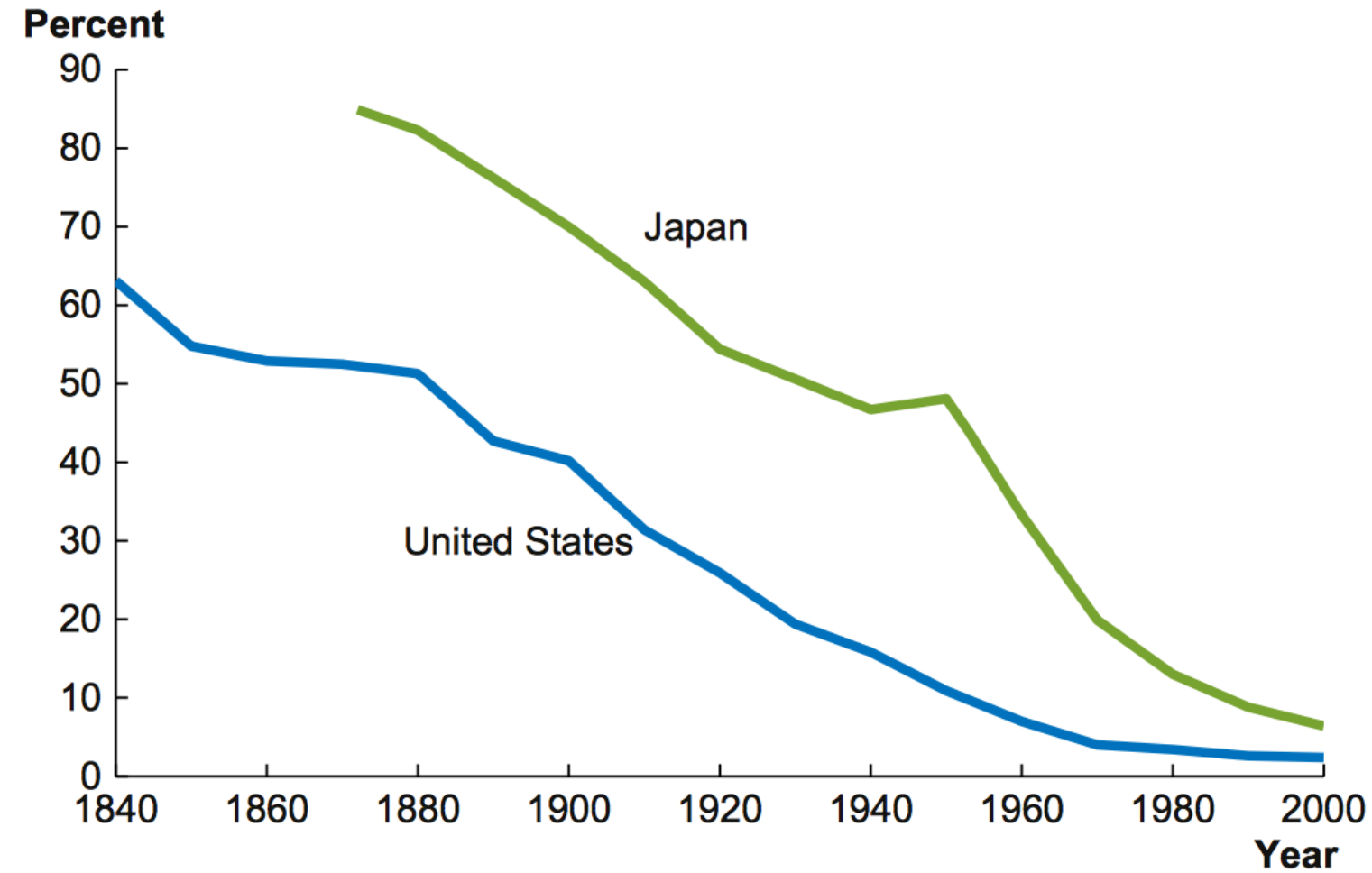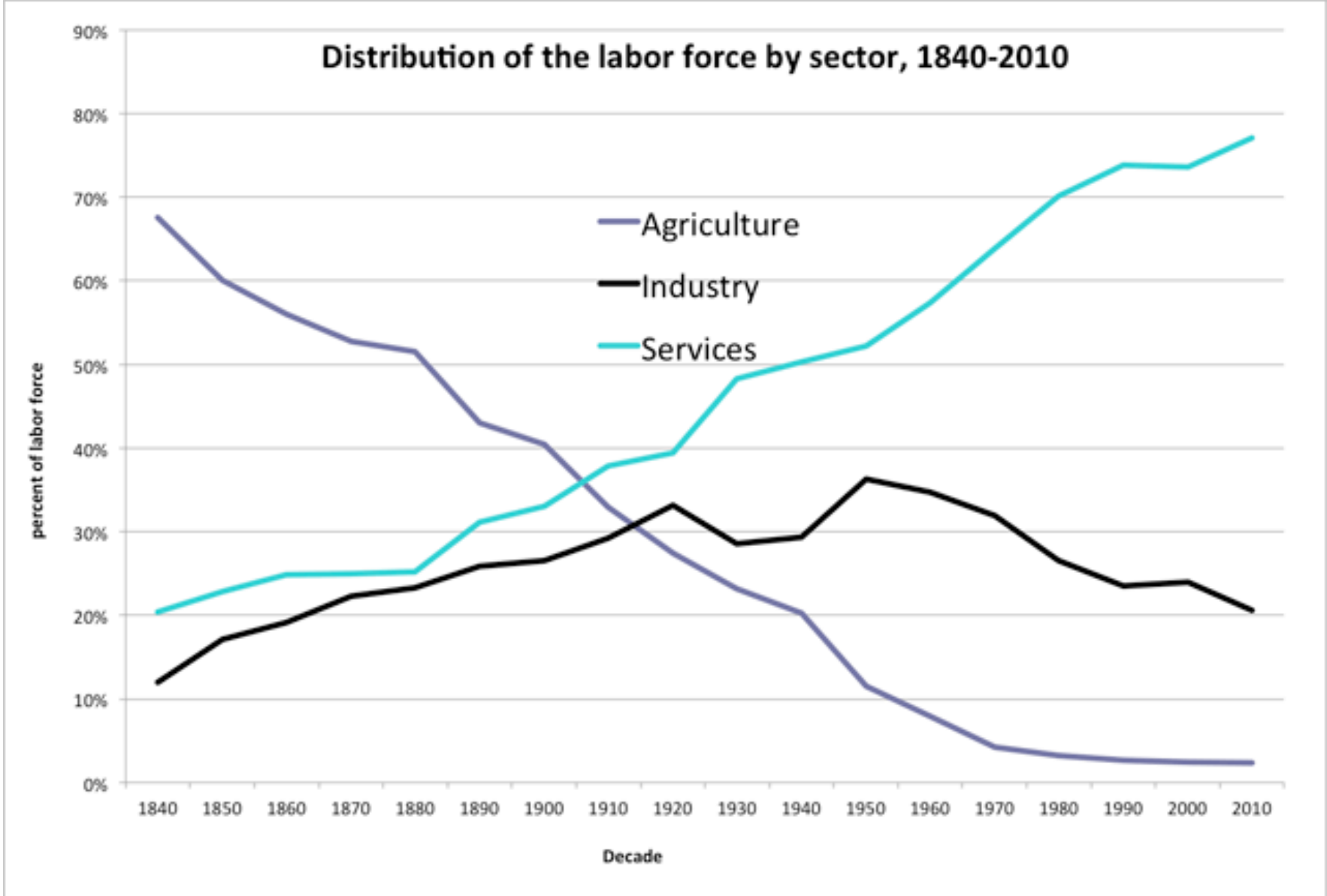
농업 종사수 감소

Fig. 12 Employment in agriculture as a share of total employment. Source: *Herrendorf, B., Rogerson, R., Valentinyi, A. 2014, Growth and structural transformation, In: Handbook of Economic Growth, vol. 2, Elsevier, pp. 855–941,* http://ideas.repec.org/h/eee/grochp/2-855.html.

distribution of the labor force

Distribution of the labor force by sector, 1840-2010

digital revolution

increasing returns
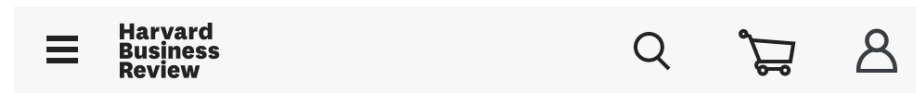
FINANCIAL MANAGEMENT

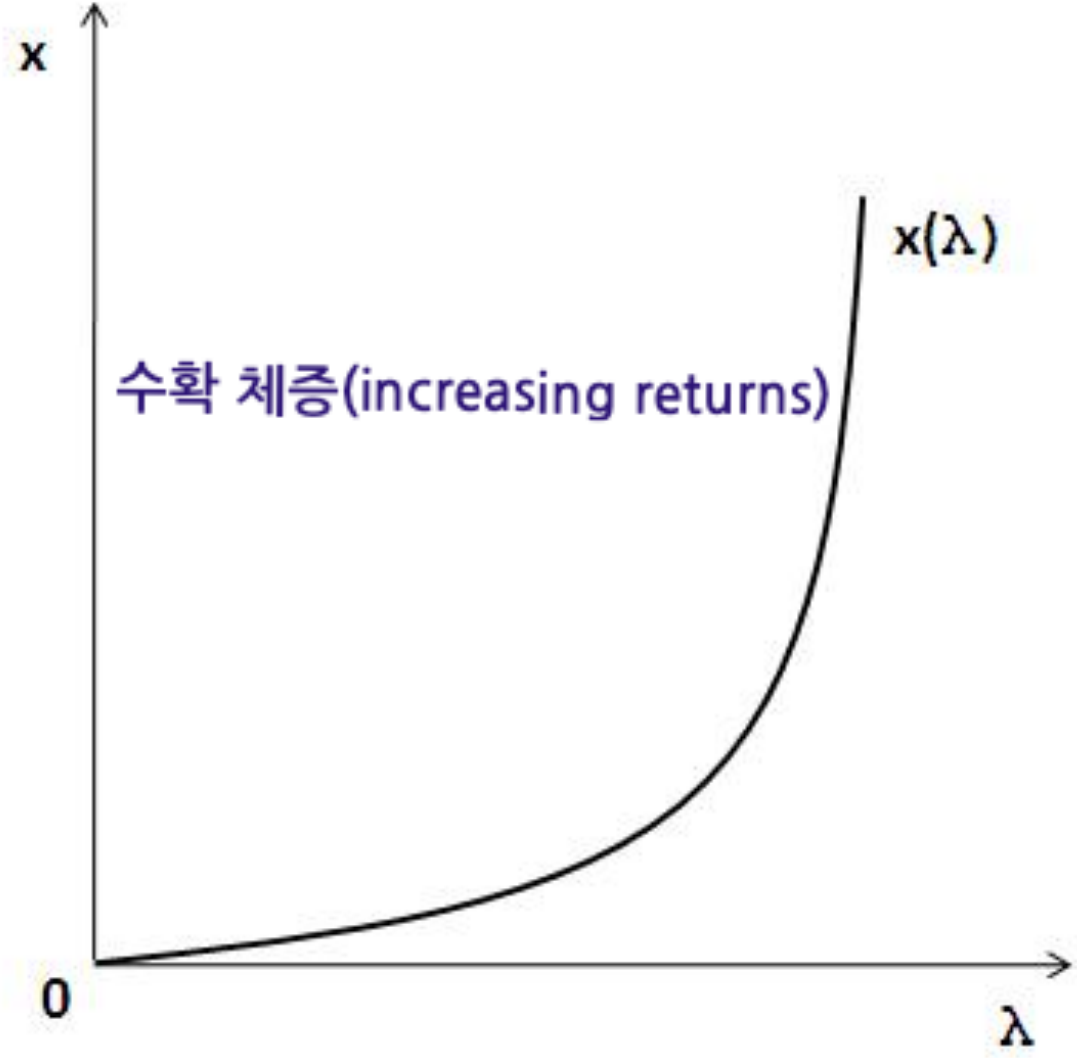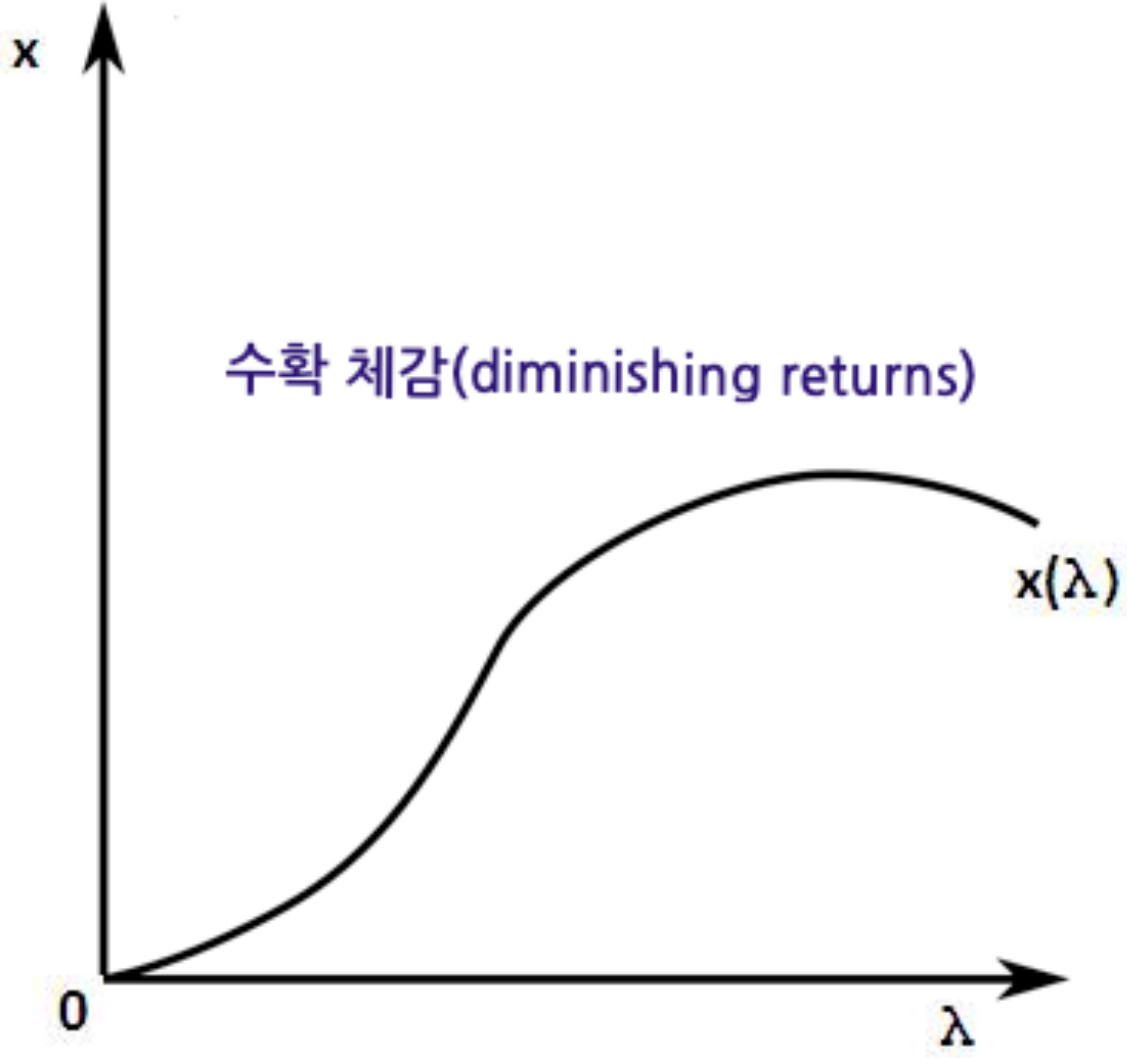## Increasing Returns and the New World of Business

by W. Brian Arthur
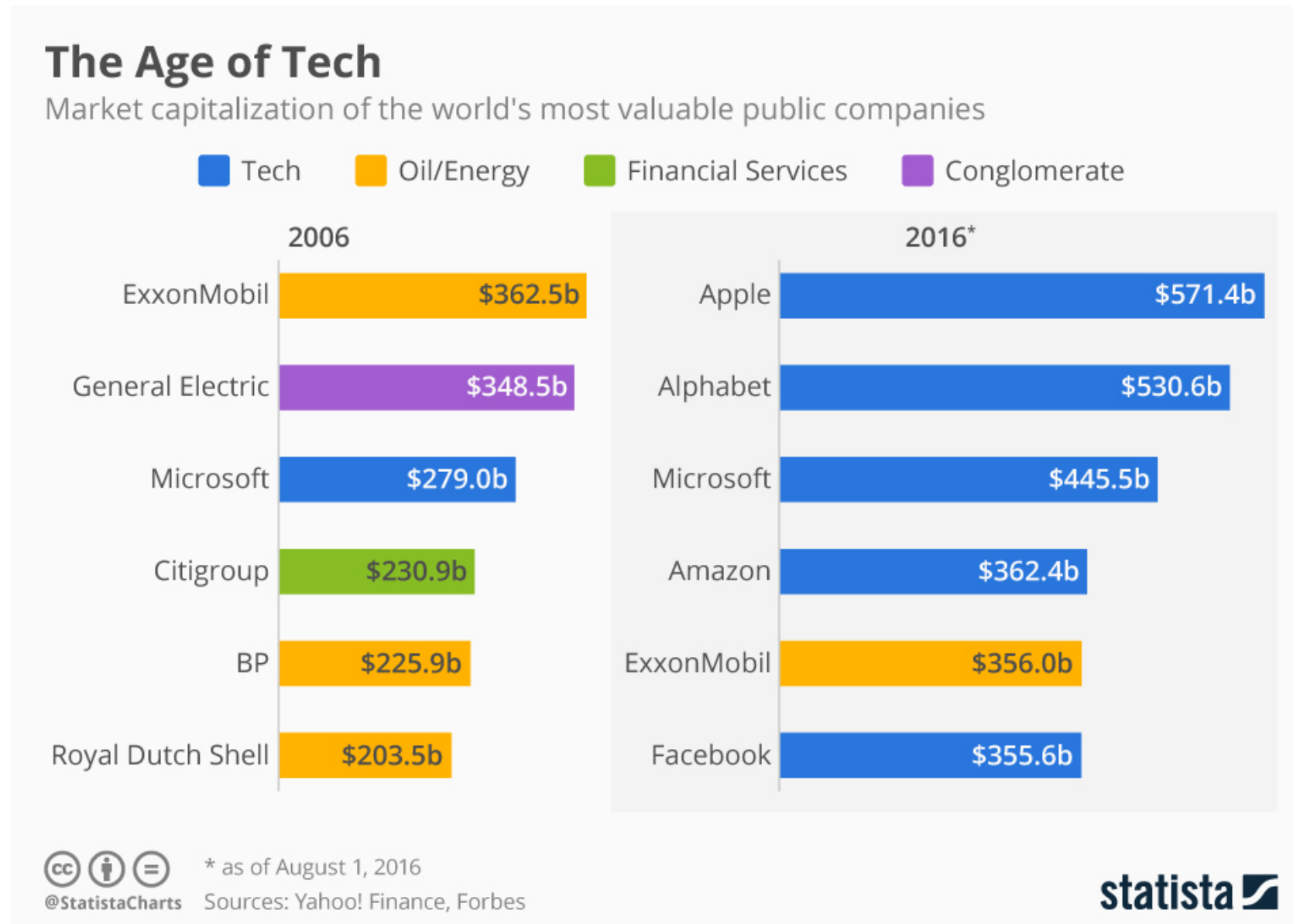
FROM THE JULY–AUGUST 1996 ISSUE

0     $8.95

Our understanding of how markets and businesses operate was passed down to us more than a century ago by a handful of European economists—Alfred Marshall in England and a few of his contemporaries on the continent. It is an understanding based squarely upon the assumption of diminishing returns: products or companies that get ahead in a market eventually run into limitations, so that a predictable equilibrium of prices and market shares is reached. The theory was roughly valid for the bulk-processing, smokestack economy of Marshall's day. And it still thrives in

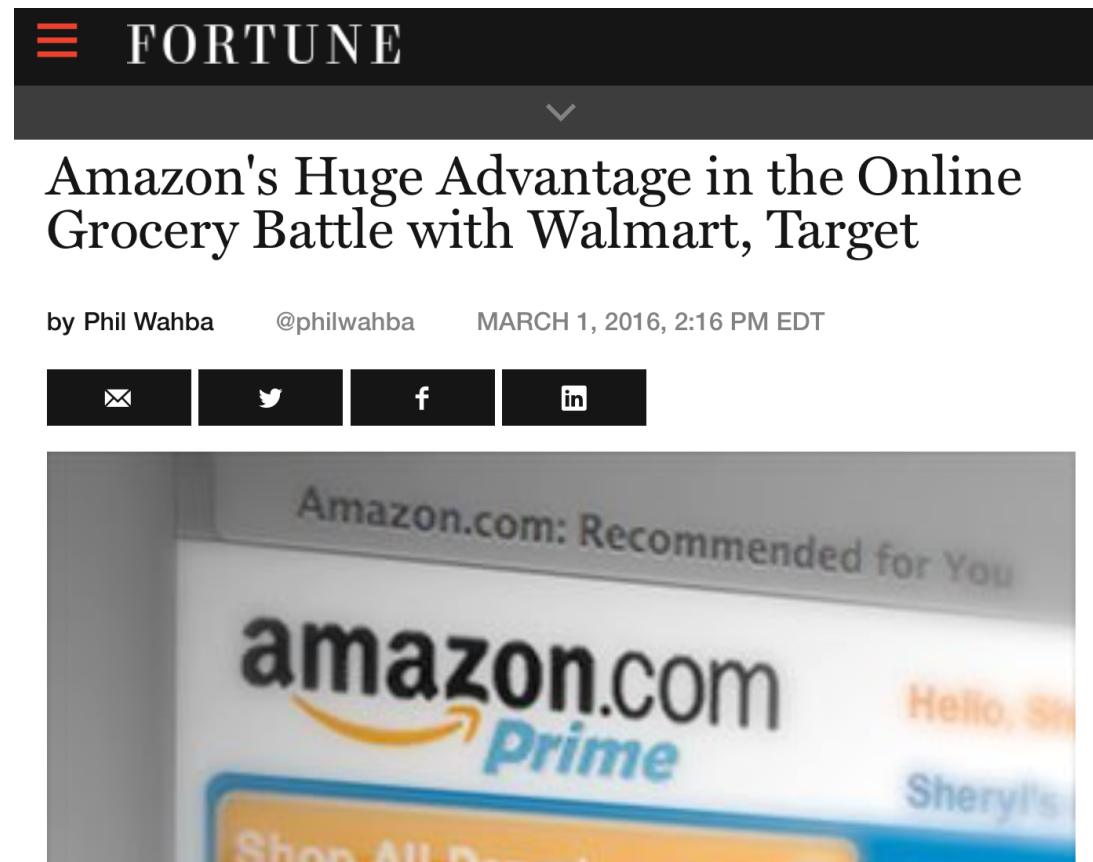# dimishing returns vs. increasing returns

수확 체감(diminishing returns)

$x(\lambda)$

수확 체증(increasing returns)

$x(\lambda)$

The Age of Tech

The Age of Tech
Market capitalization of the world's most valuable public companies

Tech ▪ Oil/Energy ▪ Financial Services ▪ Conglomerate

2006

Company	Value
ExxonMobil	$362.5b
General Electric	$348.5b
Microsoft	$279.0b
Citigroup	$230.9b
BP	$225.9b
Royal Dutch Shell	$203.5b

2016*

Company	Value
Apple	$571.4b
Alphabet	$530.6b
Microsoft	$445.5b
Amazon	$362.4b
ExxonMobil	$356.0b
Facebook	$355.6b

@StatistaCharts
* as of August 1, 2016
Sources: Yahoo! Finance, Forbes

statista

optimism?

AI?

Amazon Prime Now
"Ultra-fast FREE Delivery"
(for 2-hour delivery)

FORTUNE

Amazon's Huge Advantage in the Online Grocery Battle with Walmart, Target

by Phil Wahba   @philwahba   MARCH 1, 2016, 2:16 PM EDT

Deepmind

QUARTZ

THE NEW OIL

DeepMind's access to UK health data shows how tech could outgun privacy laws

By Joon Ian Wong | March 17, 2017

📷 The new data mine. (Reuters/Stefan Wermuth)

Google's artificial intelligence unit DeepMind engaged in "highly questionable" practices when it struck a 2015 deal to access years' worth of UK hospital patient records held by

WIRED NHS

NHS

DeepMind's Streams app is reportedly 'saving NHS nurses two hours a day'

The data-processing deal has proved controversial with privacy advocates
—

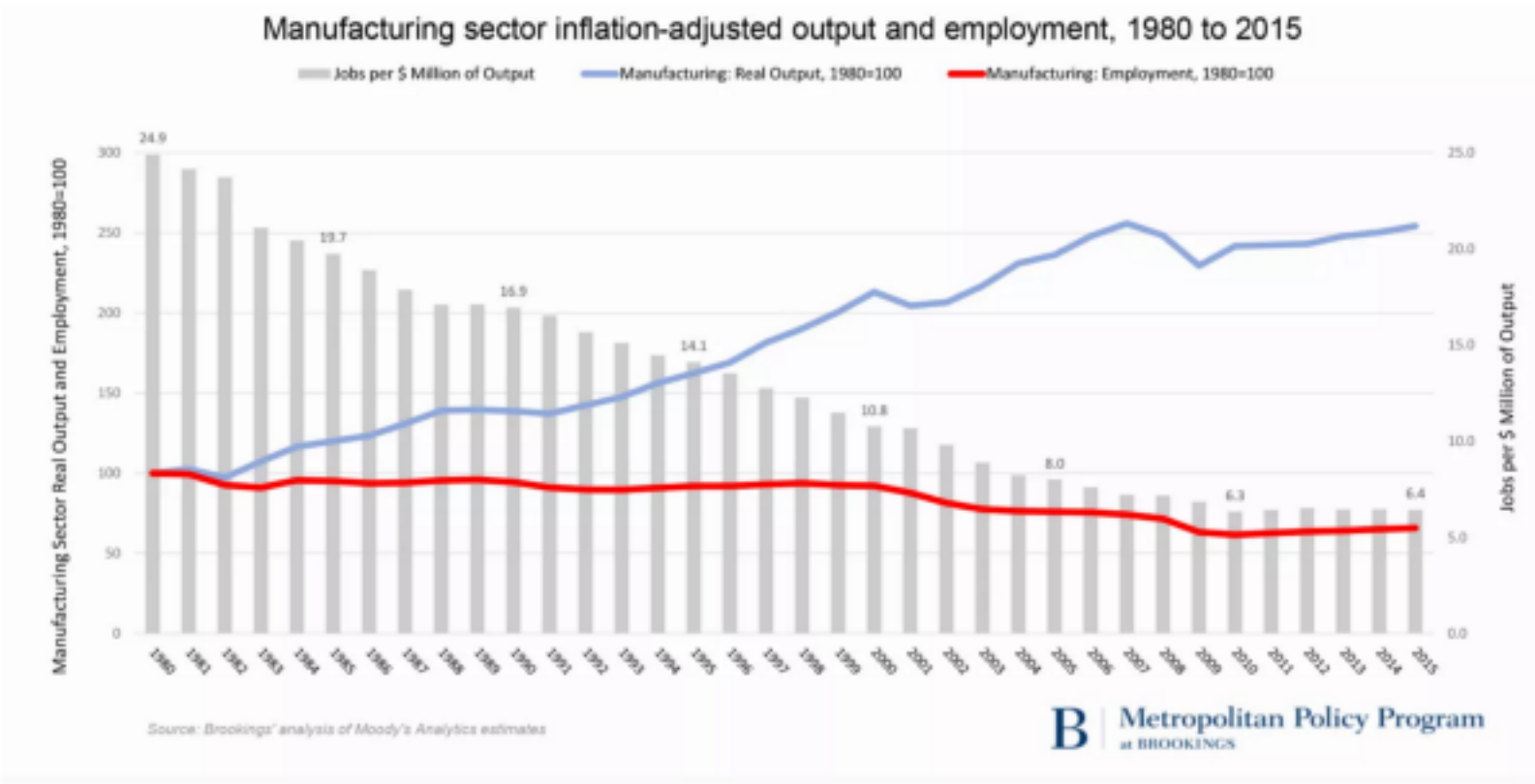*By* **MATT BURGESS**

27 Feb 2017

High Frequency Trading (HFT)
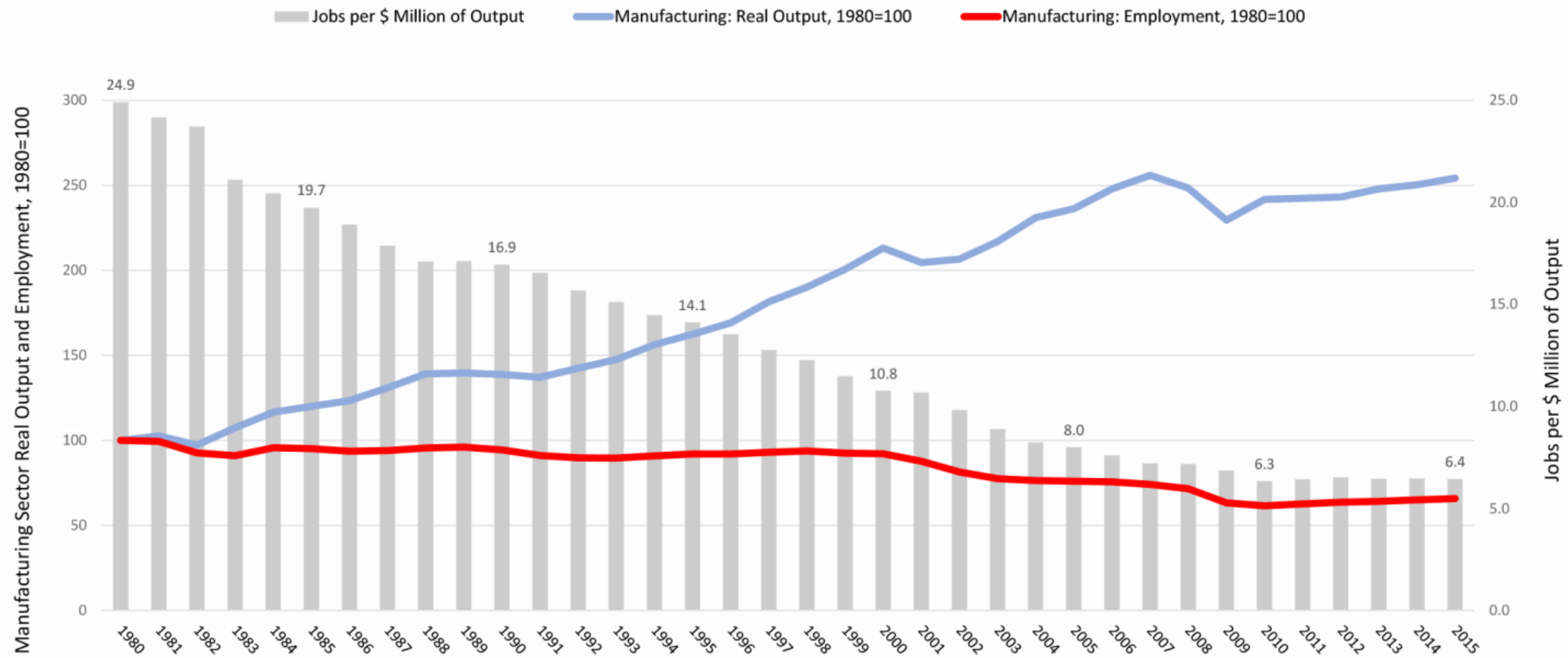
Law Intelligence

Automation?

improvement in efficiency

We need 1/4 as many jobs to manufacture $1m

Manufacturing sector inflation-adjusted output and employment, 1980 to 2015

Source: Brookings' analysis of Moody's Analytics estimates

B | Metropolitan Policy Program at BROOKINGS

Manufacturing sector inflation-adjusted output and employment, 1980 to 2015

순위	직업	Job Title	위험성	종사자 수
1	텔레마케터	Telephone salesperson	99.0%	43,000
2	(컴퓨터)입력 요원	Typist or related keyboard worker	98.5%	51,000
3	법률비서	Legal secretaries	98.0%	44,000
4	경리	Financial accounts manager	97.6%	132,000
5	분류업무	Weigher, grader or sorter	97.6%	22,000
6	검표원	Routine inspector and tester	97.6%	63,000
7	판매원	Sales administrator	97.2%	70,000
8	회계 관리자	Book-keeper, payroll manager or wa	97.0%	436,000
9	회계사	Finance officer	97.0%	35,000
10	보험사	Pensions and insurance clerk	97.0%	77,000
11	은행원	Bank or post office clerk	96.8%	146,000
12	기타 회계 관리자	Financial administrative worker (oth	96.8%	175,000
13	NGO 사무직	Non-governmental organisation (NG	96.8%	60,000
14	지역 공무원	Local government administrative w	96.8%	147,000
15	도서관 사서 **보조**	Library clerk	96.7%	26,000
			총 종사자 수	1,527,000

self driving car?

electric car?

Figure 2 ● Evolution of battery energy density and cost
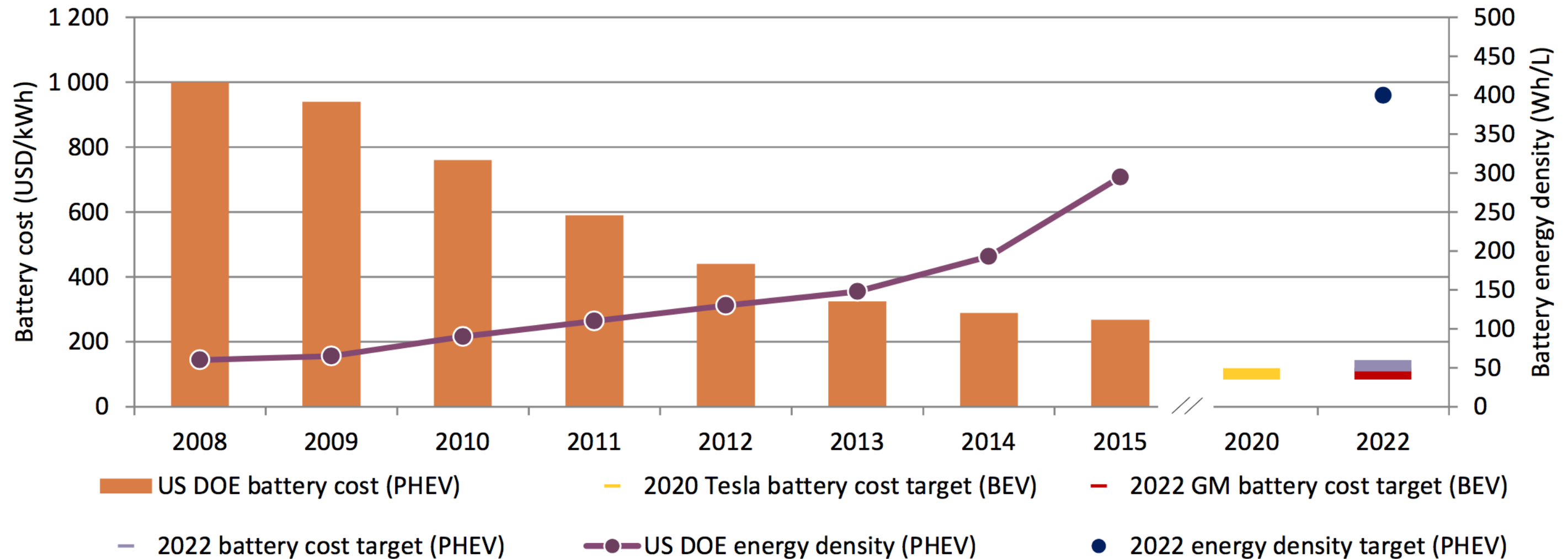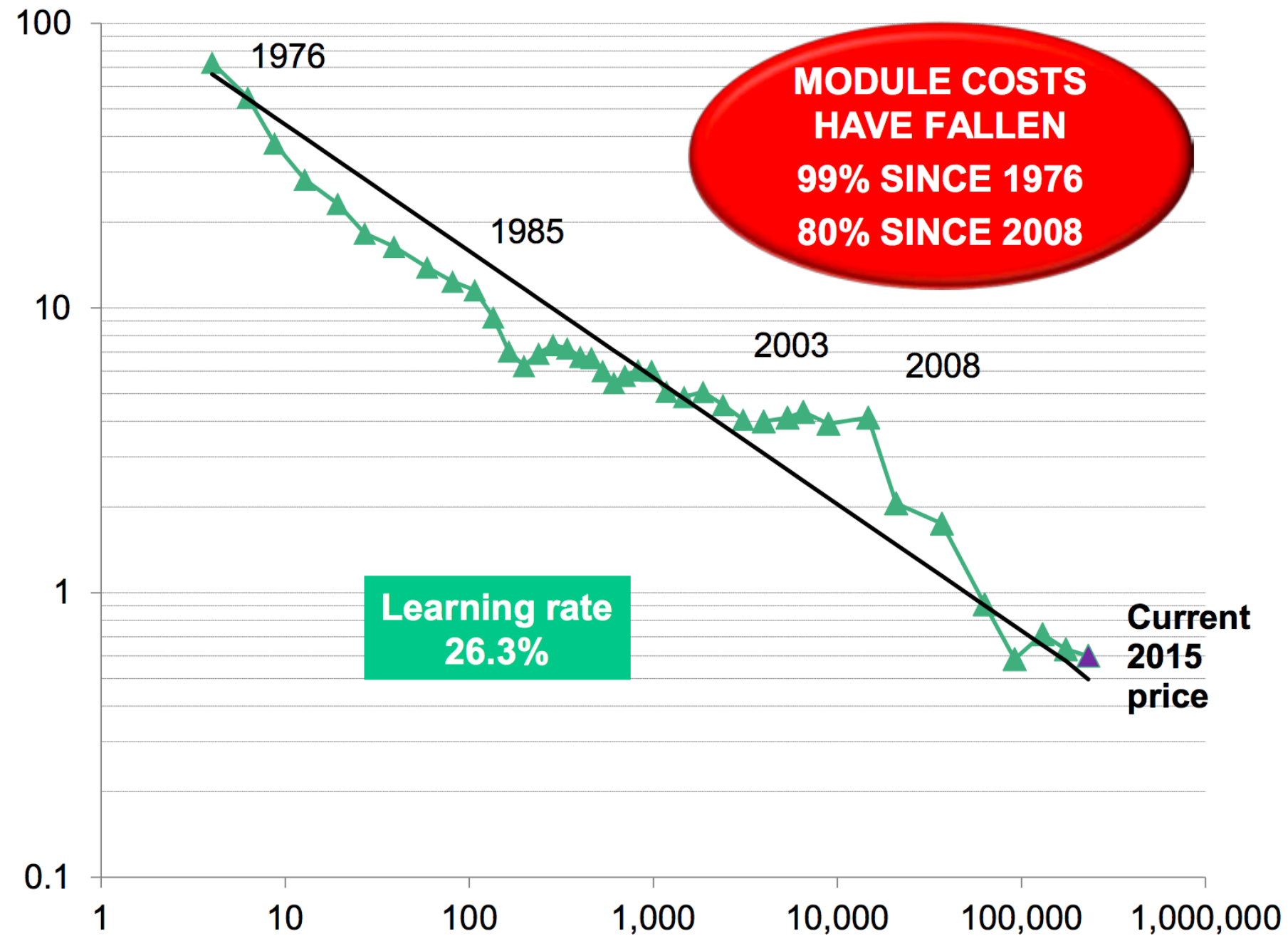

Notes: USD/kWh = United States dollars per kilowatt-hour; Wh/L = watt-hours per litre. PHEV battery cost and energy density data shown here are based on an observed industry-wide trend, include useful energy only, refer to battery packs and suppose an annual battery production of 100 000 units for each manufacturer.

Sources: US DOE (2015 and 2016) for PHEV battery cost and energy density estimates; EV Obsession (2015); and HybridCARS (2015).

The Beautiful Math of Solar Power

Every time the world's solar power doubles, the cost of panels falls 26%

MODULE COSTS HAVE FALLEN 99% SINCE 1976 80% SINCE 2008

Learning rate 26.3%

1976
1985
2003
2008
Current 2015 price

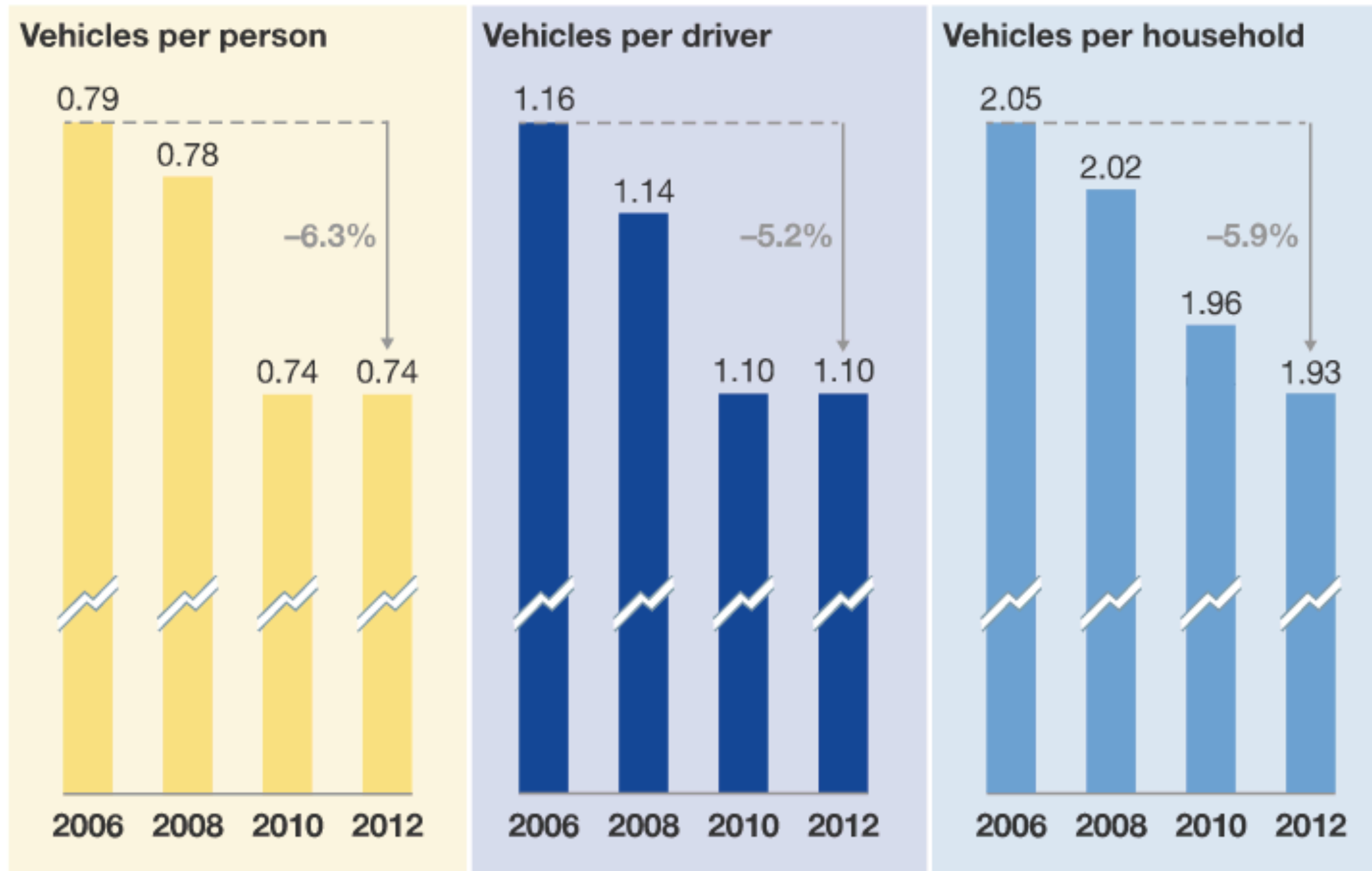# self driving = 사고율 0

The Third Transportation Revolution

Car = a parking machine.

The average vehicle is

used only *4%* of the time

and parked the other *96%*.

In the United States, vehicle ownership rates are declining.

Vehicles per person

0.79
0.78
−6.3%
0.74 0.74

2006 2008 2010 2012

Vehicles per driver

1.16
1.14
−5.2%
1.10 1.10

2006 2008 2010 2012

Vehicles per household

2.05
2.02
−5.9%
1.96
1.93

2006 2008 2010 2012

Urban Reimagination!

negative effects?

inequality
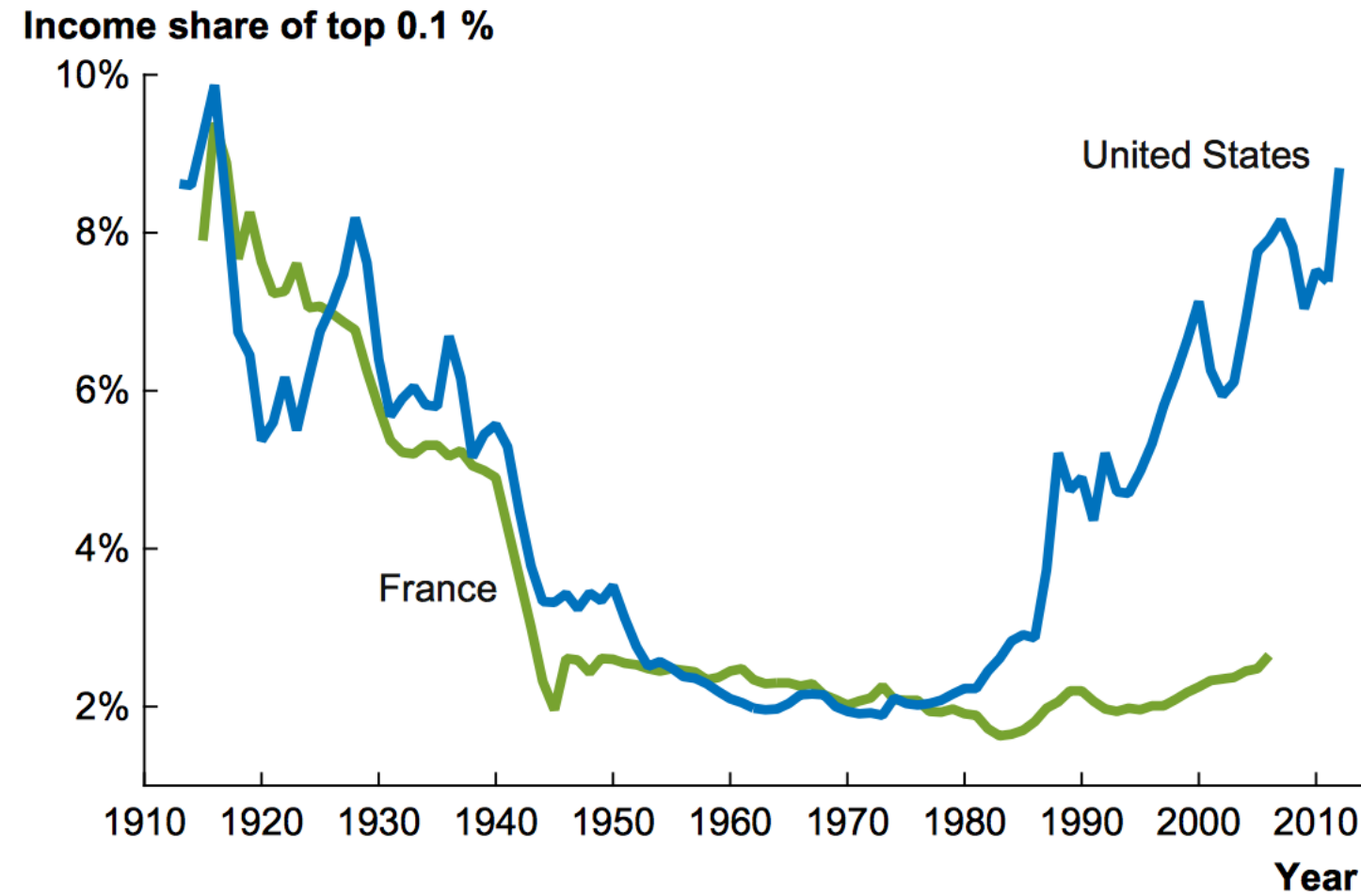
Fig. 18 Top income inequality in the United States and France. Source: *Alvaredo, F., Atkinson, A.B., Piketty, T., Saez, E. 2013. The World Top Incomes Database. Accessed on October 15, 2013,* http://topincomes.g-mond.parisschoolofeconomics.eu/.
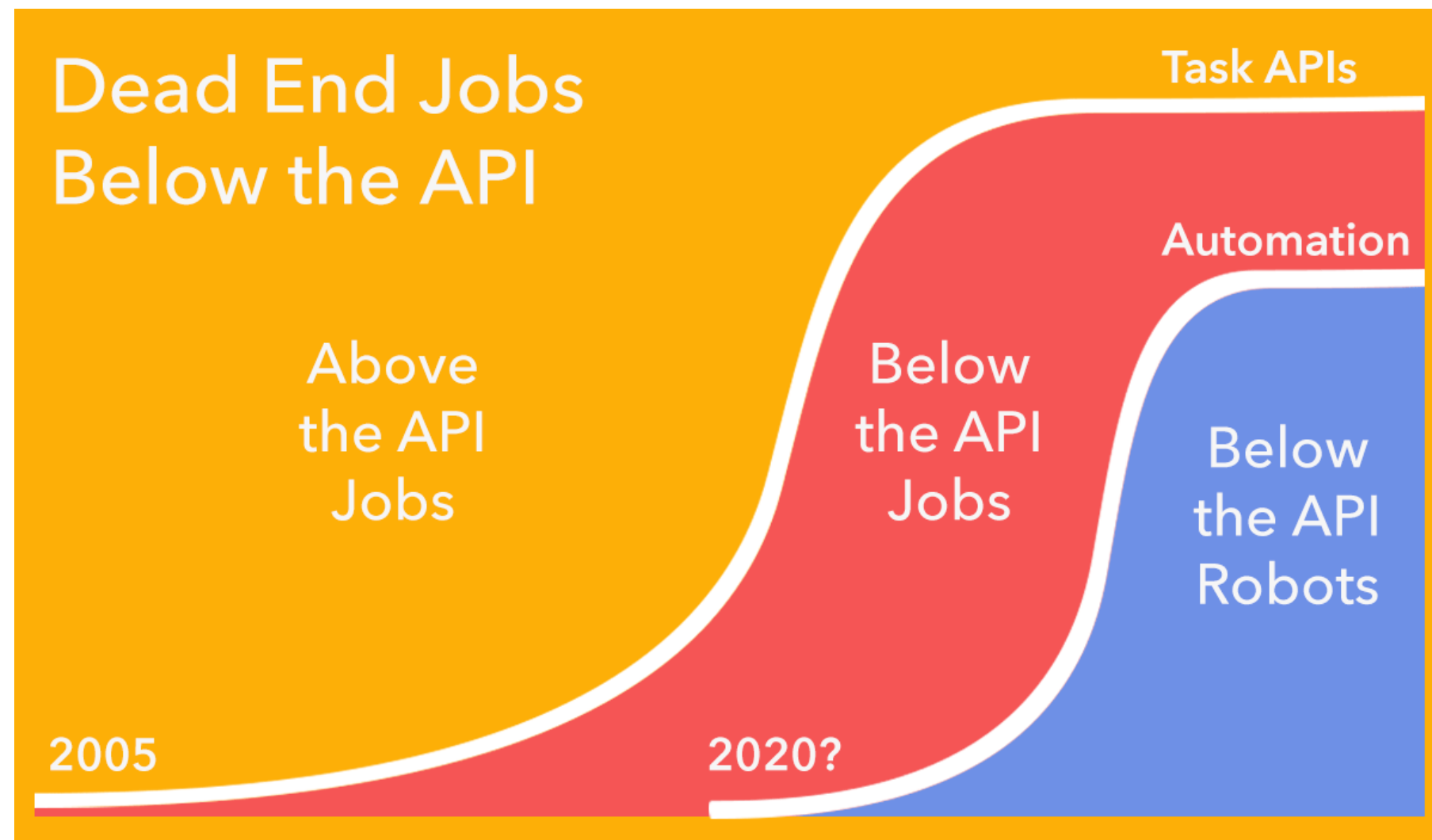
Elephant curve by Milanovic

Figure 4. Change in real income between 1988 and 2008 at various percentiles of global income distribution (calculated in 2005 international dollars)
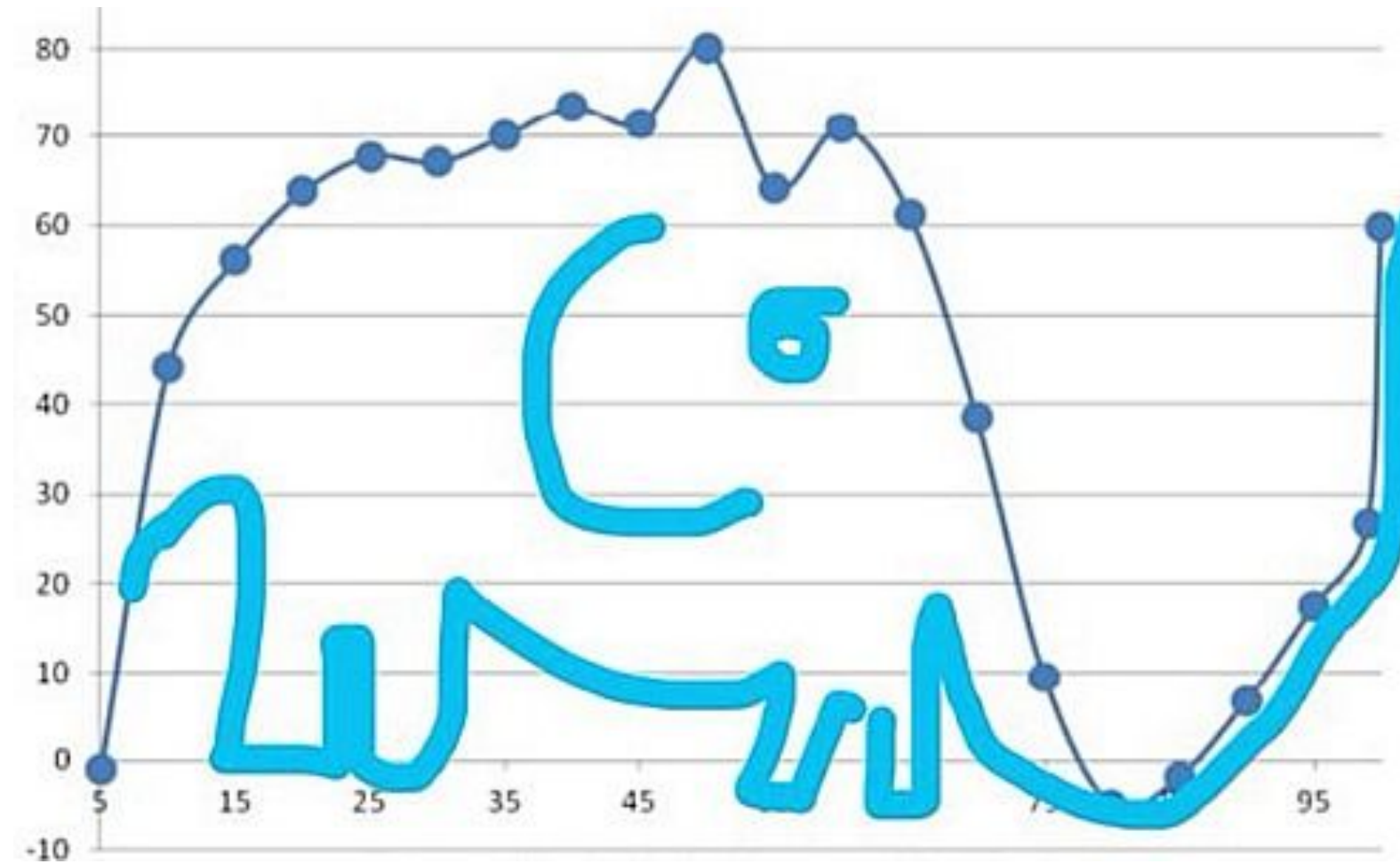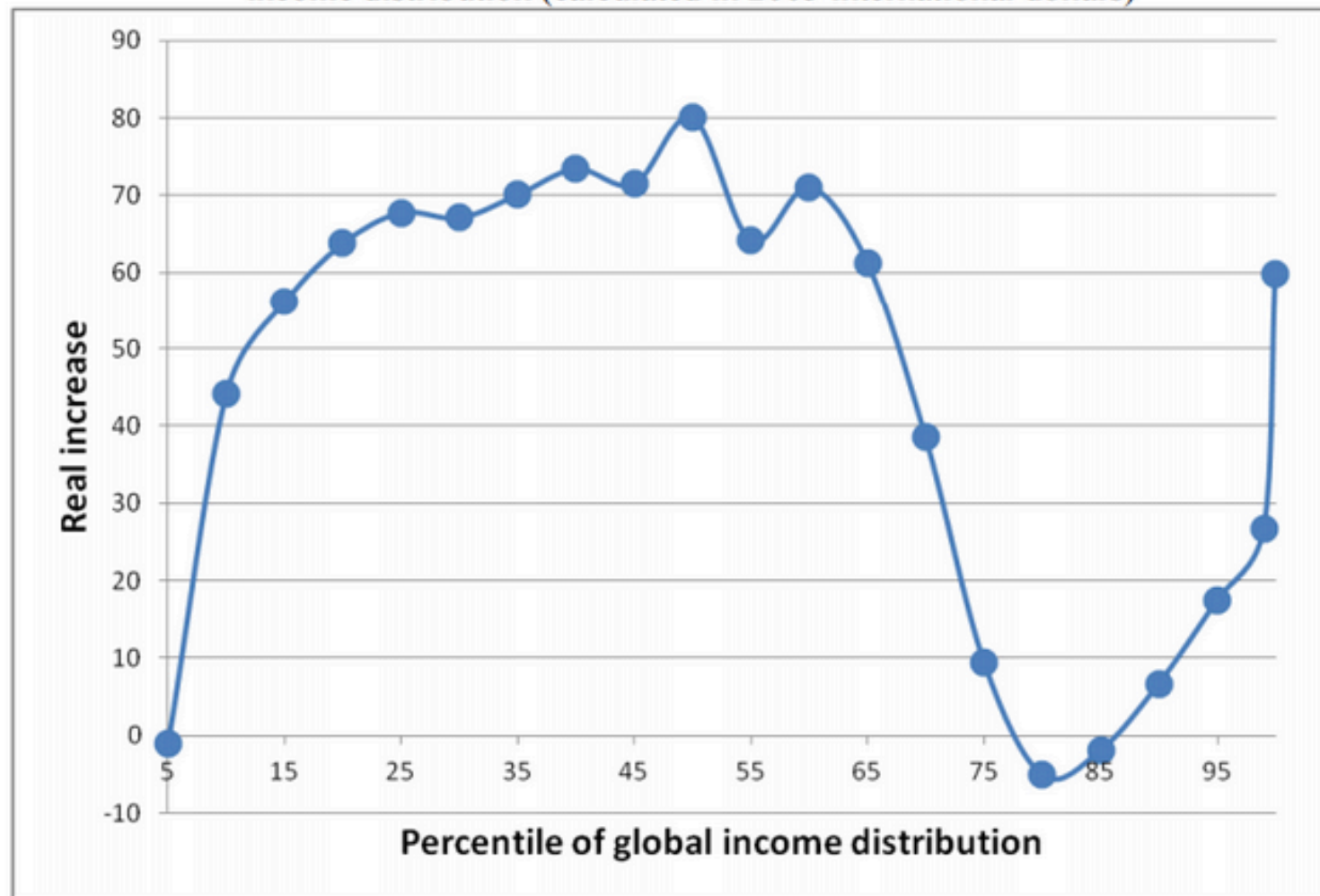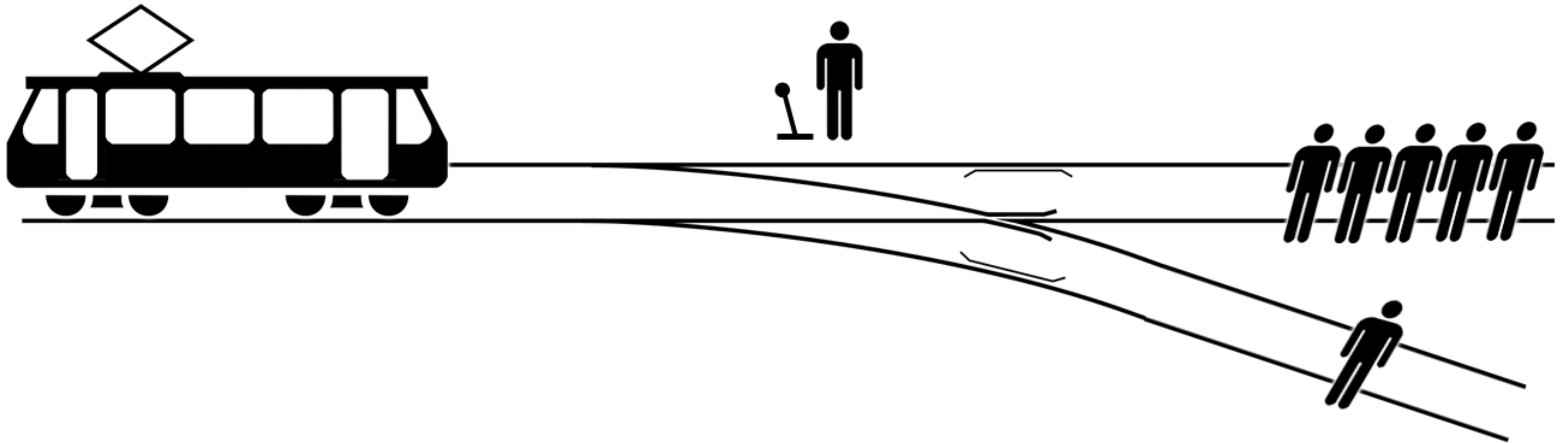
Workers for Algorithms
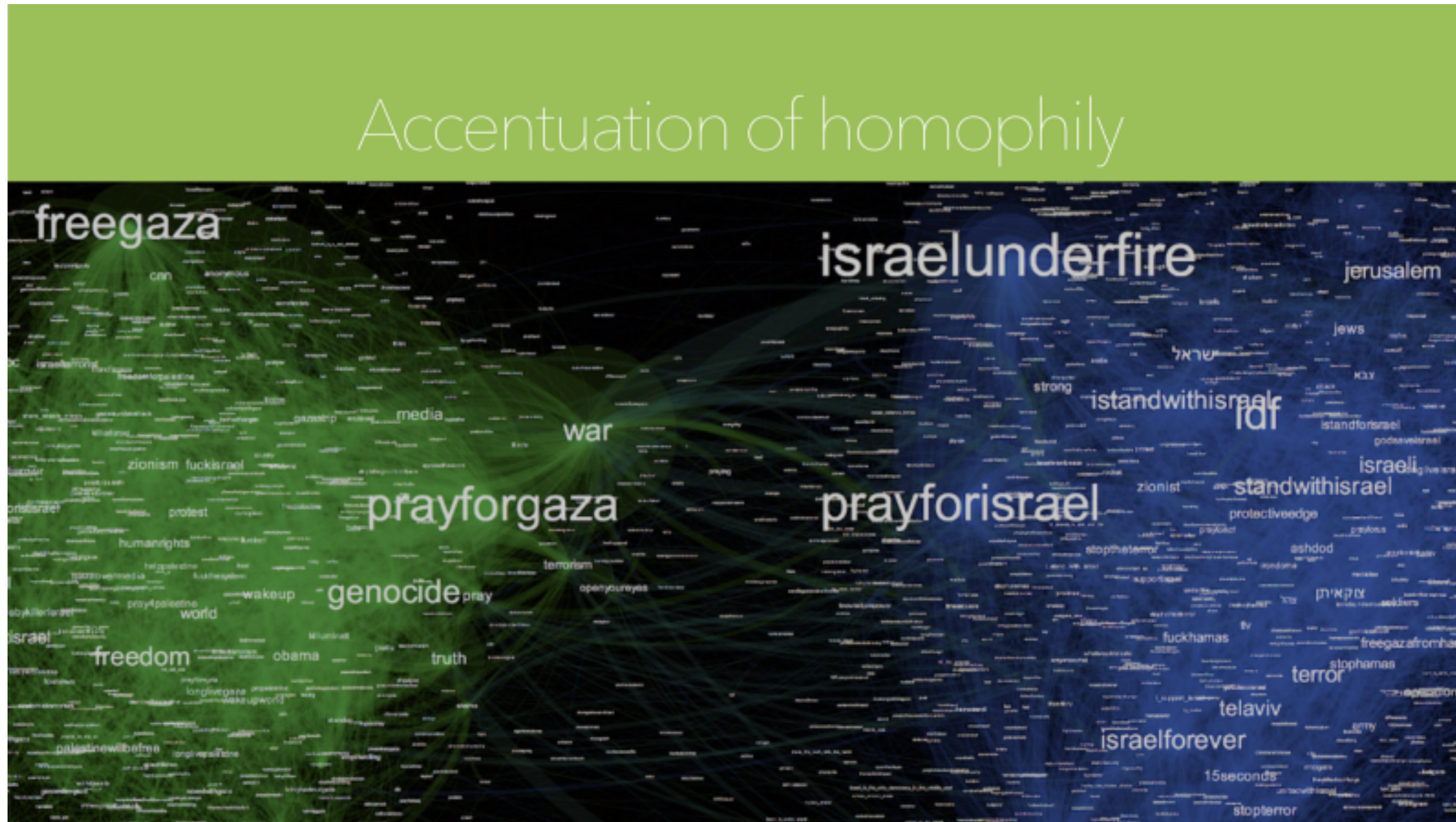
Peter Reinhard: API 위/아래 노동

trolley problem
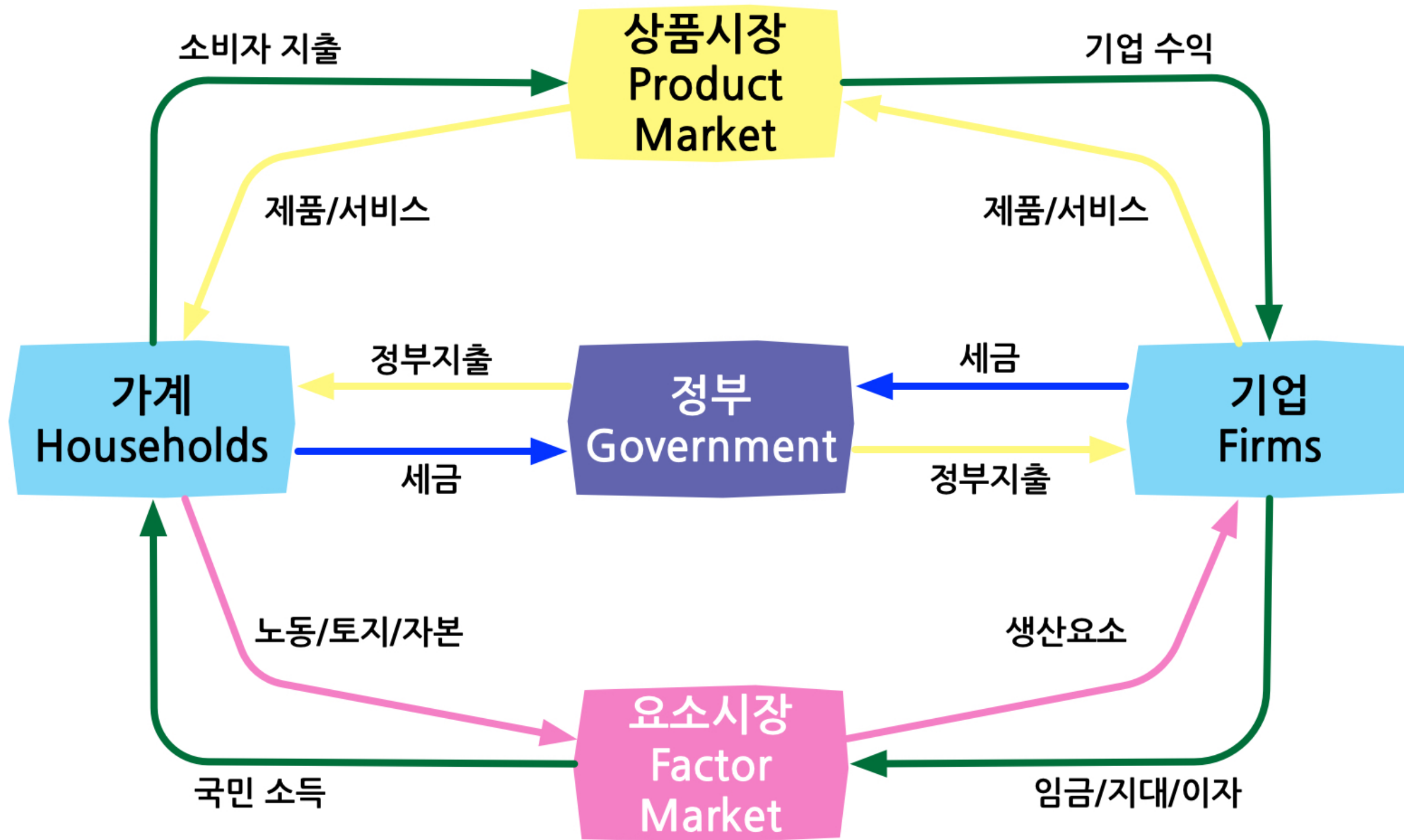
filter bubble

일자리 축소

= 소득세 축소

= 국가 재정 축소

그림: 강정수

상품시장
Product
Market

소비자 지출?

기업 수익?

제품/서비스?

제품/서비스?

가계
Households

정부
Government

기업
Firms

정부지출?

세금?

세금?

정부지출?

토지/자본

생산요소

요소시장
Factor
Market

국민 소득

지대/이자
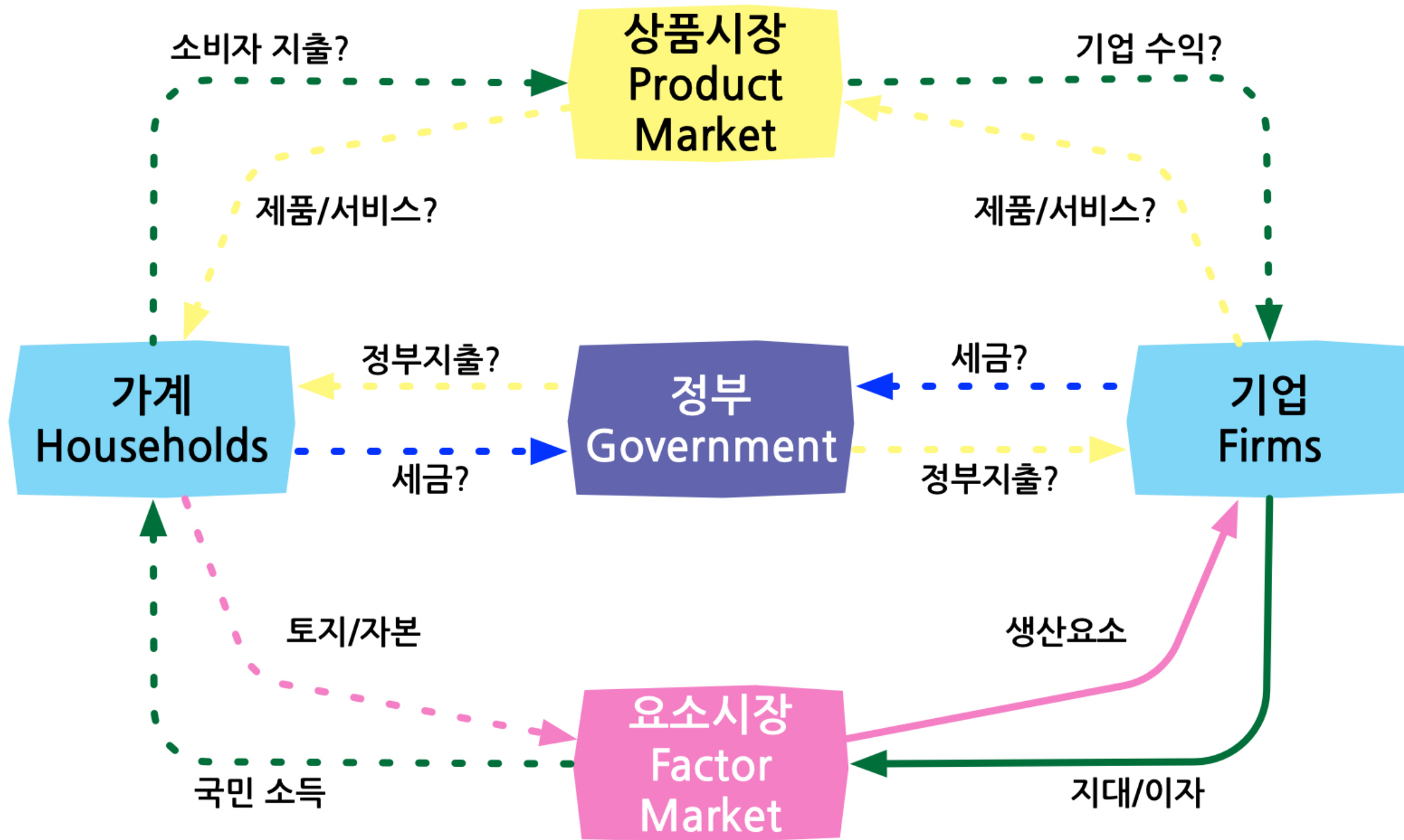
그림: 강정수

declining labor share

Distribution of the labor force by sector, 1840-2010
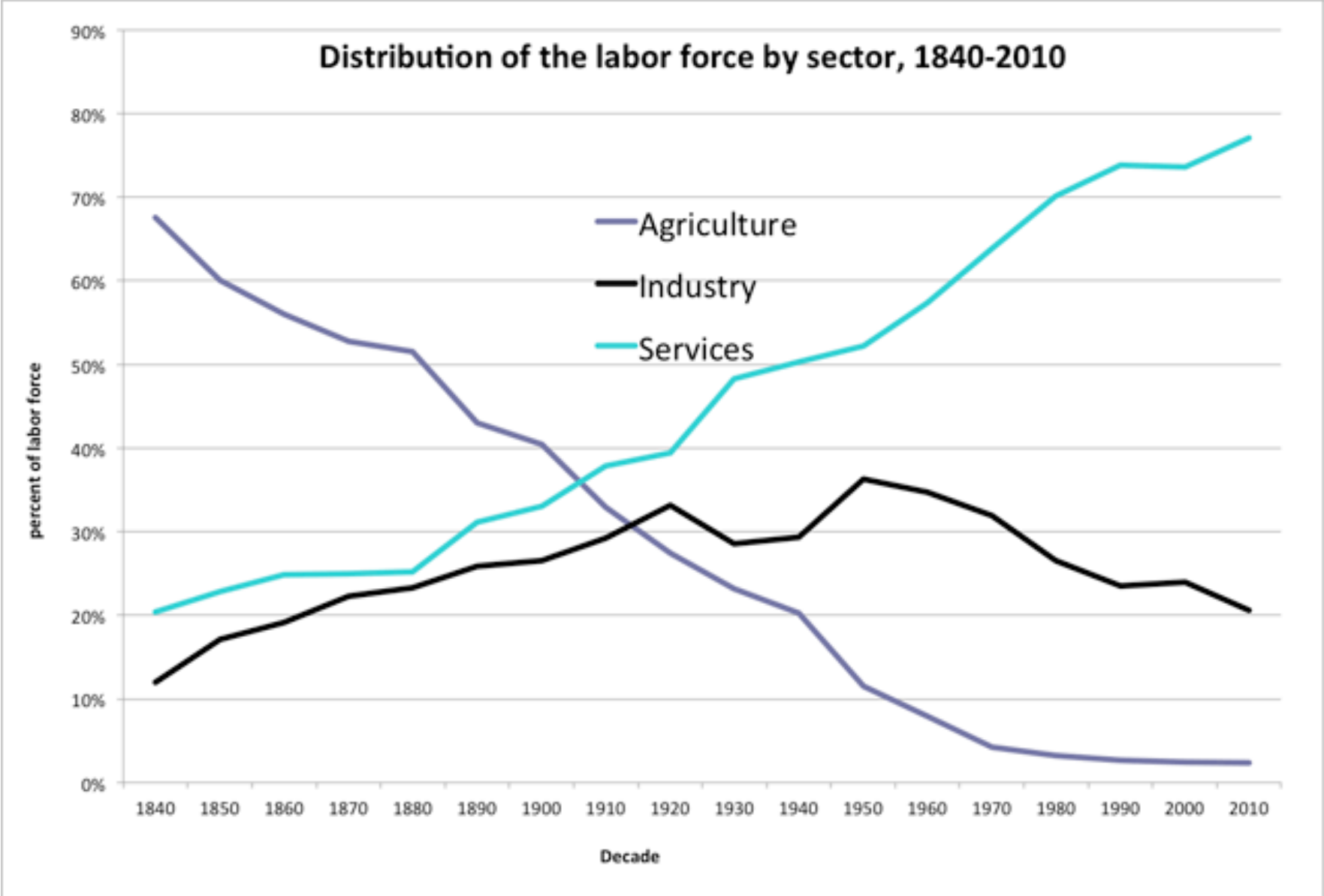
optimism?

Technology Gap

AI Gap

Knowledge Gap

optimism?

Janus-faced progress!

조건없는 기본 소득

Adjustment Cost

The Great Transformation

Karl Polany

1944

Capitalism arrived unannounced.

No one had forecast

the development of a machine industry.

It came as a complete surprise.