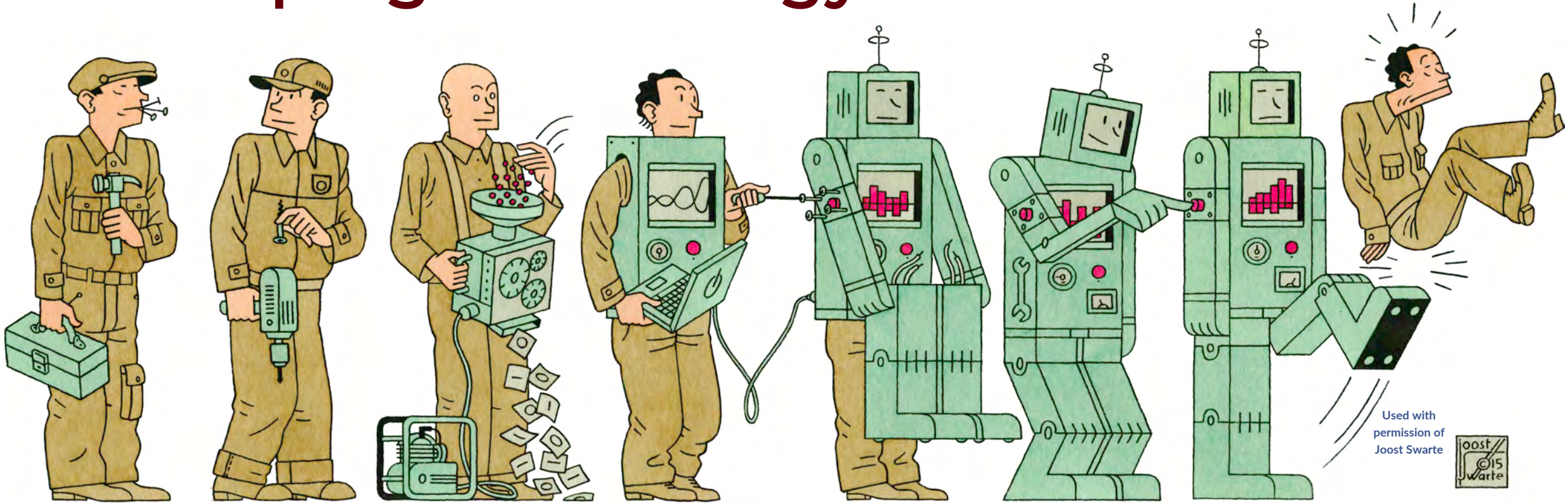


The Work of the Future: Shaping Technology and Institutions



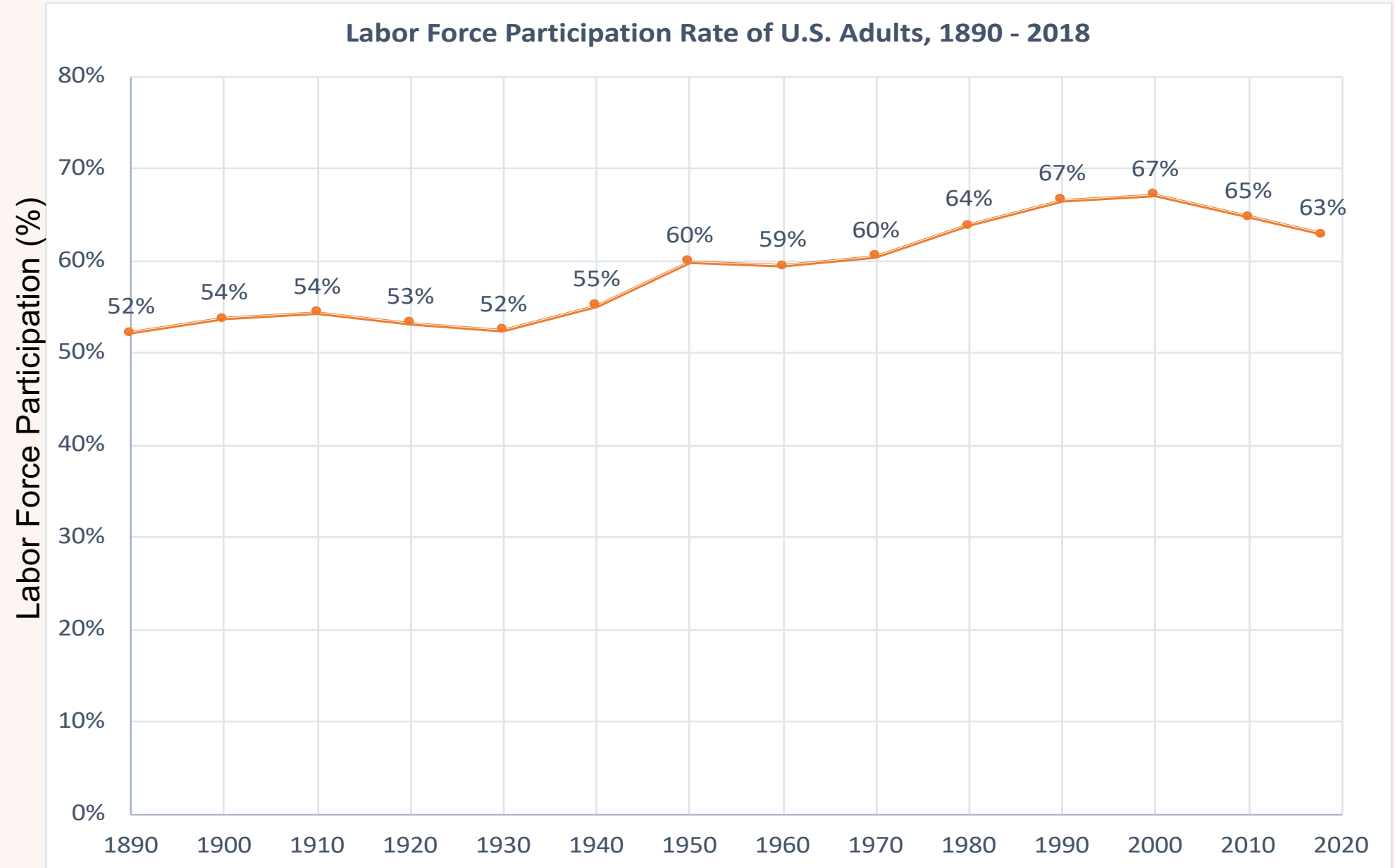
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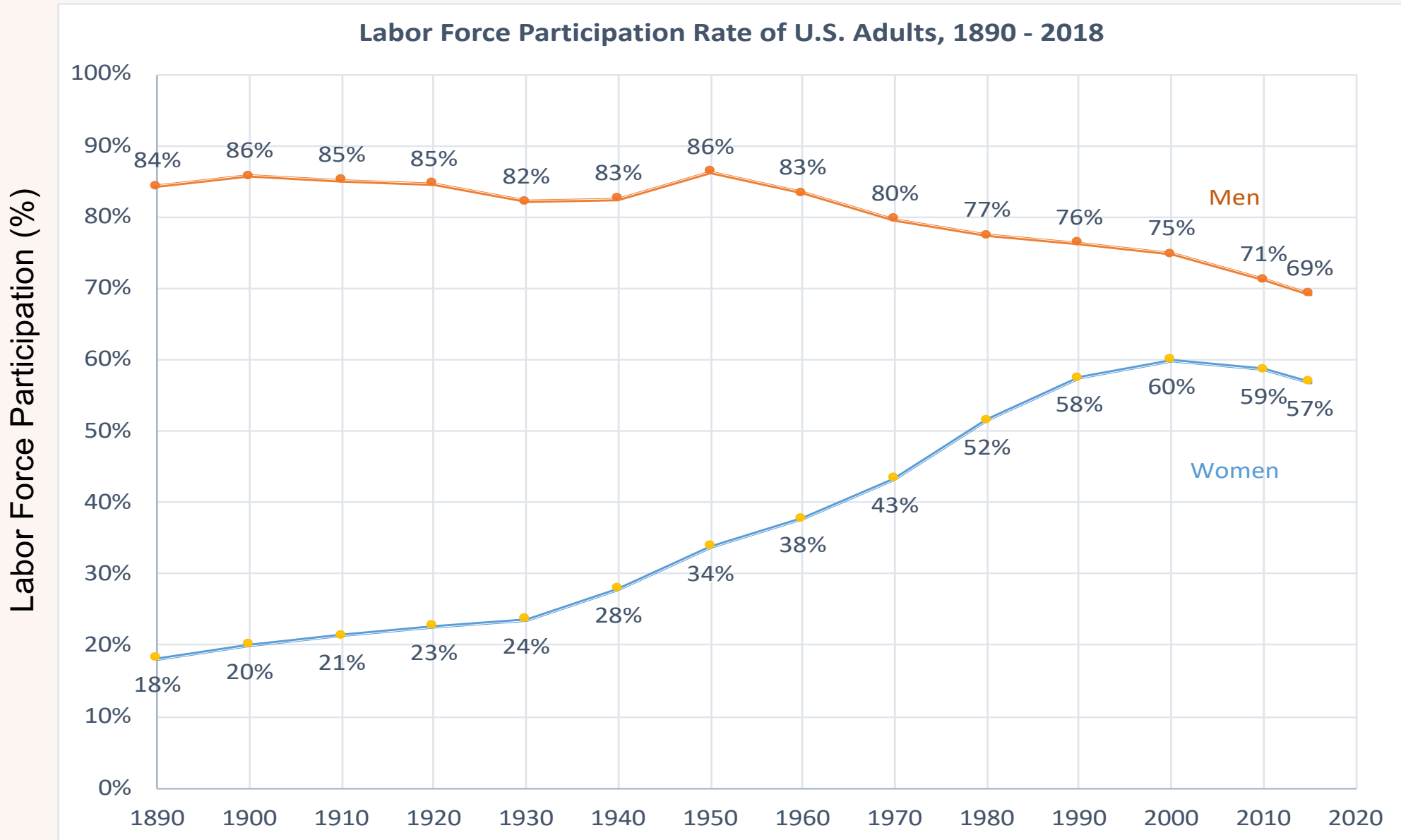
David Autor, Ford Professor of Economics, MIT
UBS Center for Economics in Society
Università della Svizzera italiana. November 27, 2019



Labor Force Participation of U.S. Adults Has Risen in All but Two Decades of the Last 130 Years



This Rise Reflects Two Offsetting Forces: Rising Female, and Declining Male Labor Force Participation



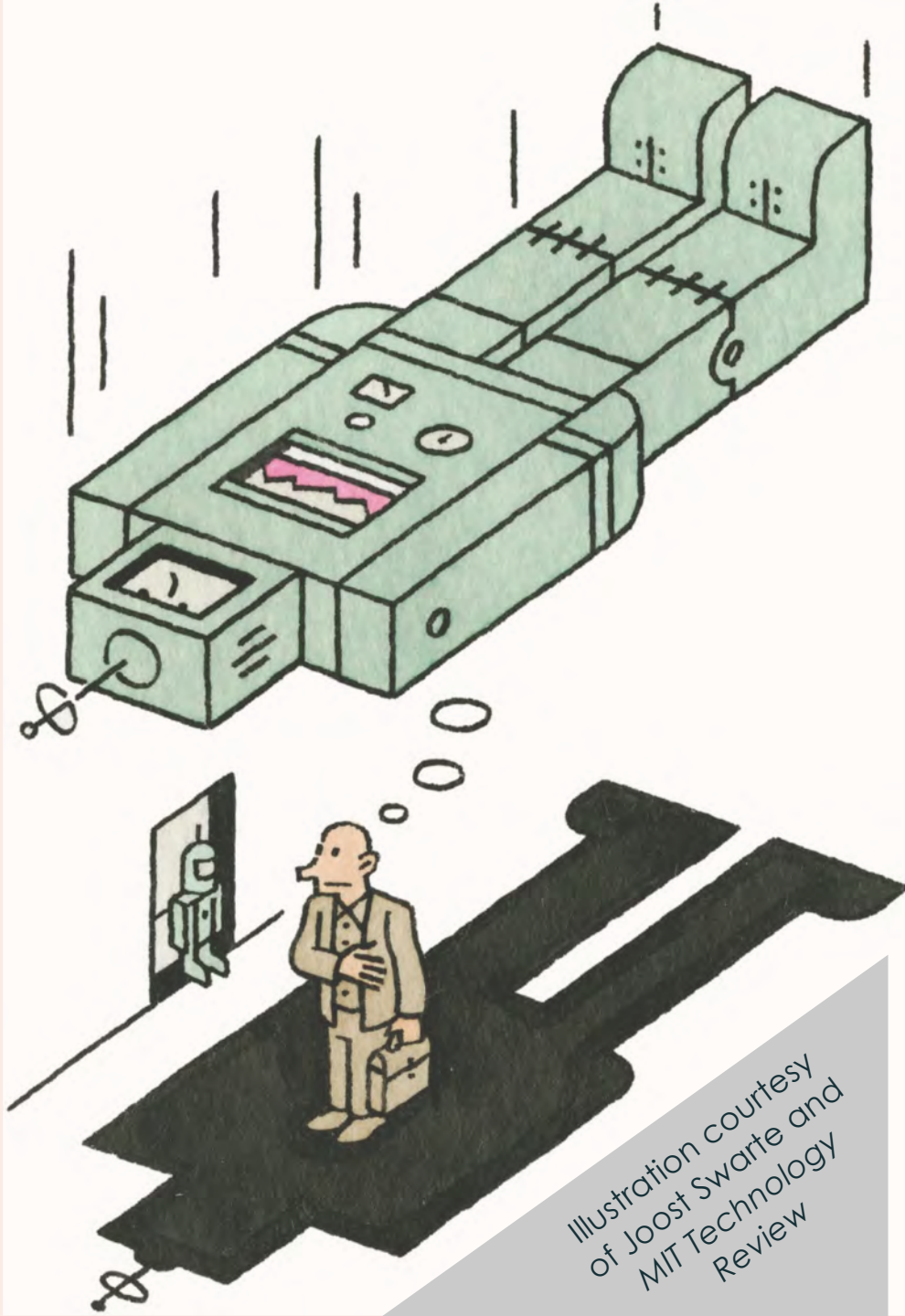


Illustration courtesy
of Joost Swarte and
MIT Technology
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Agenda

1. Why are there *still* so many jobs?
2. The emergence of new work
3. What *should* we worry about?
4. Shaping the future of work

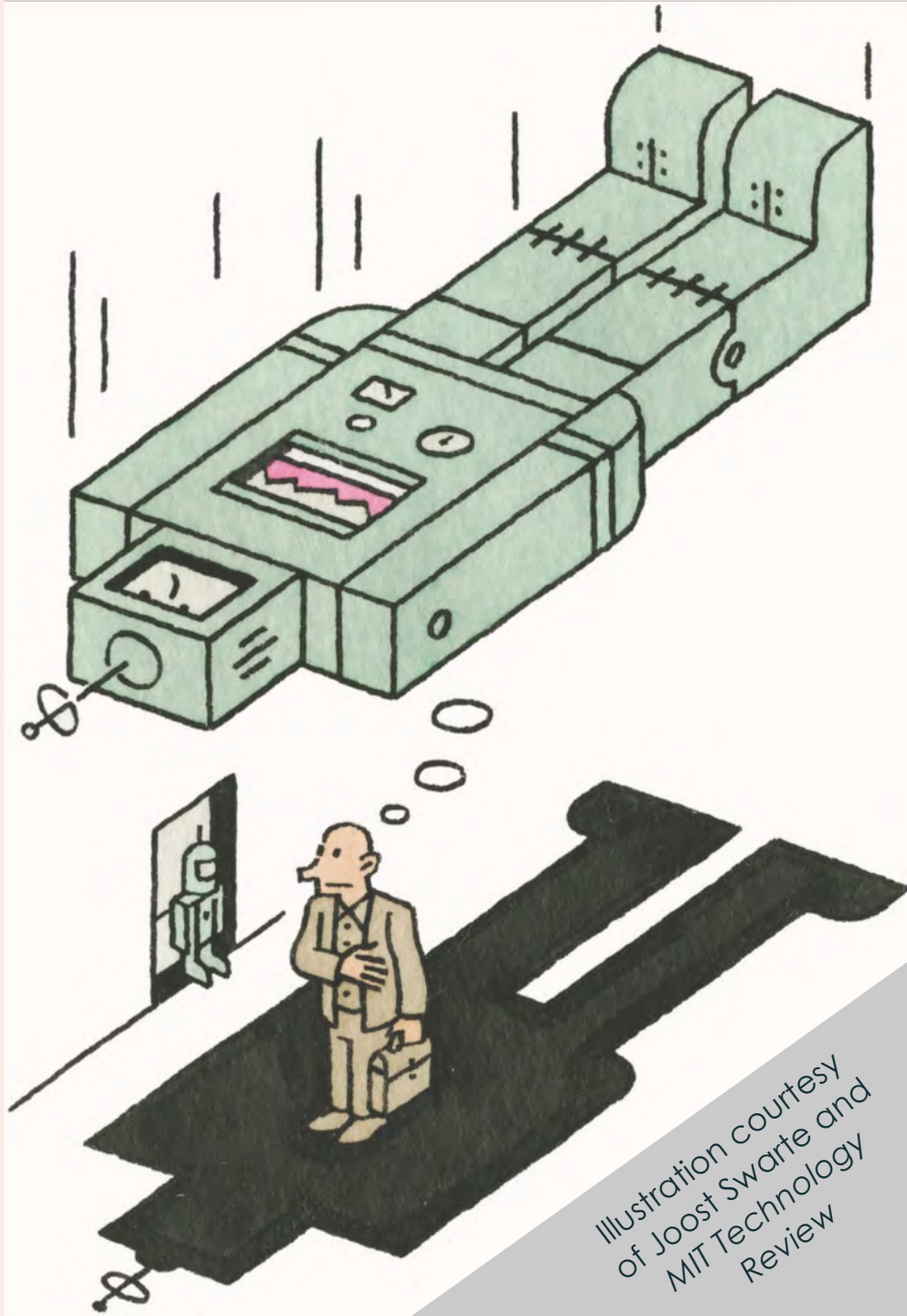
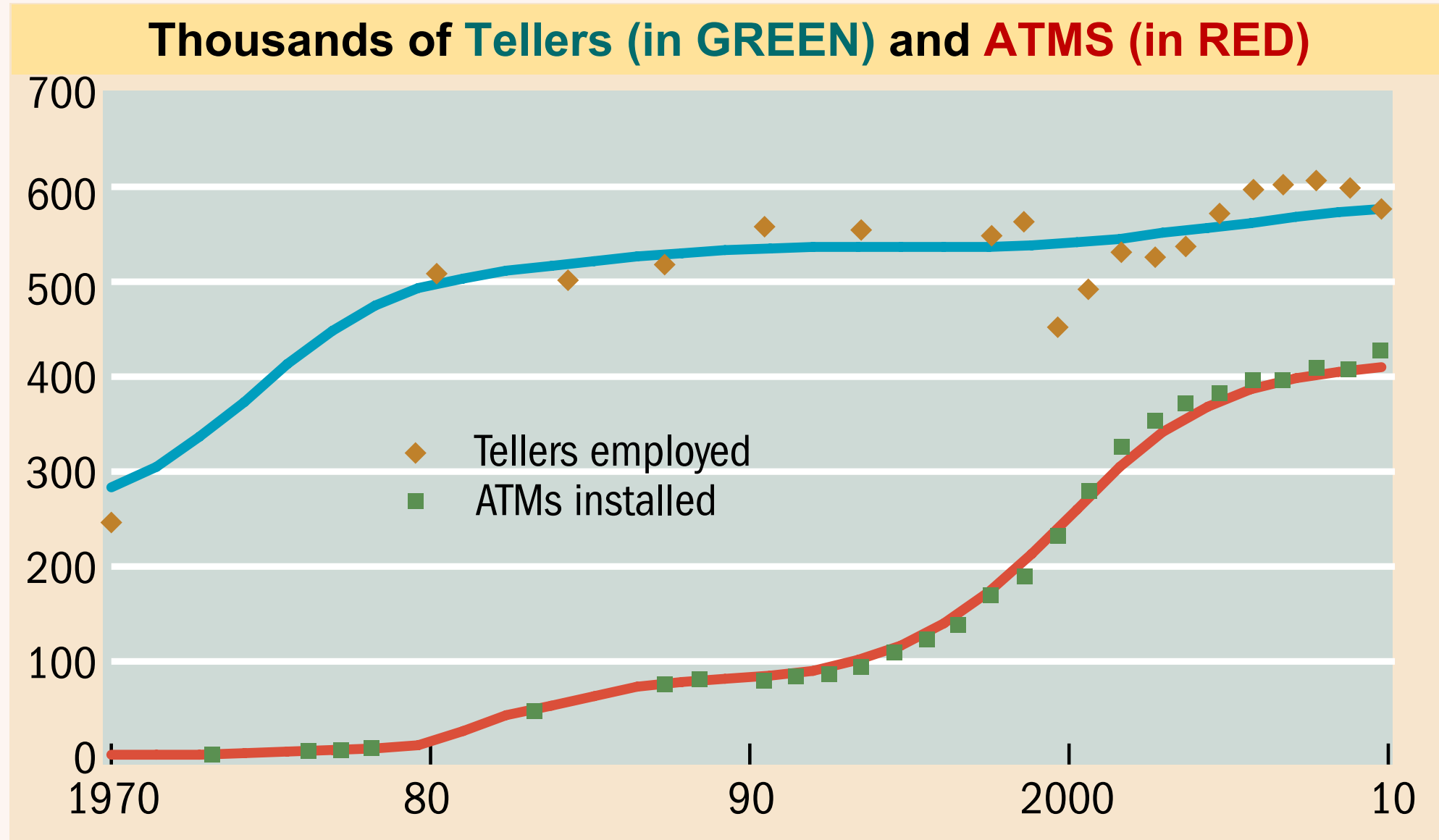


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Why are there still so many jobs? Part I. Complementarity

Bank Tellers Employment **Rose** as ATMS Rolled Out



Source: James Bessen, 2015

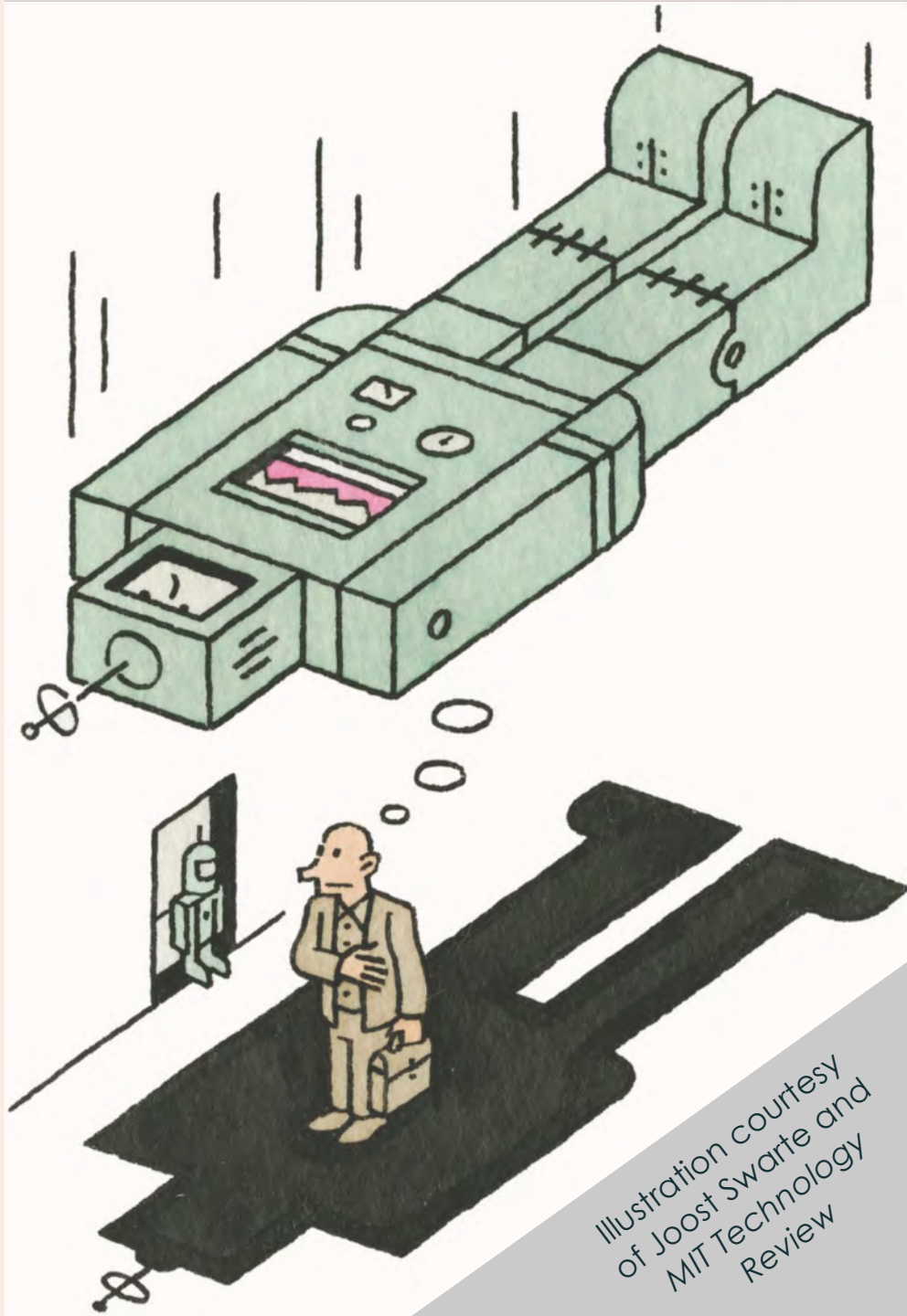
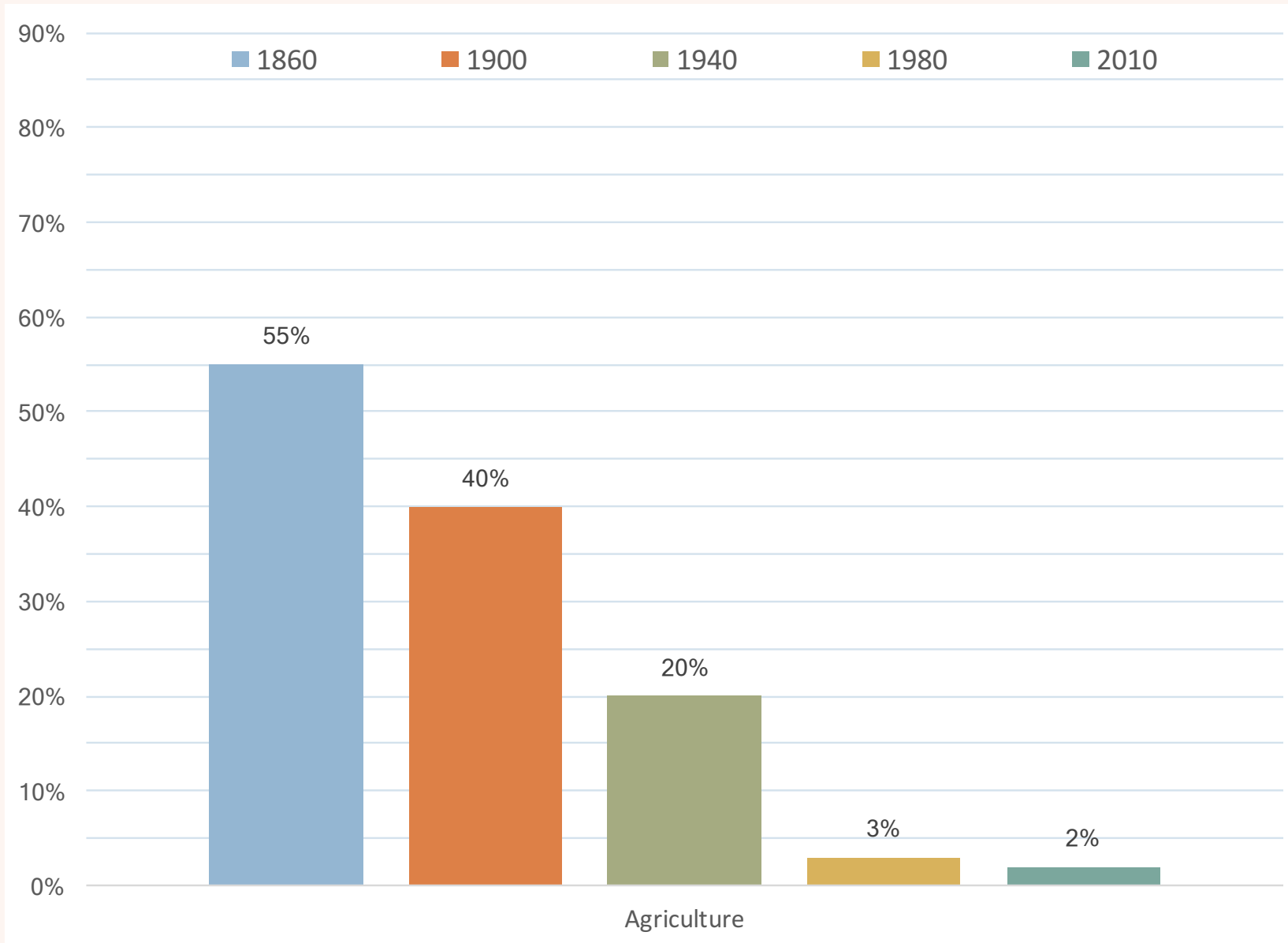


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Why are there still so many jobs?

Part 2. Insatiability

Harvesting Productivity: Falling U.S. Agricultural Employment Share, 1860 – 2010



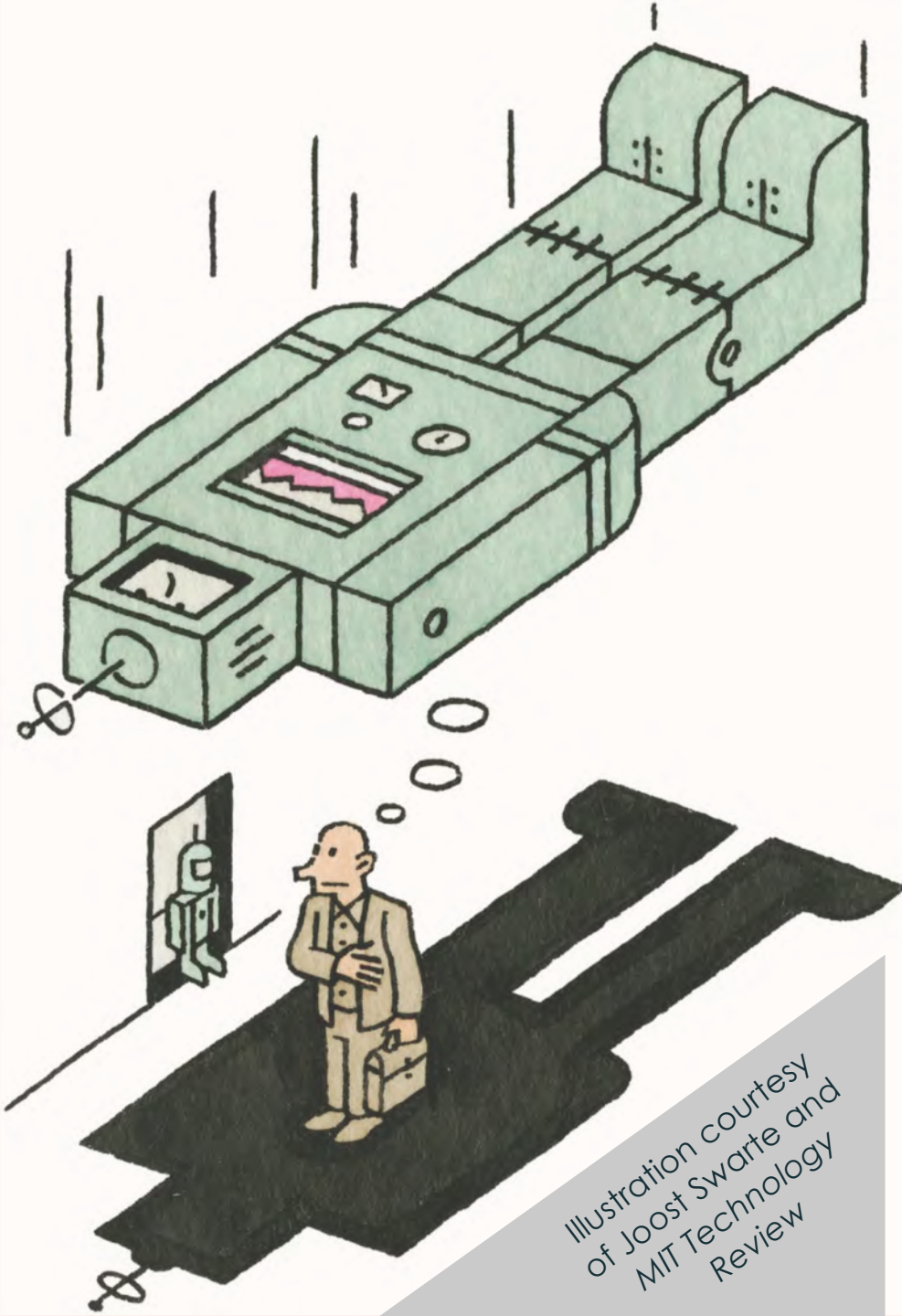


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The Emergence of New Work

Where Does New Work Come From?

1. **Uber effects**

- Productivity gains create new work

2. **Walmart effects**

- Price declines free income, spur consumption

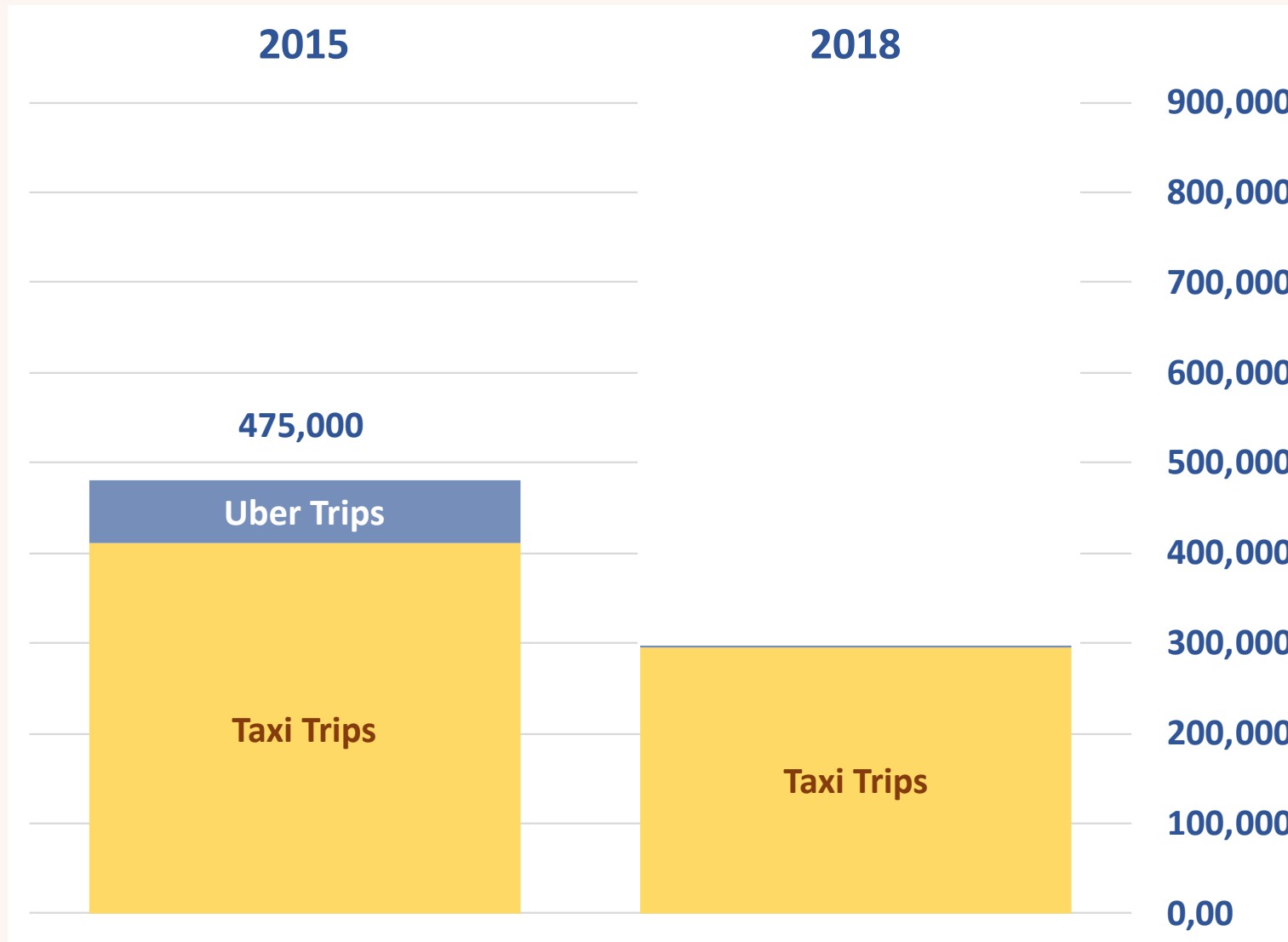
3. **Network effects**

- Productivity growth in one industry raises demand in customer and supplier industries

4. **Invention of new work**

'Uber' Effects – Produce a Cheaper, Better Product, and Employment May Rise

Ride Hailing Trips in New York City, 2015 and 2018

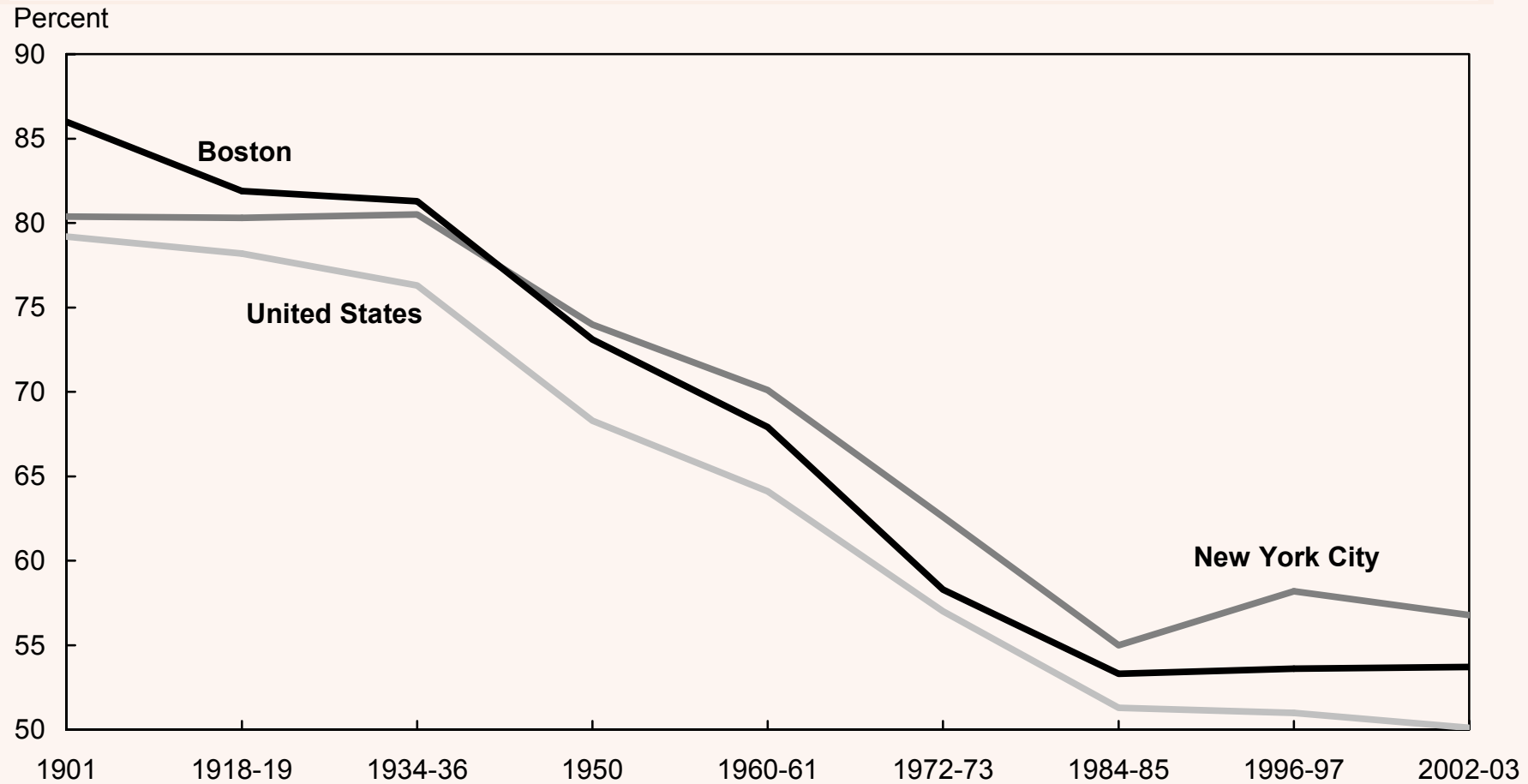


Walmart Effects – A Fall In the Cost of Necessities Frees Income for Luxuries



Over the 20th Century, the Share of Household Income Spent on Necessities Fell from 85% to 55%

Food, clothing, and housing expenditure shares for the United States, New York City, and Boston, 1901 – 2002

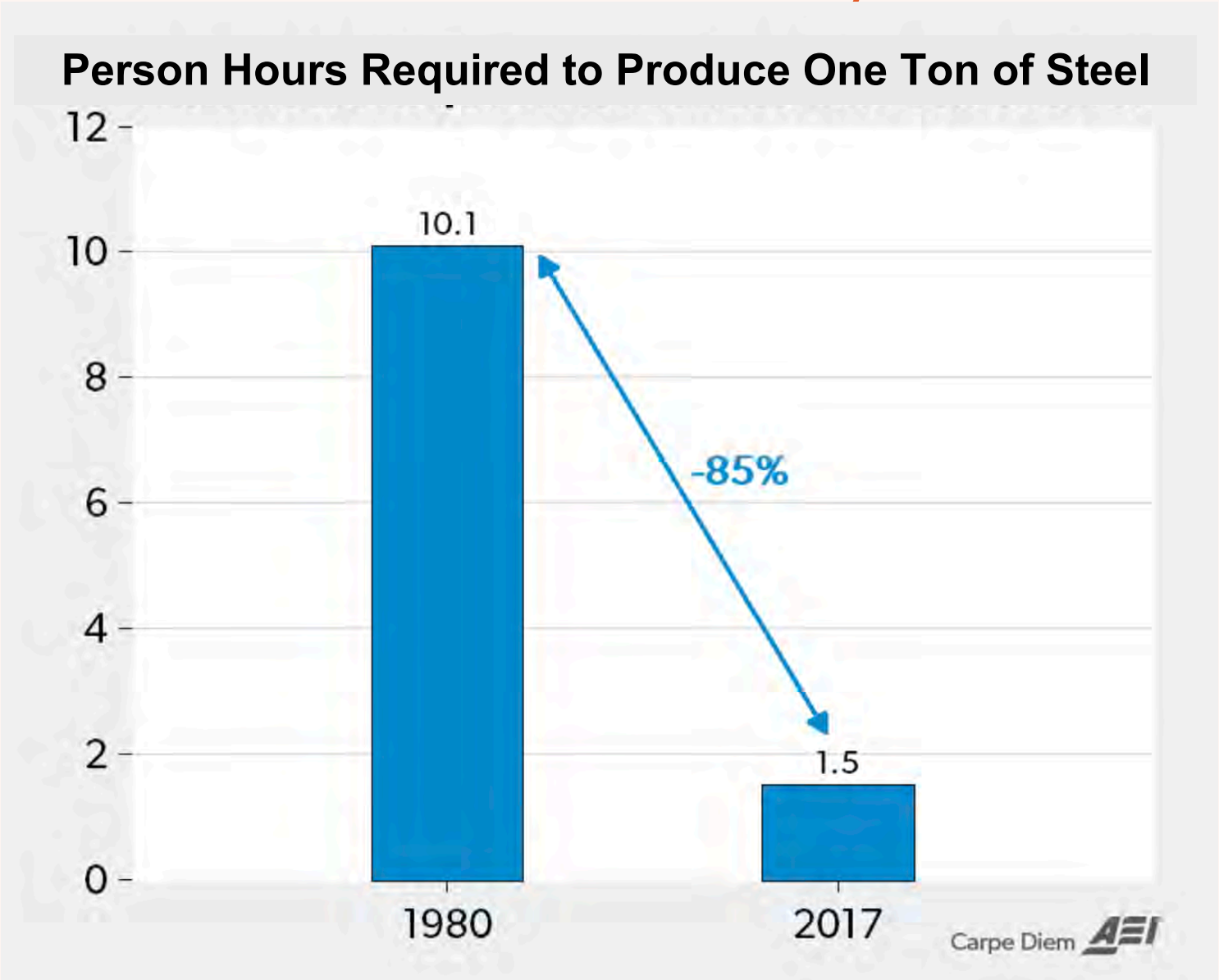


SOURCE: U.S. Bureau of Labor Statistics, Consumer Expenditure Survey

Where Does New Work Come From?

1. **Uber effects**
 - Productivity gains create new work
2. **Walmart effects**
 - Price declines free income, spur consumption
3. **Network effects**
 - Productivity growth in one industry raises demand in customer and supplier industries
4. **Invention of new work**

Tons of progress: Labor Hours Needed to Produce a Ton of Steel Fell by 85% since 1980



Network Effects: <400K Jobs in Metal-Making, More than 4 Million Jobs in Metal-Using Industries



Where Does New Work Come From?

1. Uber effects

- Productivity gains create new work

2. Walmart effects

- Price declines free income, spur consumption

3. Network effects

- Productivity growth in one industry raises demand in customer and supplier industries

4. **Invention of new work**

The Invention of New Work



Frontier Jobs

Wealth Work

Last Mile Jobs

Frontier Jobs Added to U.S. Census, 1980 – 2016

Supervisor, Word Processing (1980)

Circuit Layout Designer (1990)

**Artificial Intelligence Specialist
(2000)**

Echocardiographer (2000)

Wind Turbine Technician (2010)

**Computing Services Director
(2106)**

George Jetson at Work



The Invention of New Work



Frontier Jobs



Wealth Work



Last Mile Jobs

Wealth Work Jobs Added to U.S. Census, 1980 – 2016

Gift wrapper (1980)

Fingernail former (1990)

Horse exerciser (2000)

Oyster preparer (2000)

Sommelier (2010)

Golf cart mechanic (2016)

George Jetson @Home



The Invention of New Work



Frontier Jobs



Wealth Work



Last Mile Jobs

Last Mile Jobs Added to Census, 1980 - 2016

Tamale-machine feeder (1980)

**Vending-machine attendant
(1990)**

Chat room host/monitor (2000)

**Underground utility cable locator
(2010)**

Teleprompter (2016)

**Winder, Robotic Football
Players (on the Jetsons)**



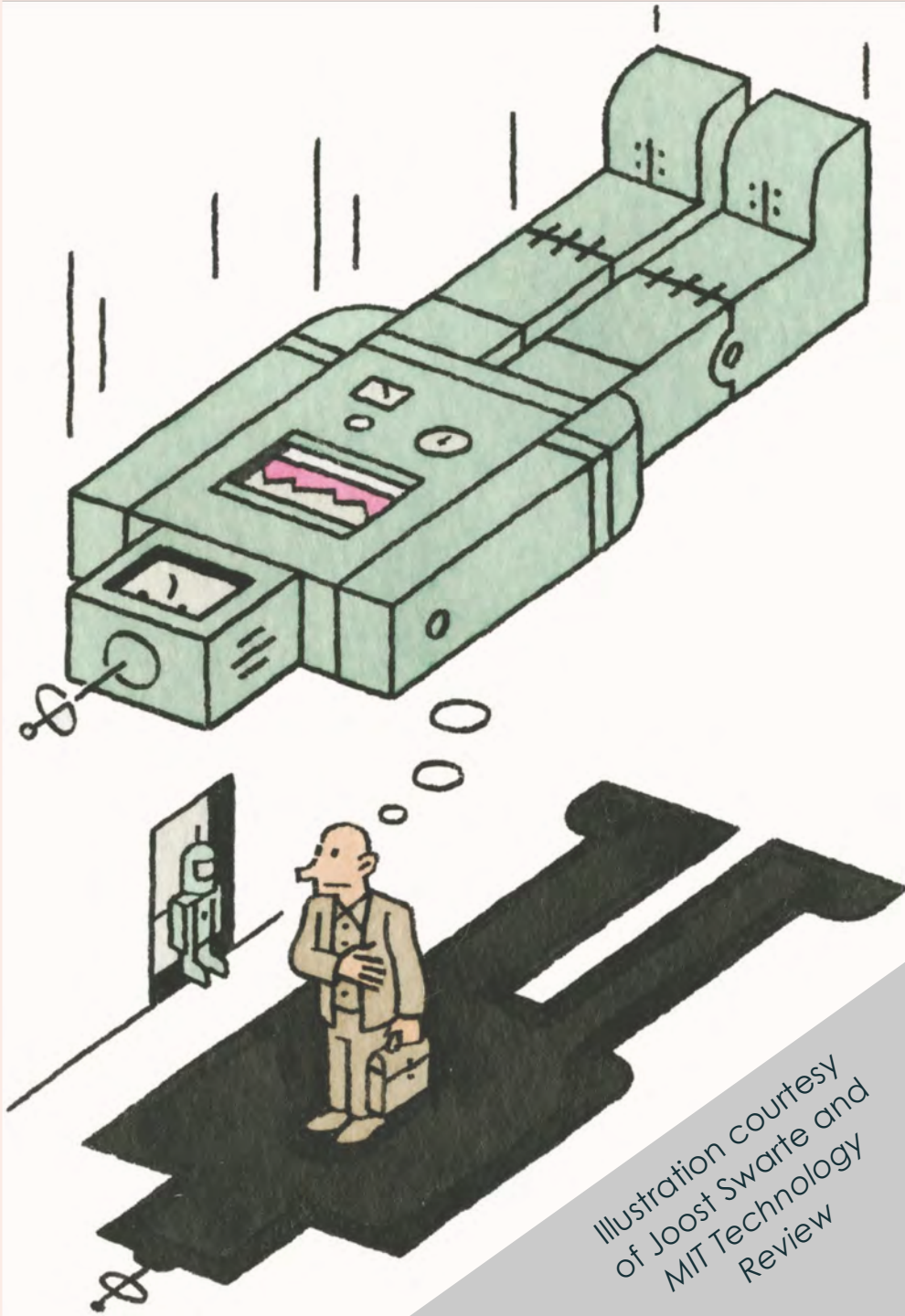


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**So, Is there Nothing
to Worry About?**

The *Economist* Says: Nothing to Worry About!

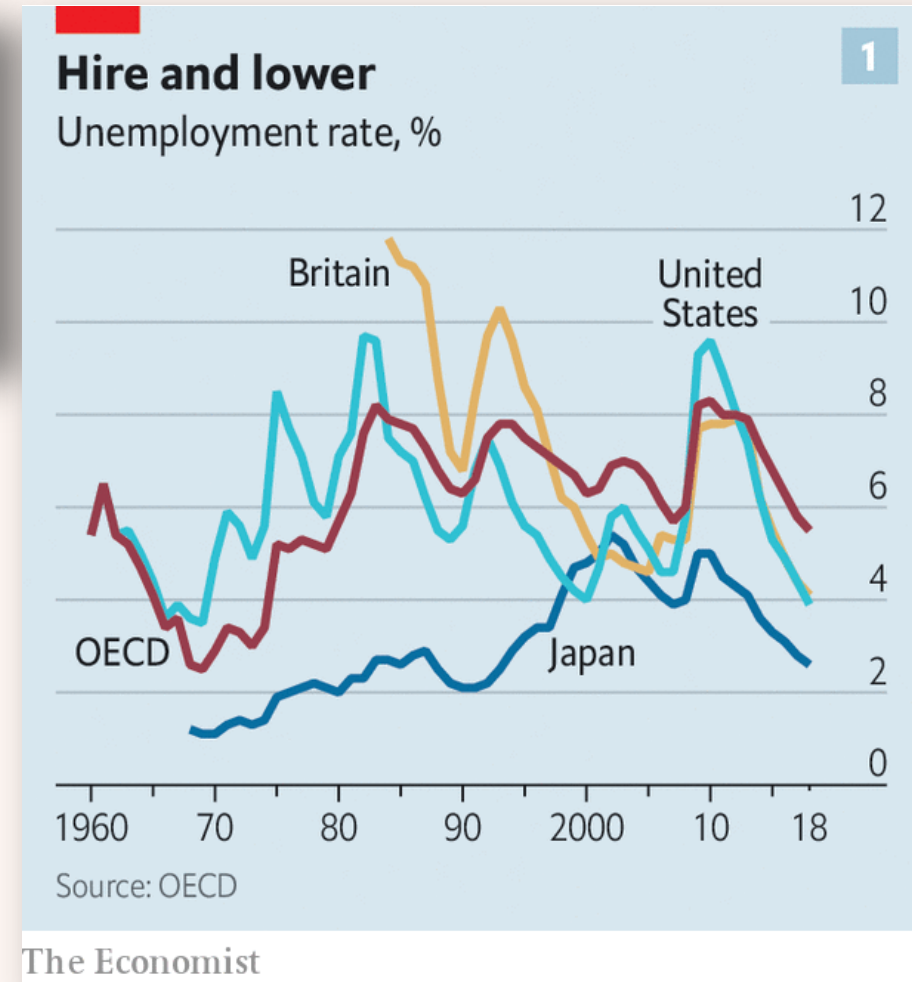
The
Economist

Working it

Across the rich world, an extraordinary jobs boom is under way

Many popular perceptions about the modern labour market are wrong

- “The Zeitgeist has lost touch with the data”
- “Many popular perceptions about the modern labour market are wrong”
- “The despondency might be justified were not popular perceptions about the world of work so obviously wrong”



MIT Work of the Future Task Force *Disagrees*

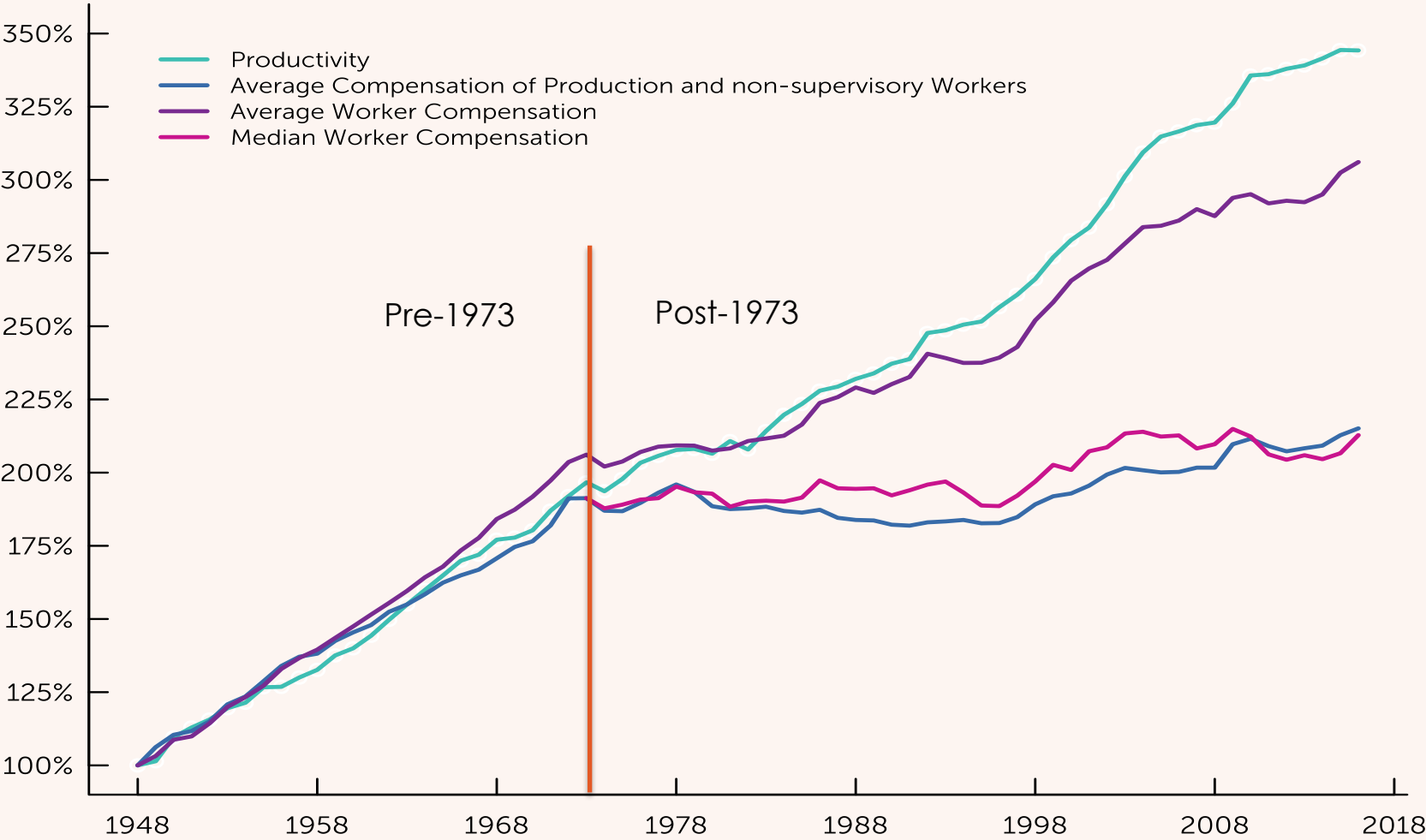
- “Work is a central human activity, critical to self-realization and social cohesion
- Public concern about the future of work is neither ill-informed nor misguided
- The last four decades of economic history show that technological progress will likely deliver rising productivity
- But there is no certainty that the fruits of this bounty will reach the typical worker”

The Work of the Future:
Shaping Technology and Institutions



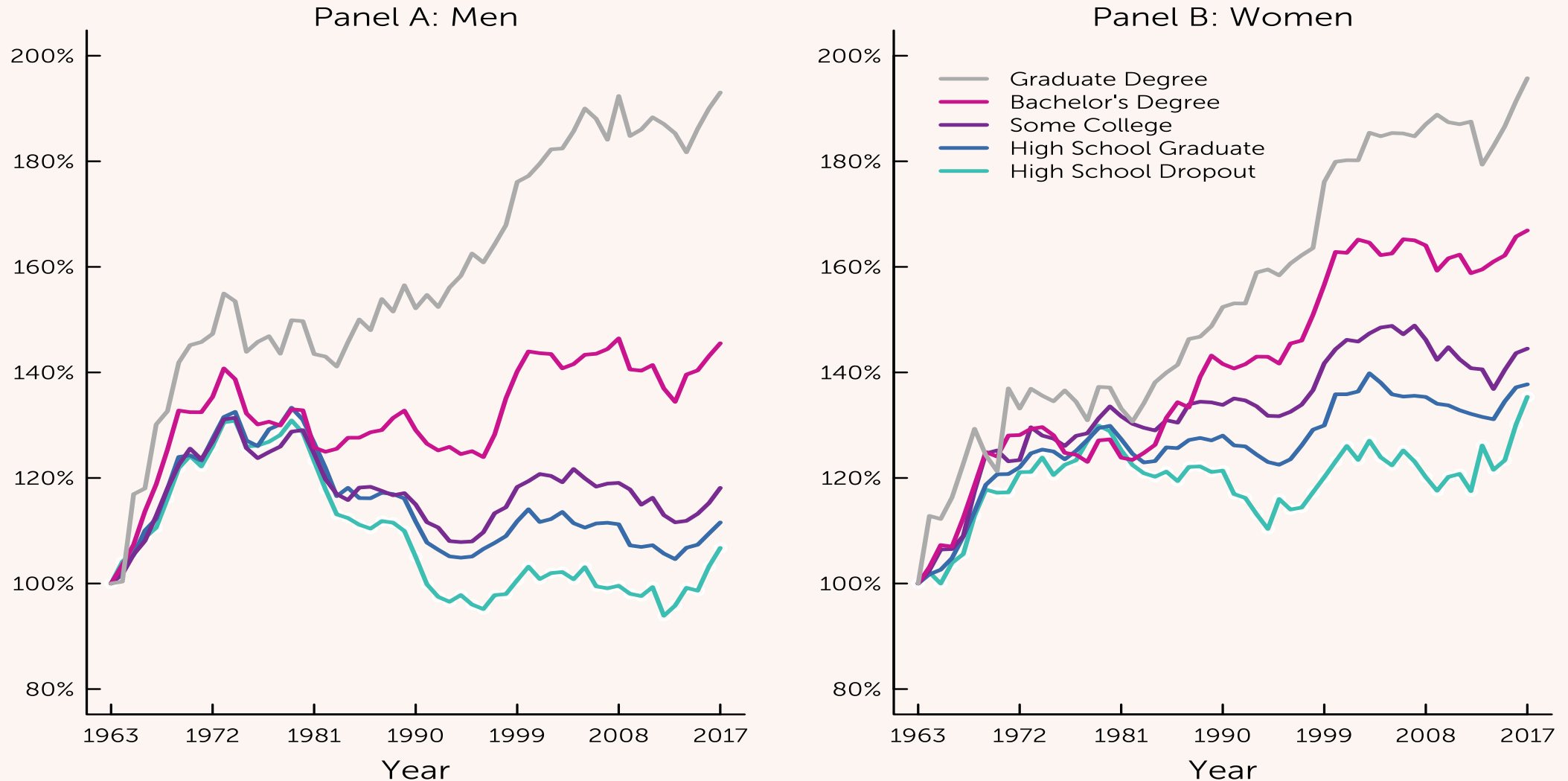
The Parallel and then Diverging Path of Productivity and Earnings in the U.S., 1948 – 2017

Figure 2: Changes in Labor Productivity and Compensation, 1948-2016



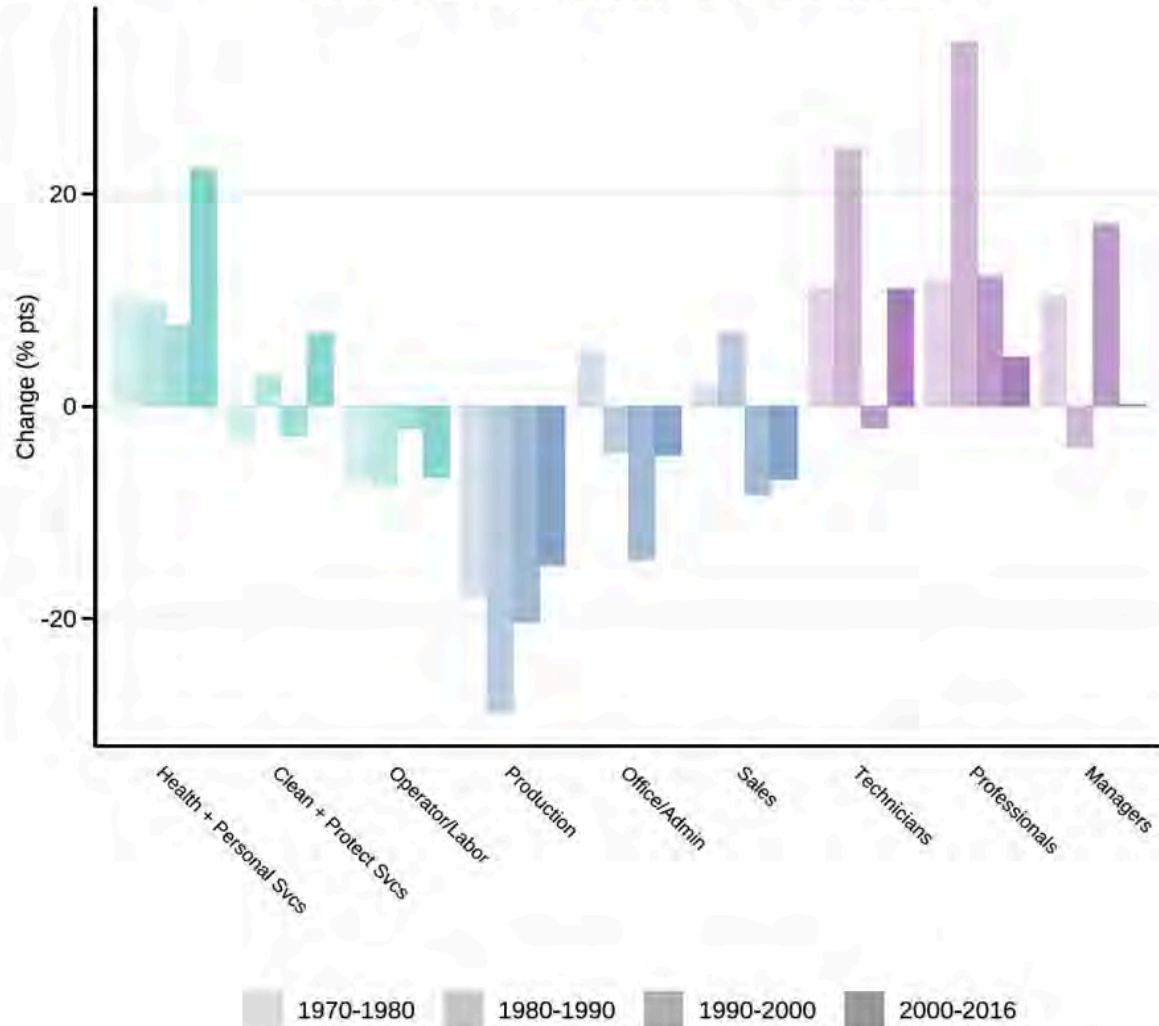
The Steep Rise of Earnings Inequality in the U.S. Labor Market from 1980 to Present

Figure 1: Cumulative Change in Real Weekly Earnings of Working-Age Adults Ages 18-64



The Polarization of Work: Specialized vs. Commodified Jobs

Figure 5: Changes in Occupational Employment Shares, 1970-2016
Working Age Adults (Percent Change Over Decade)



Specialized jobs: *Growing*

- Professional, technical, and managerial jobs

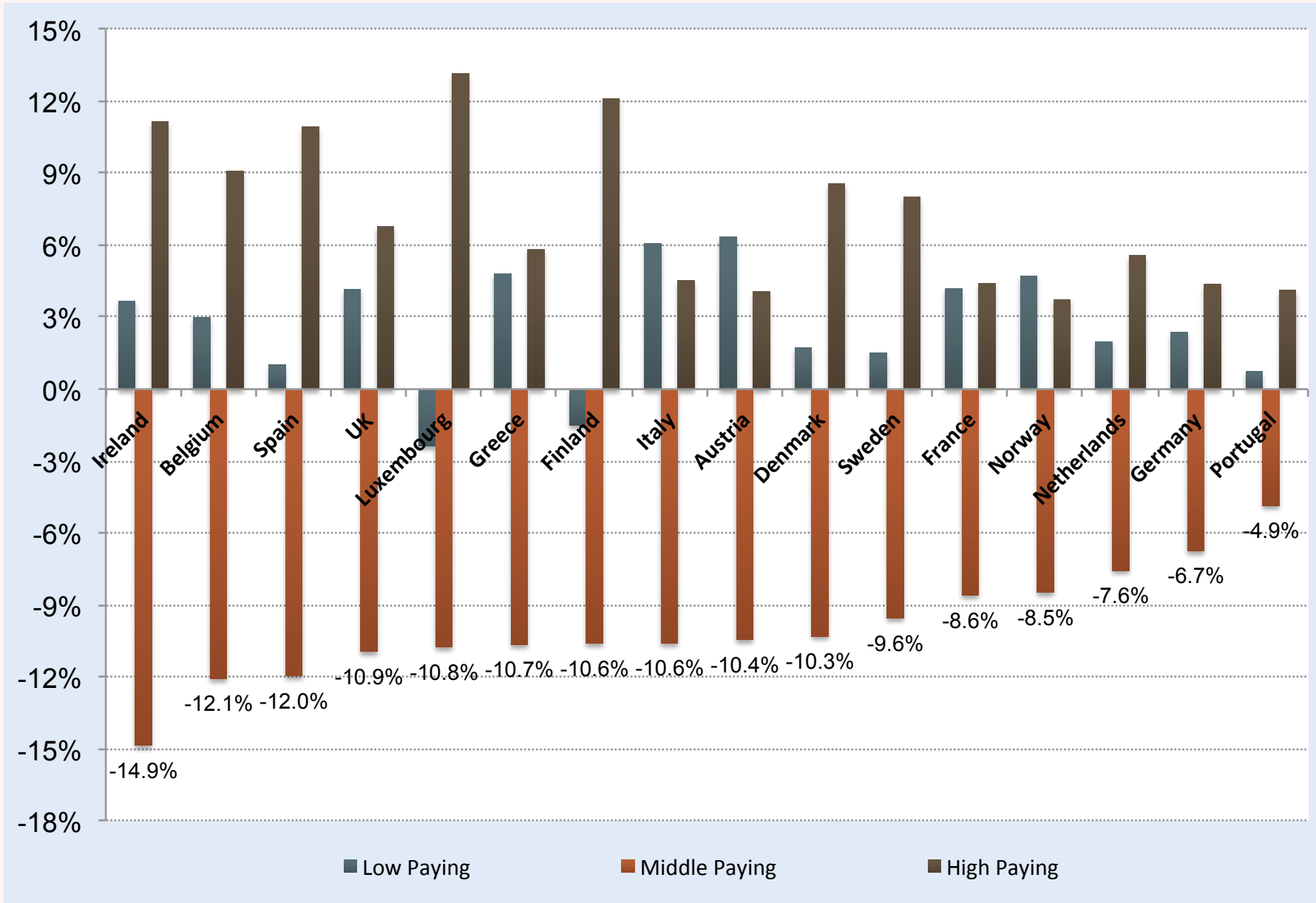
Commodified jobs: *Growing*

- Personal services — cleaning, security, recreation, health aides

Middle-skill jobs: *Shrinking*

- Production work, office/clerical, and sales

Polarization of Work: European Union, 1993 – 2010

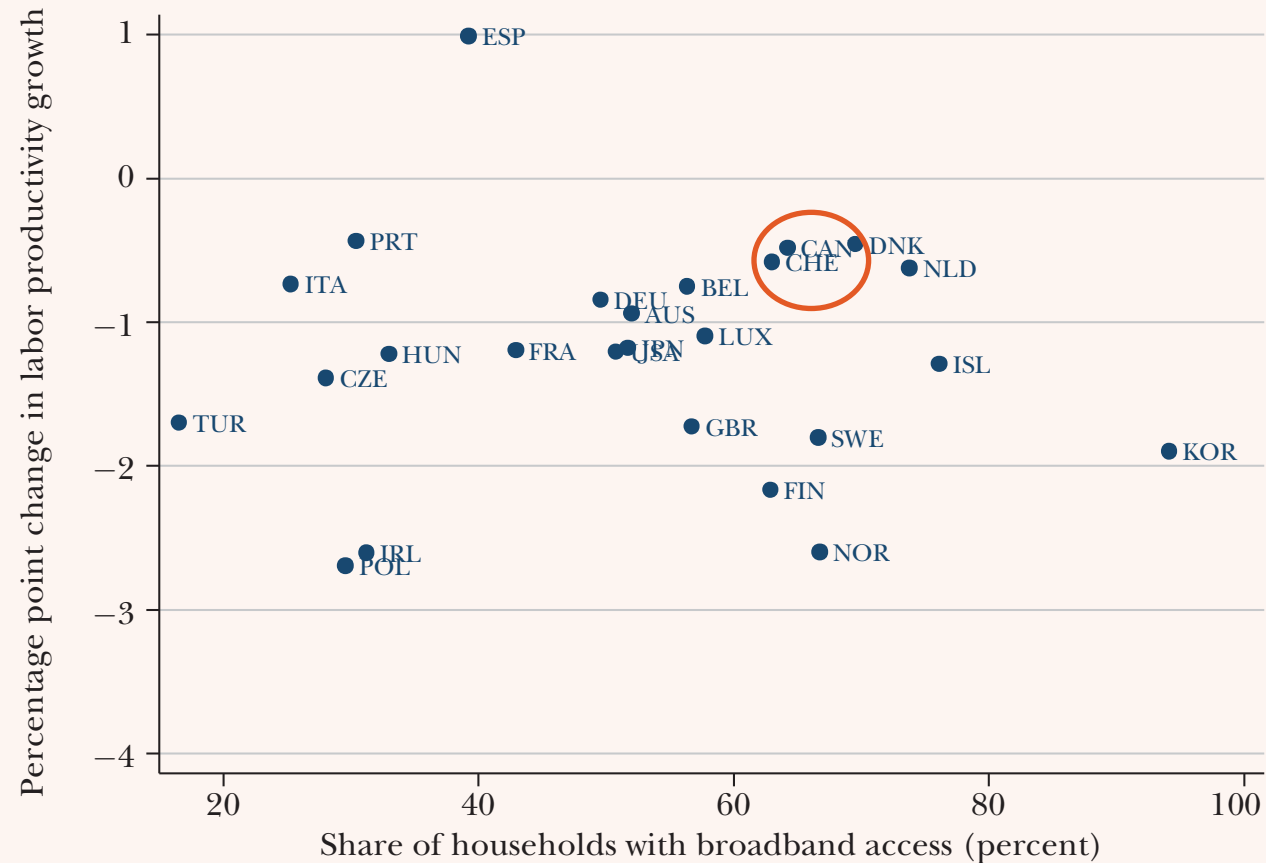


Source: Goos, Manning, and Salomons 2014

Productivity Growth **Slowed** in Most Rich Countries after 2004

Change in Labor Productivity Growth versus Information and Communication Technology (ICT) Intensity

A: Labor Productivity Growth Change between 1995–2004 and 2005–2015 versus Share of Households with Broadband Access ($N = 25$ OECD countries)



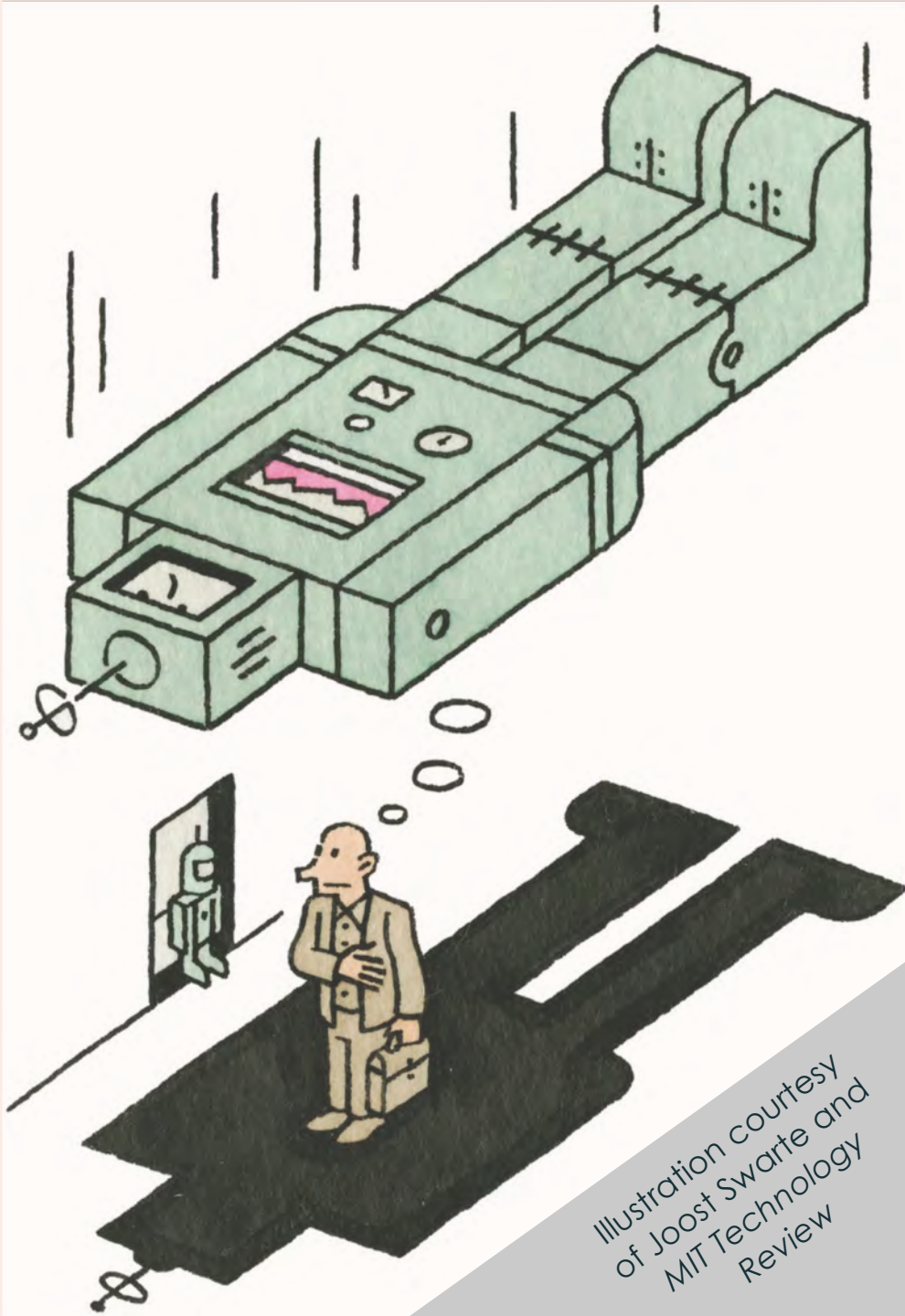


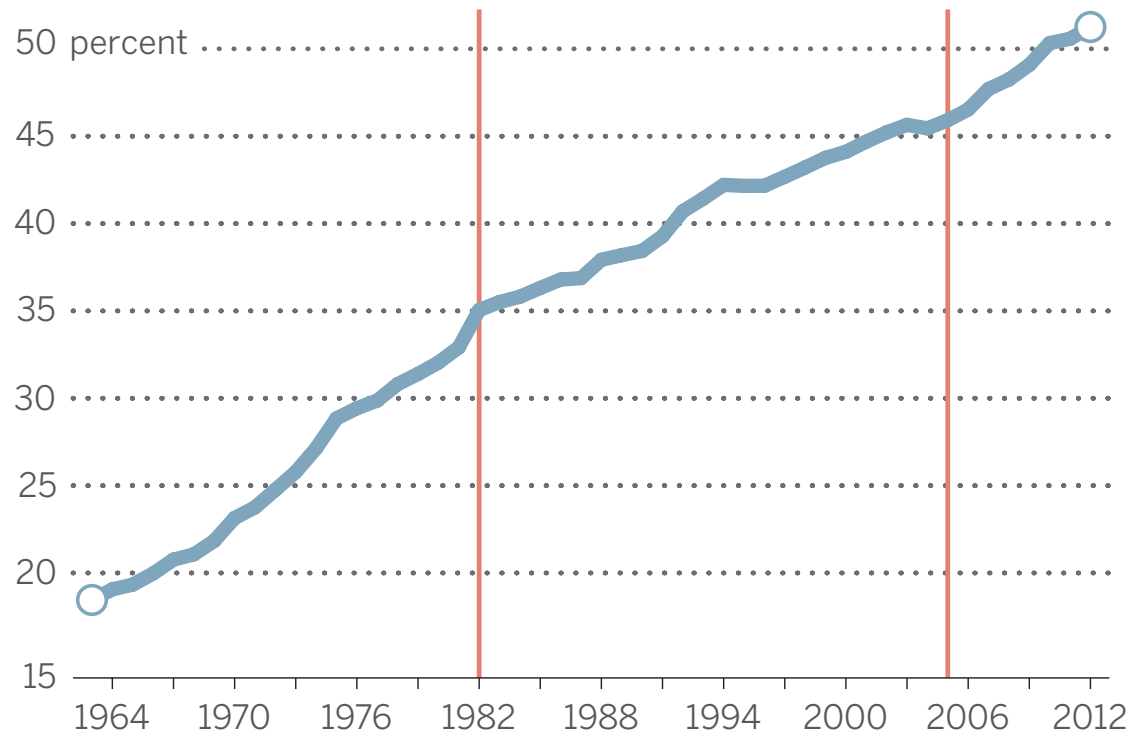
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Challenges and Opportunities

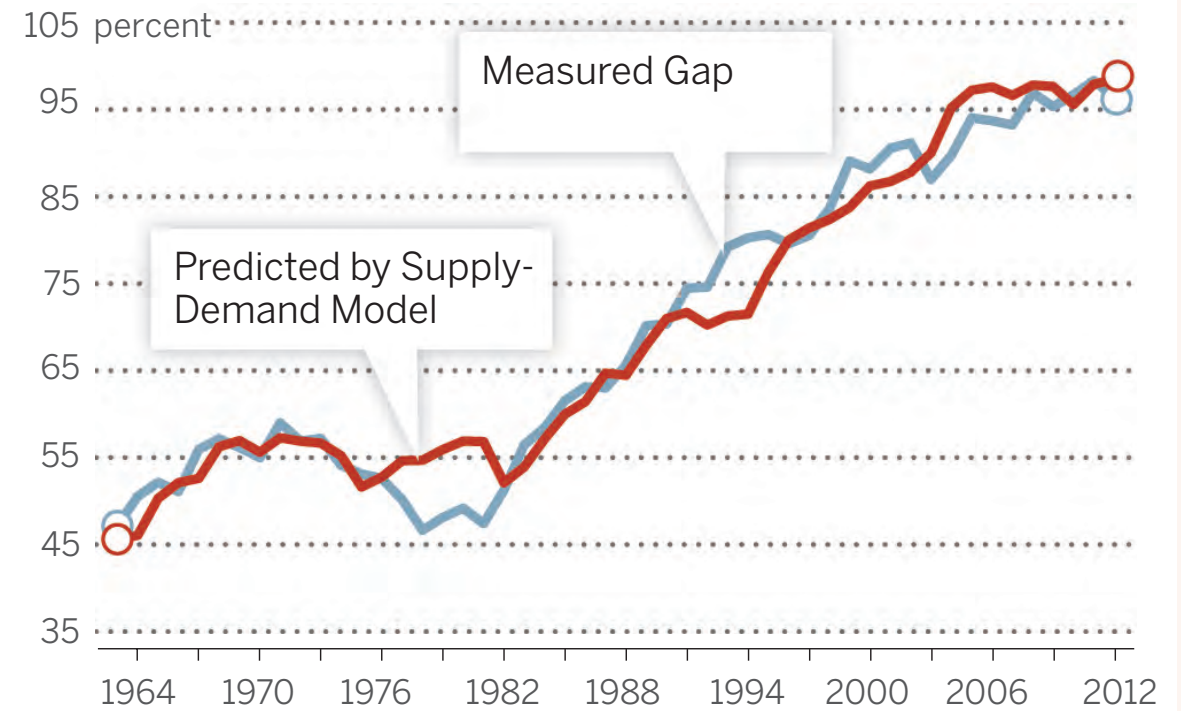
1. Raising Skills at the Pace of Technological Advancement

The supply of college graduates and the U.S. college/high school premium, 1963–2012

College share of hours worked (%), 1963–2012:
All working-age adults



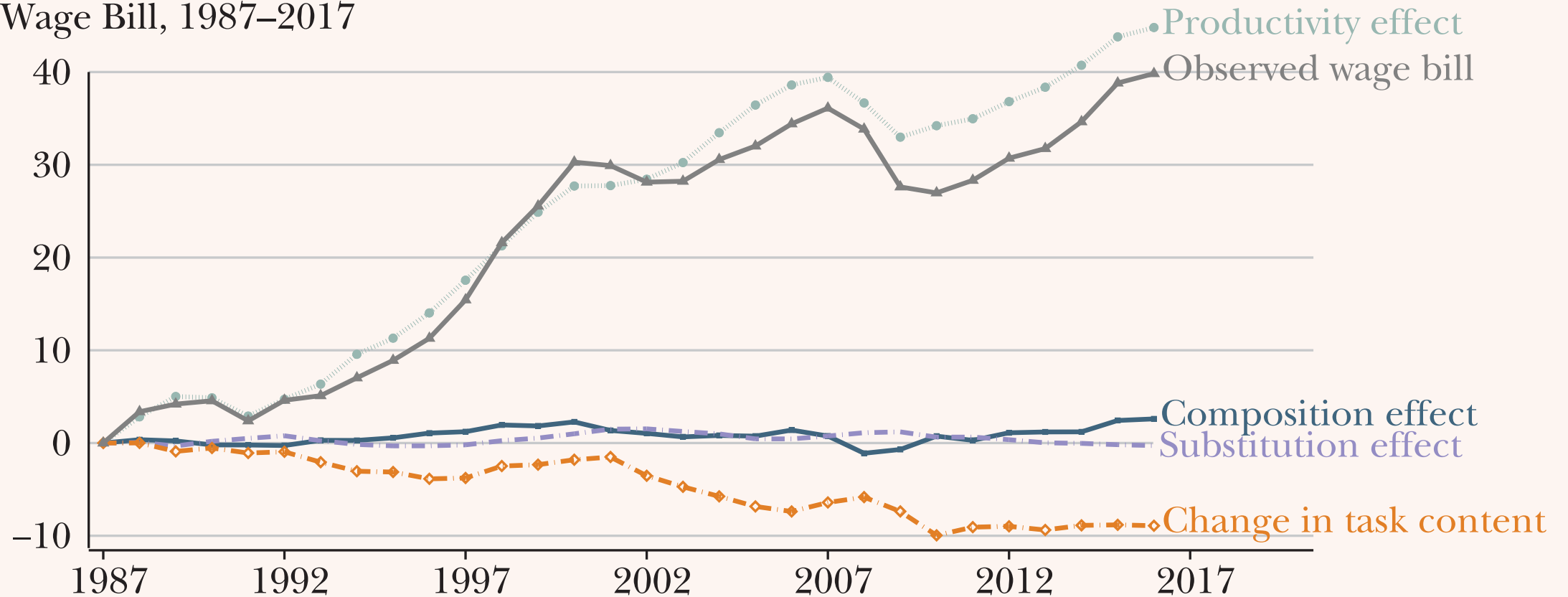
College versus high school wage gap (%)



2. Aligning Incentives to Invest in **Both** Human **and** Physical Capital

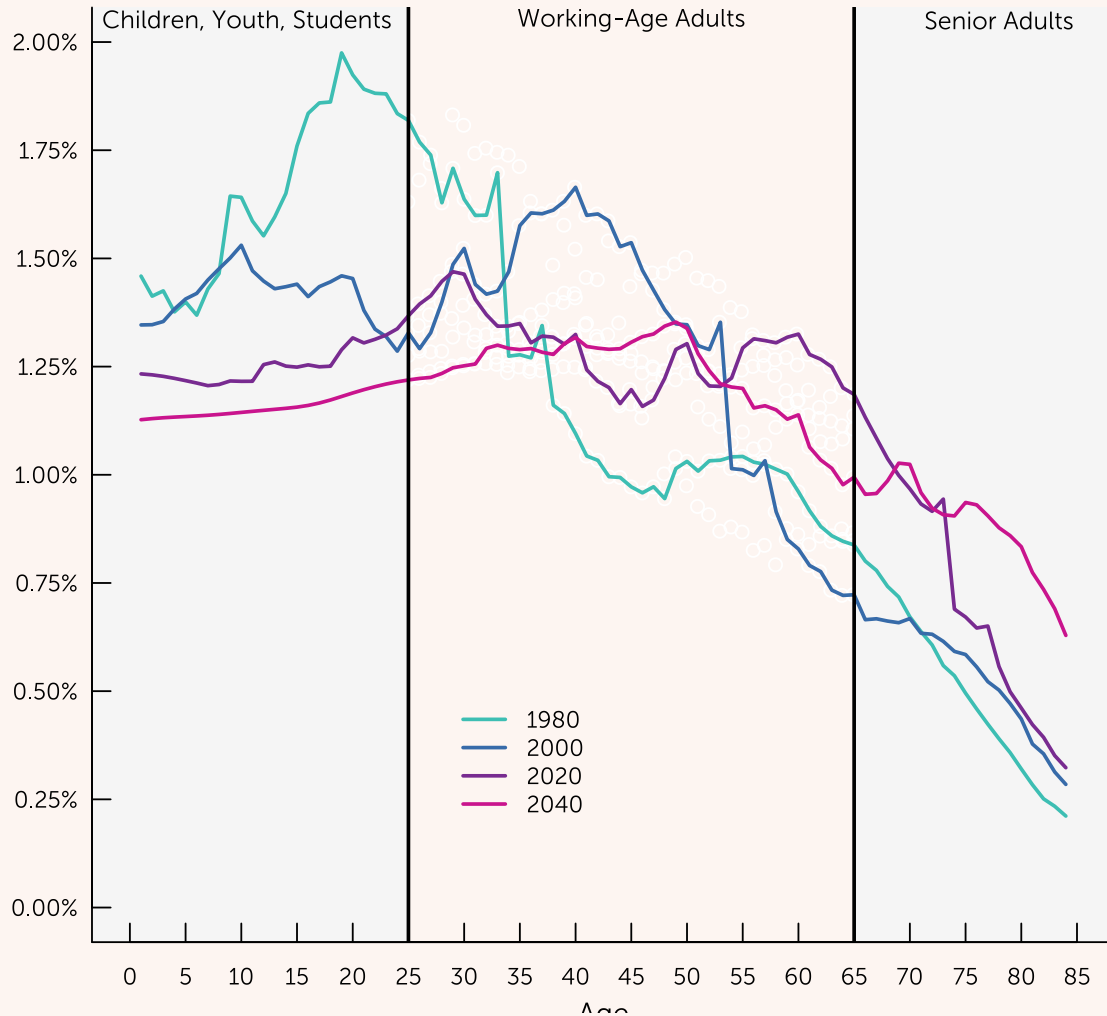
Sources of Changes in Labor Demand, 1987–2017

A: Wage Bill, 1987–2017



3. Addressing **Labor Scarcity** by Raising Productivity, Improving Job Quality

Figure 4: The Working-Age Share of the U.S. Population is Contracting

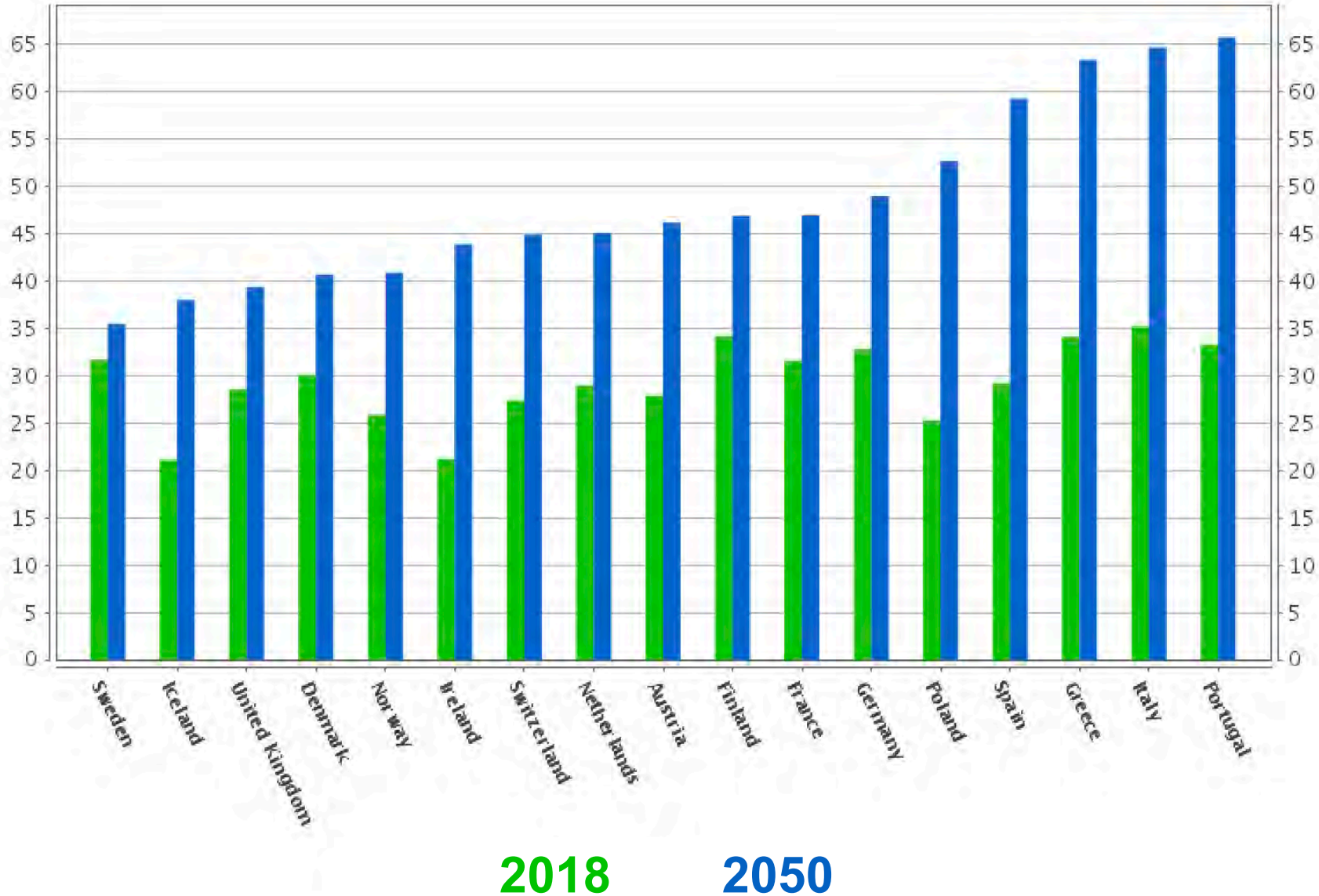


U.S. will face persistent shortage of workers in service & care jobs

1. Aging Baby Boom cohorts
2. Low and falling fertility
3. Declining immigration
4. Rising educational attainment

Japan as the extreme scenario – a huge challenge

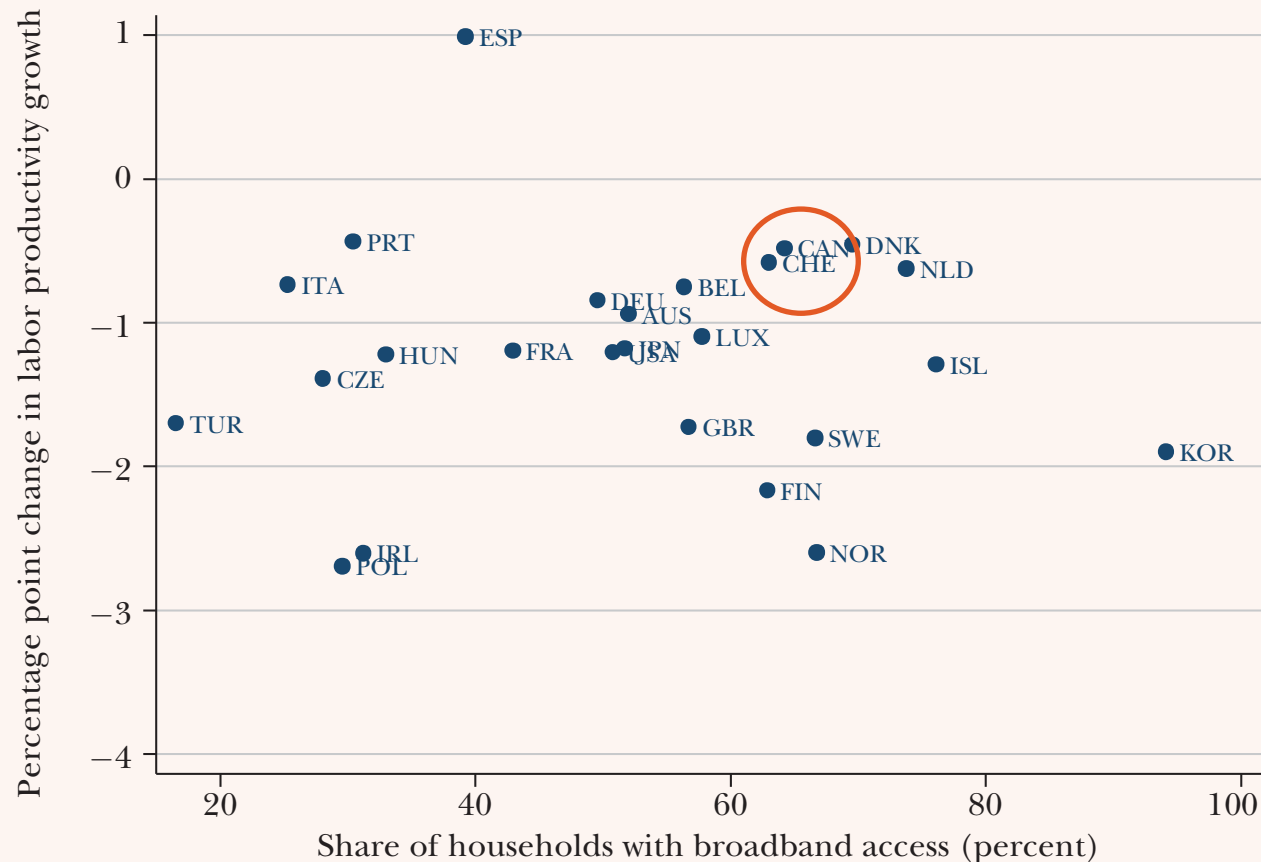
E.U. Old-Age Dependency Ratio Rising Steeply ($100 \times \text{Age } 65+ \text{ Adults} \div \text{Age } 15\text{--}65 \text{ Adults}$)



4. Steering Innovation Towards Raising Productivity, not Simply Displacing Labor

Change in Labor Productivity Growth versus Information and Communication Technology (ICT) Intensity

A: Labor Productivity Growth Change between 1995–2004 and 2005–2015 versus Share of Households with Broadband Access ($N = 25$ OECD countries)



Productivity Fell Steeply Growth in Most Rich Countries after 2004

- No universally agreed explanation
- AI and robotics not yielding miracles so far
- *Perhaps these technologies are mis-directed*
- 'So-so' technologies

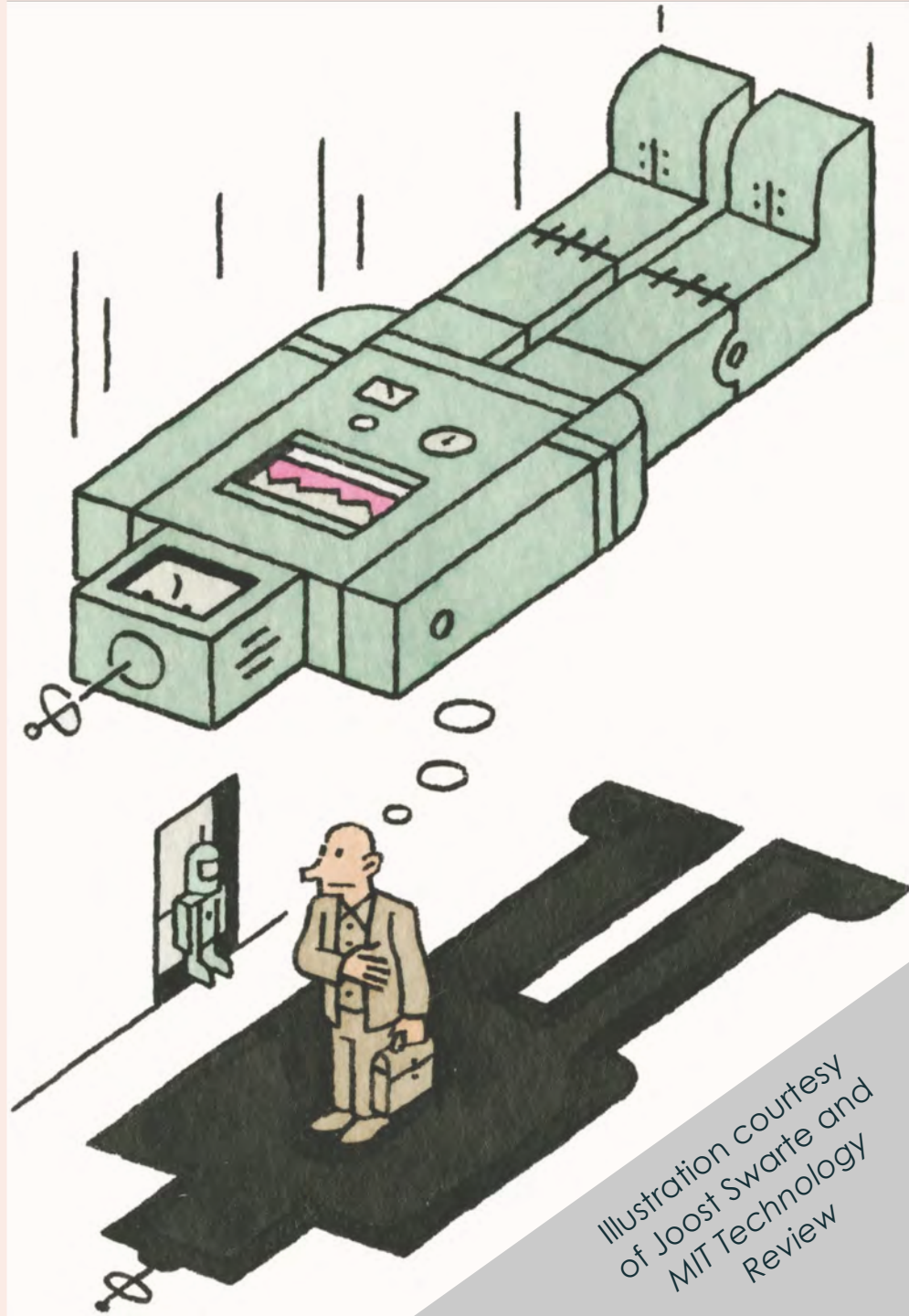


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Conclusion:
*The Future Will Not
Take Care of Itself*

The Work of the Future: Shaping Technology and Institutions

1. The challenge ahead is *not* scarcity of jobs
2. Abundant *jobs* do *not* guarantee abundant *good* jobs
3. Abundant technology does *not* guarantee fast *productivity growth* or *shared prosperity*
4. The future will not take care of itself

Thank you