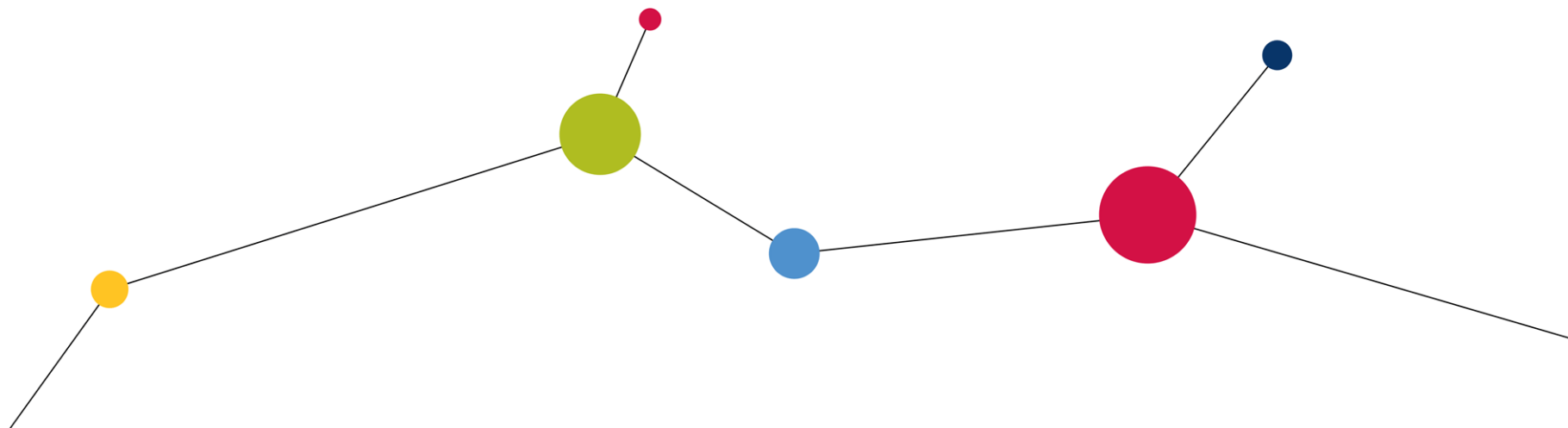


The Technology Trap:

Capital, Labor and Power in the Age of Automation

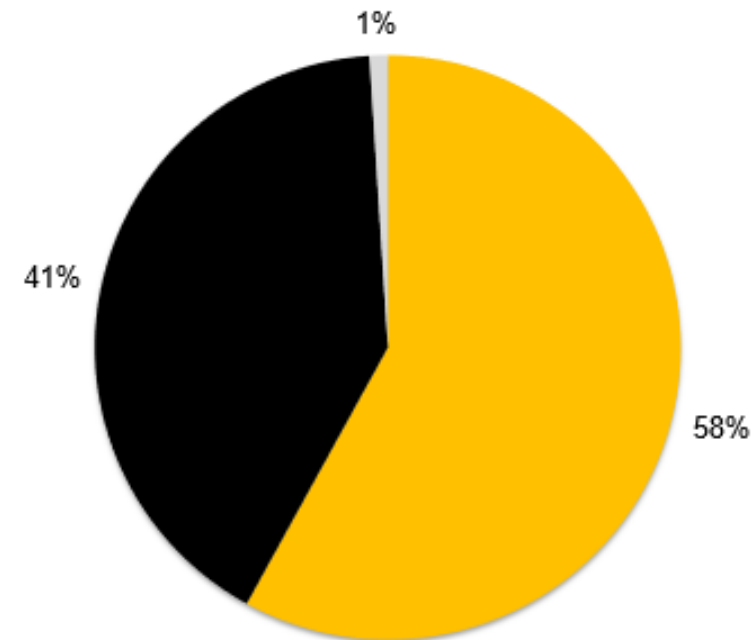
Carl Benedikt Frey
Oxford Martin Citi Fellow



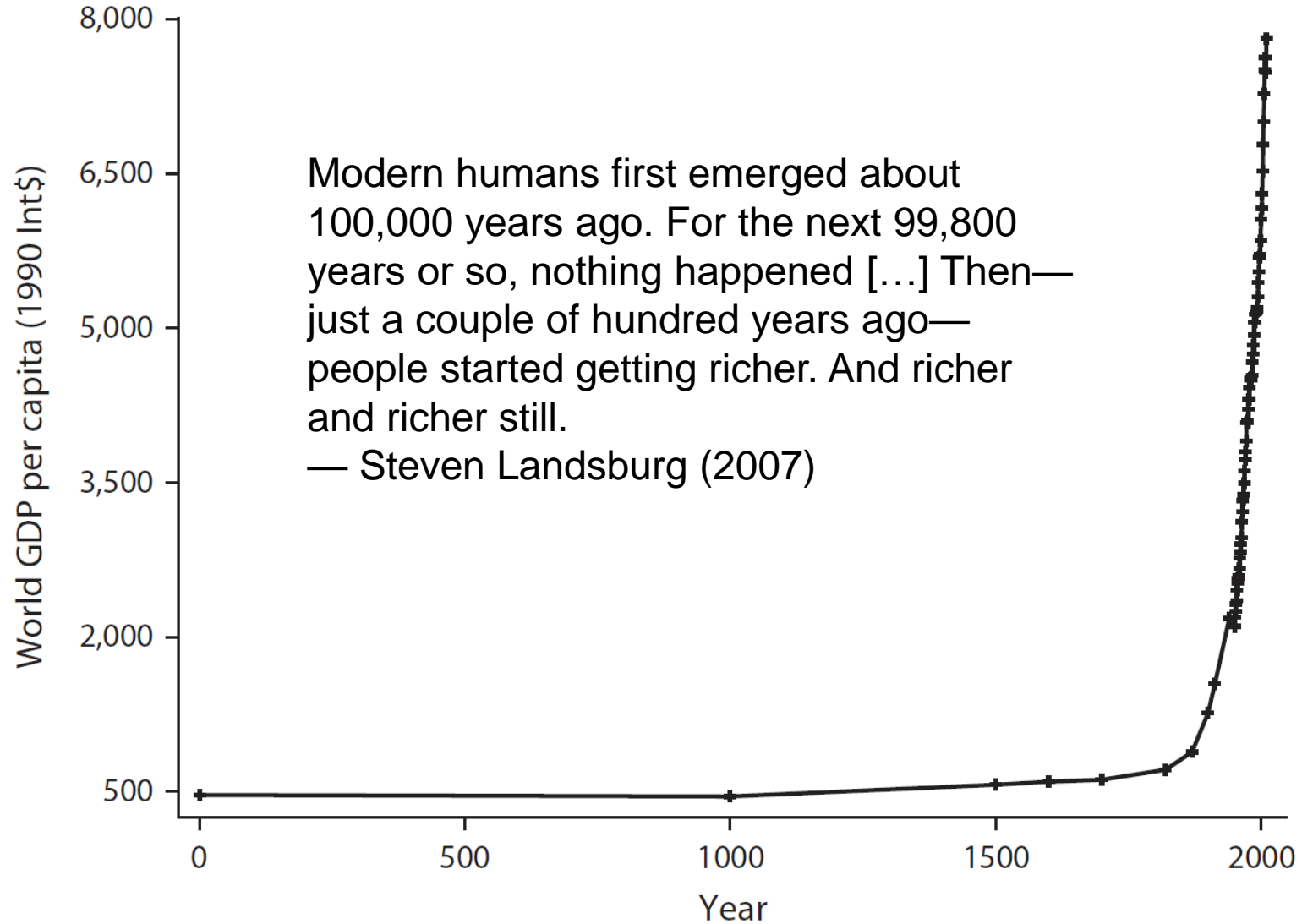


- Should be limits on number of jobs businesses can replace with machines, even if they are better and cheaper than humans
- Businesses are justified in replacing human workers if machines can do a better job at lower cost

■ No answer



A History of Progress: More Income



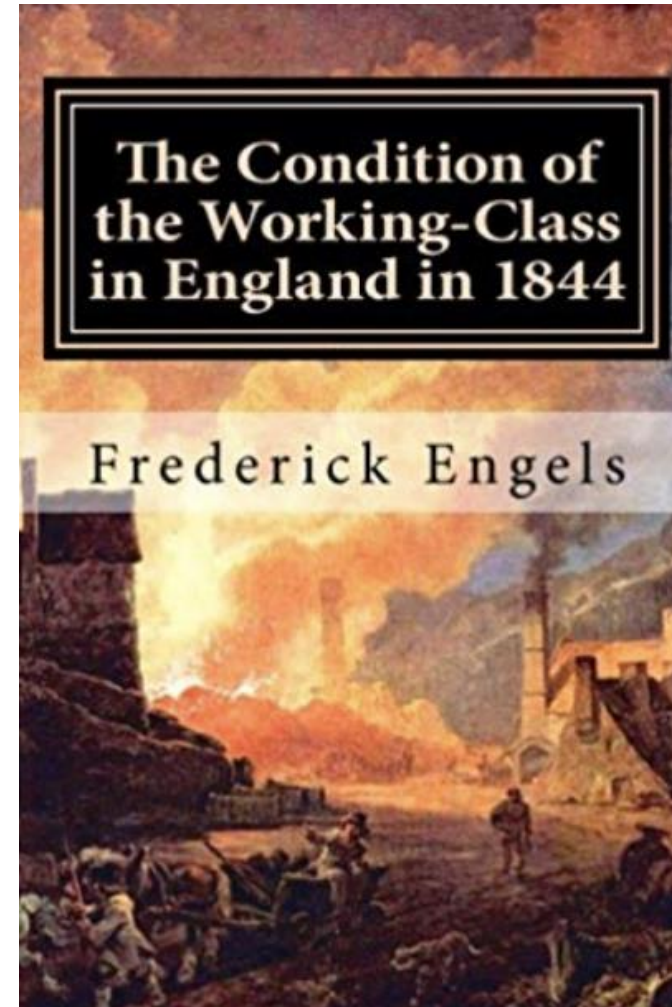
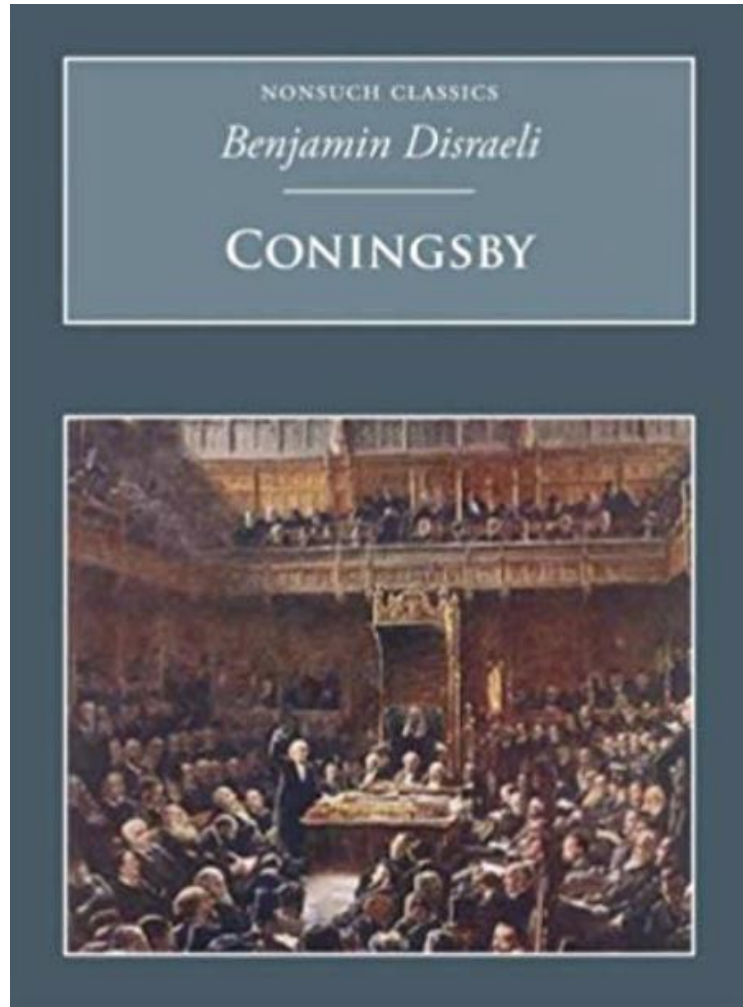
A History of Progress: More Goods



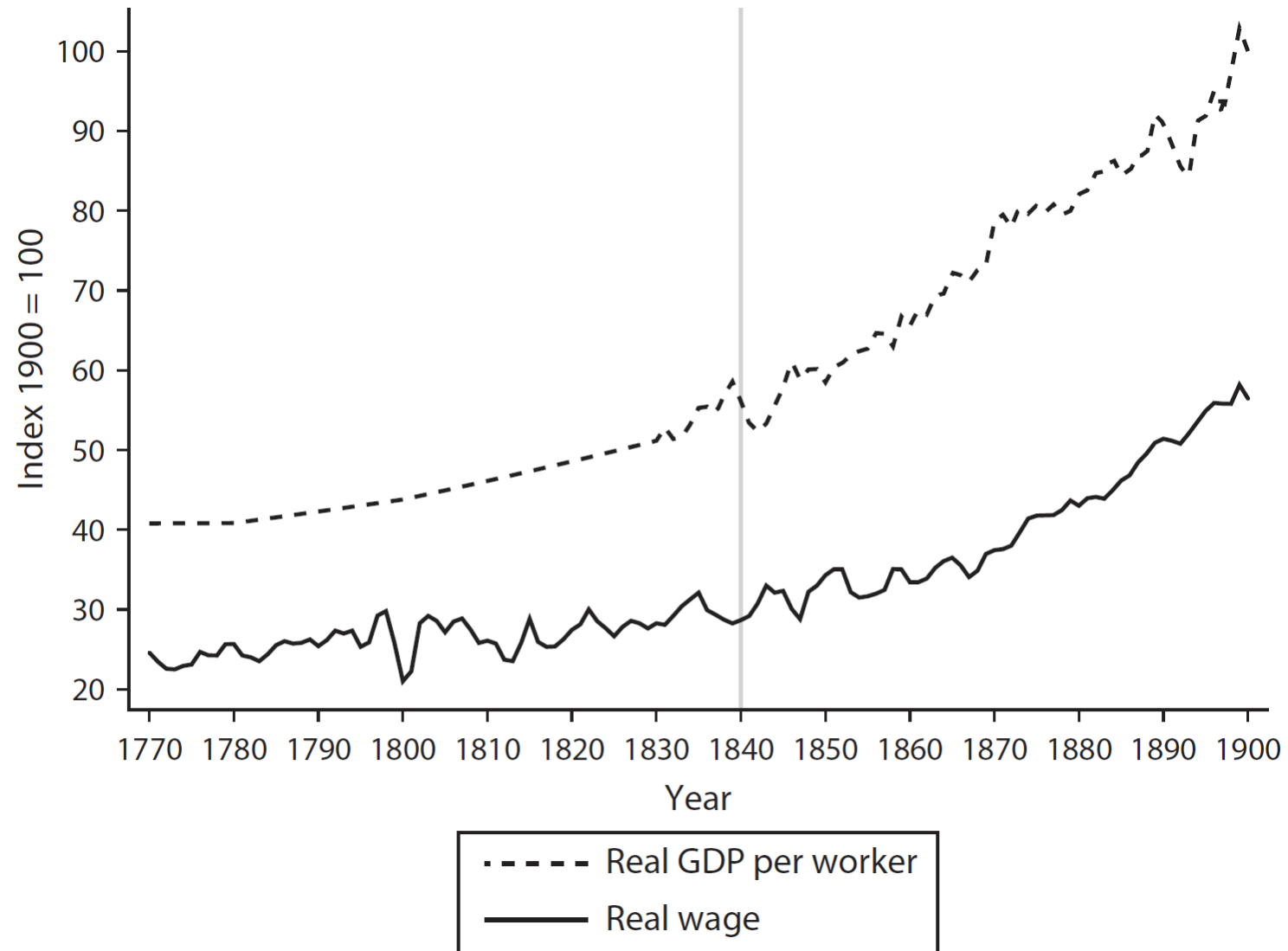
A History of Progress: Better Jobs



What did people think about the Industrial Revolution?



Engels Pause



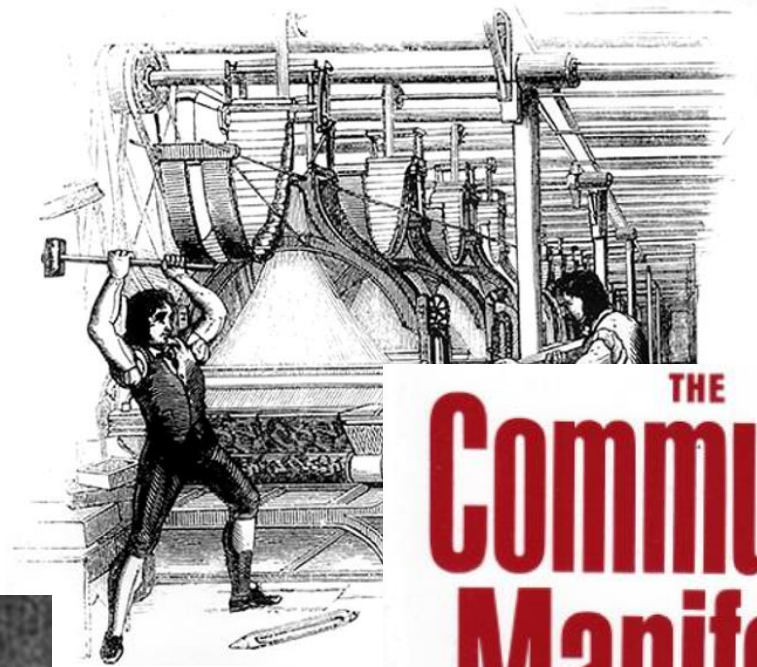
Source: Frey (2019). Based on Allen (2009).

“Even in the present day [...] it is found to be nearly impossible to convert persons past the age of puberty, whether drawn from rural or handicraft occupations, into useful factory hands.”

- Andrew Ure, 1835



Mechanics and poor labourers
Are wandering up and down
There is nothing now but poverty
In country and in town;
Machinery and steam power has
The poor man's hopes destroyed,
Then pray behold the numbers of
The suffering unemployed.



THE Communist Manifesto



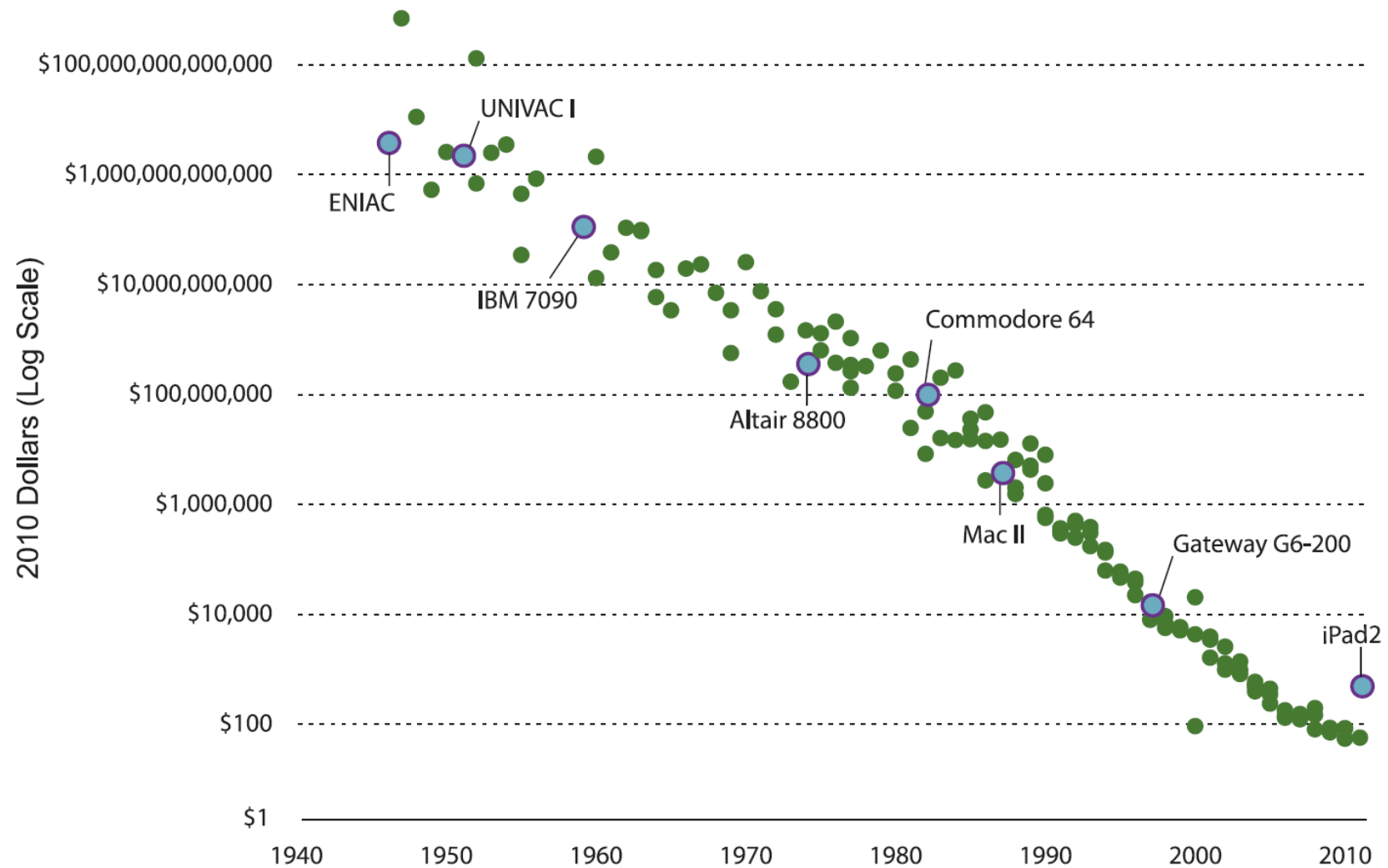
KARL MARX & FREDERICK ENGELS

A Tale of Two Technological Revolutions

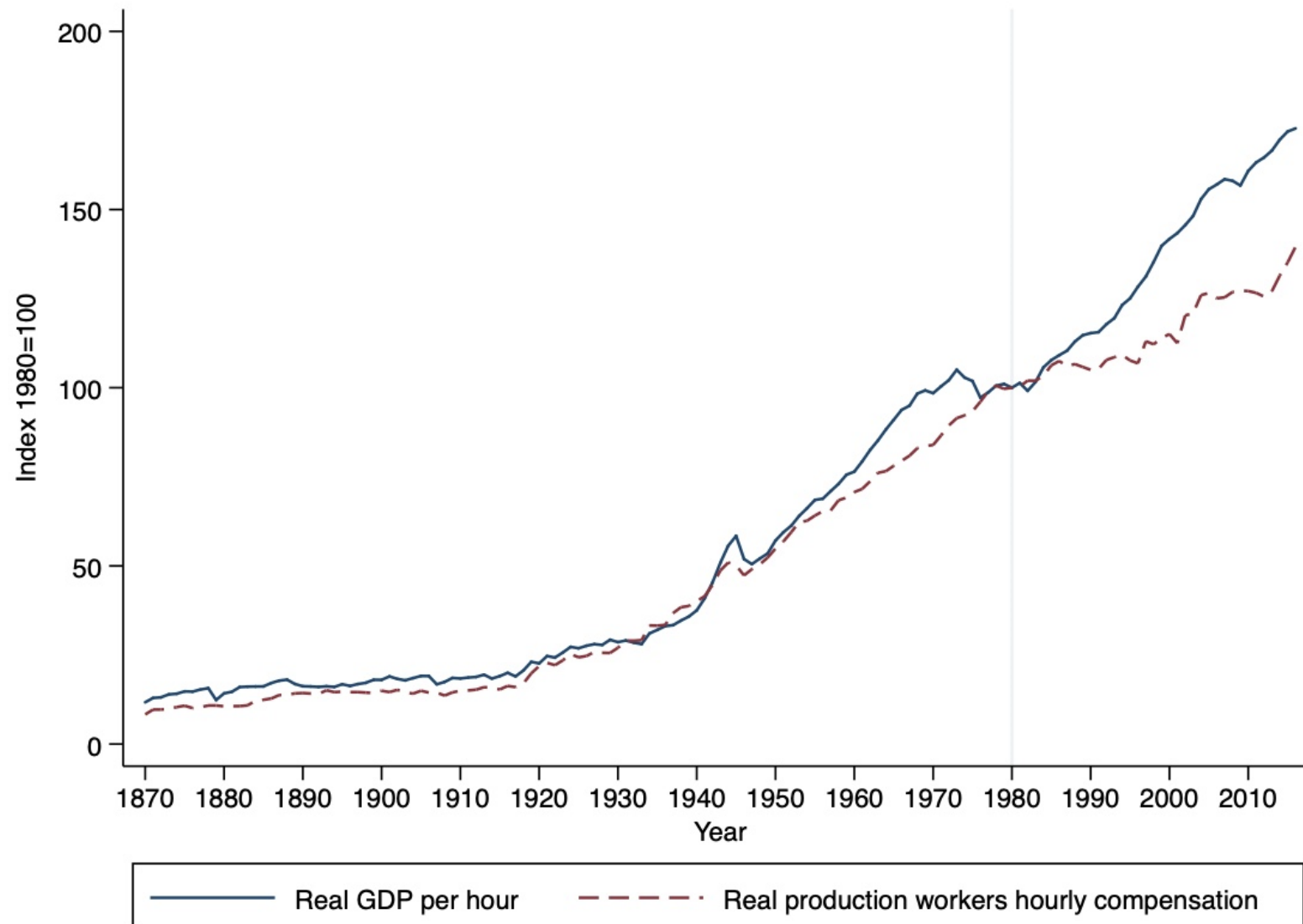


Source: Frey (2019). See also Milanovic 2019.

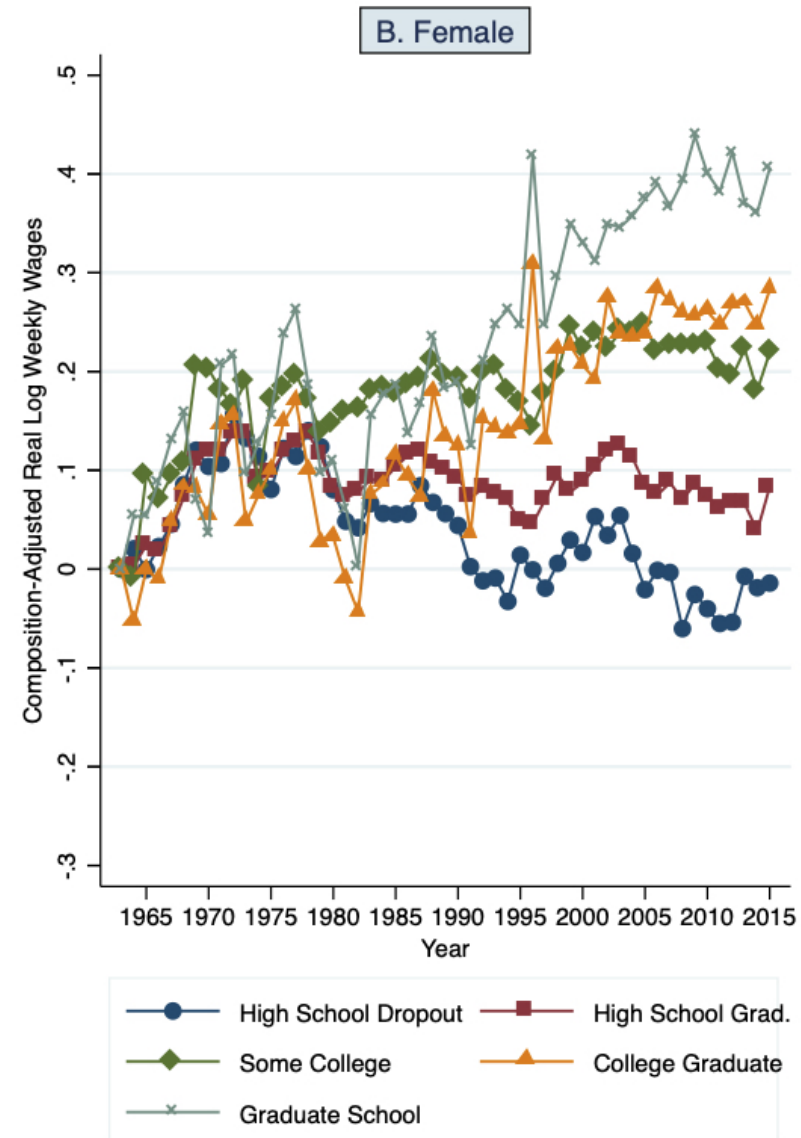
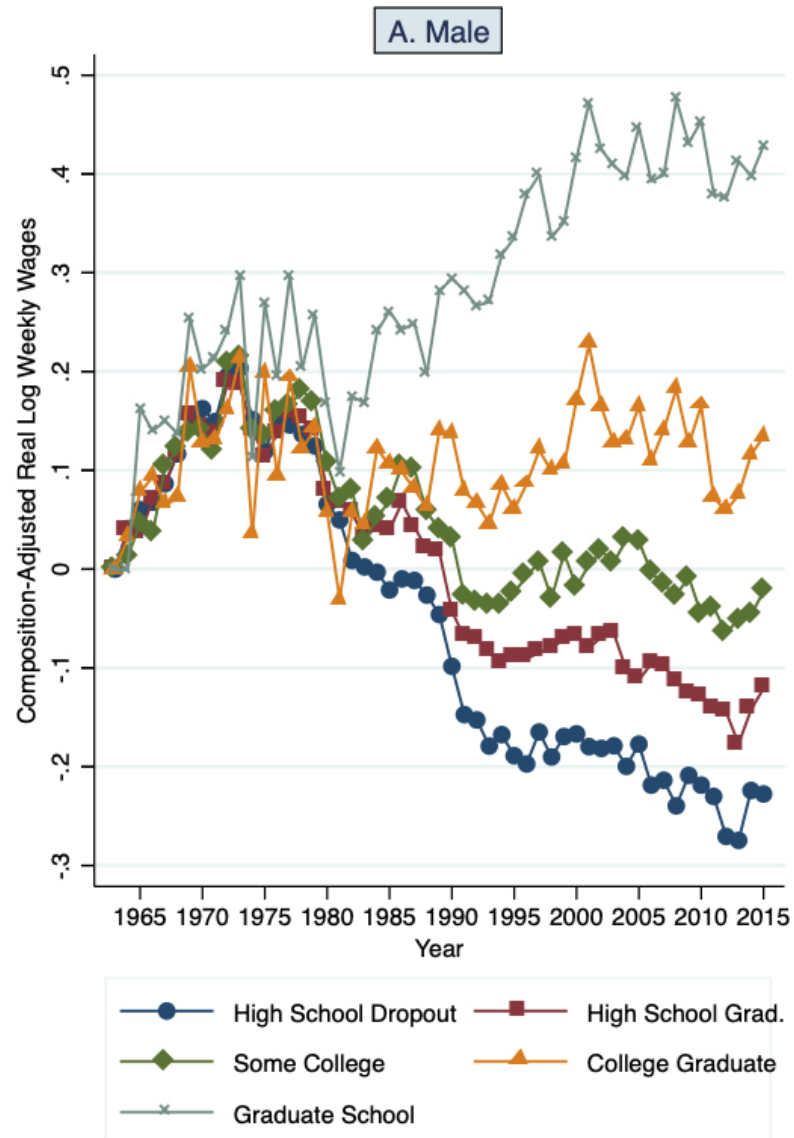
The Cost of Computing



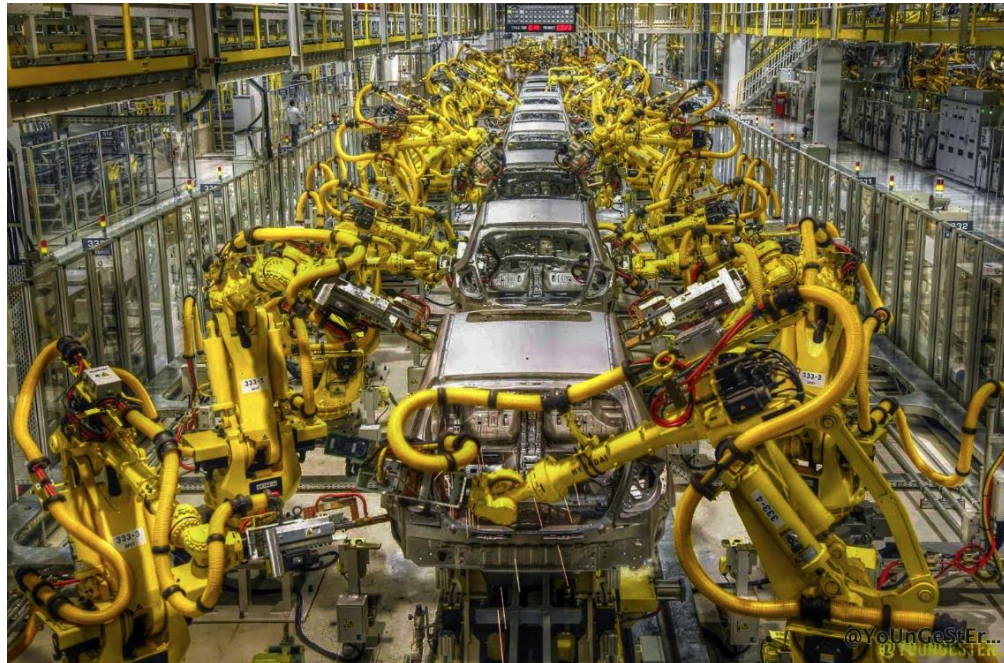
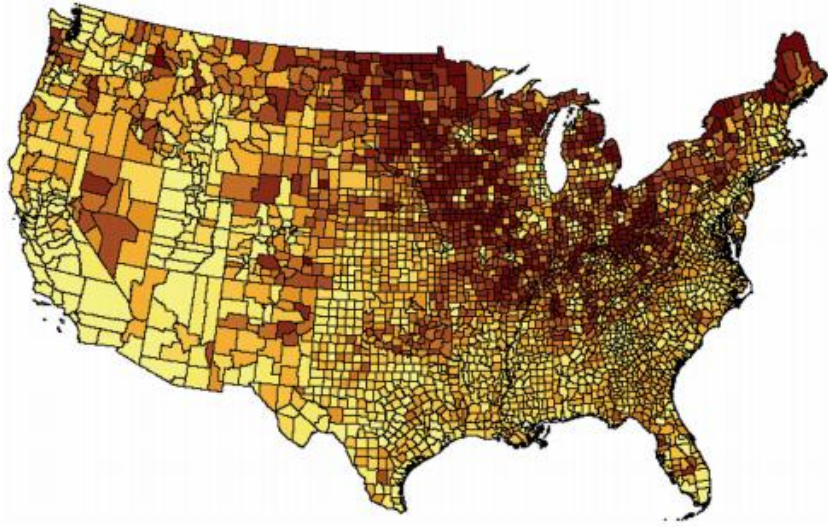
Productivity and Compensation



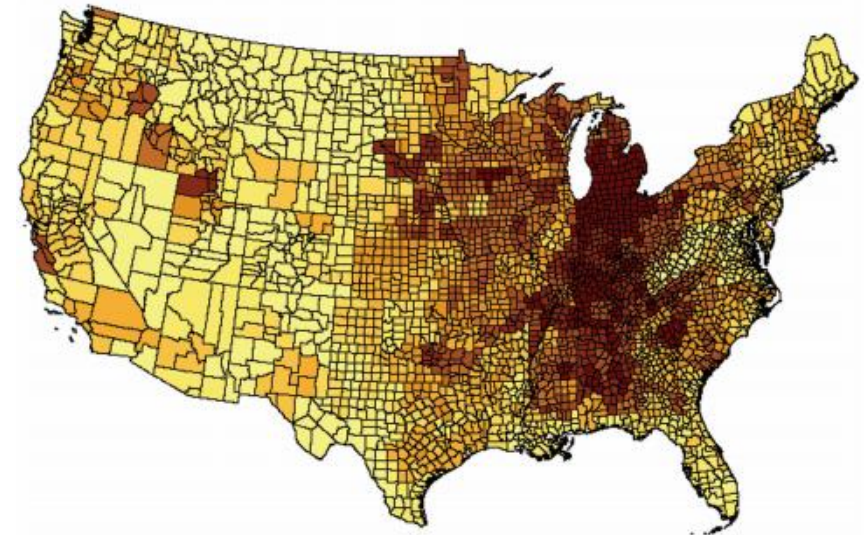
Real Wages by Skill Group



Changes in the Republican vote share, 2012-2016



Changes in robot exposure, 2012-2016



Source: Frey, Berger, and Chen (2018)

We Have Seen Nothing Yet

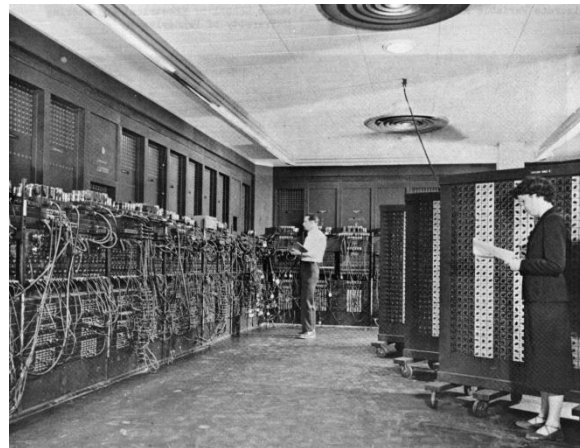
Human computers performing mathematical calculations

"The human computer is supposed to be following fixed rules; he has no authority to deviate from them in any detail."
(Turing, 1950)



Electronic computers performing routine tasks:

- Calculation
- Repetitive customer service
- Picking or sorting
- Repetitive assembly



Machine learning algorithms performing **non-routine** tasks:

- Medical diagnostics
- Document review
- Translation
- Driving

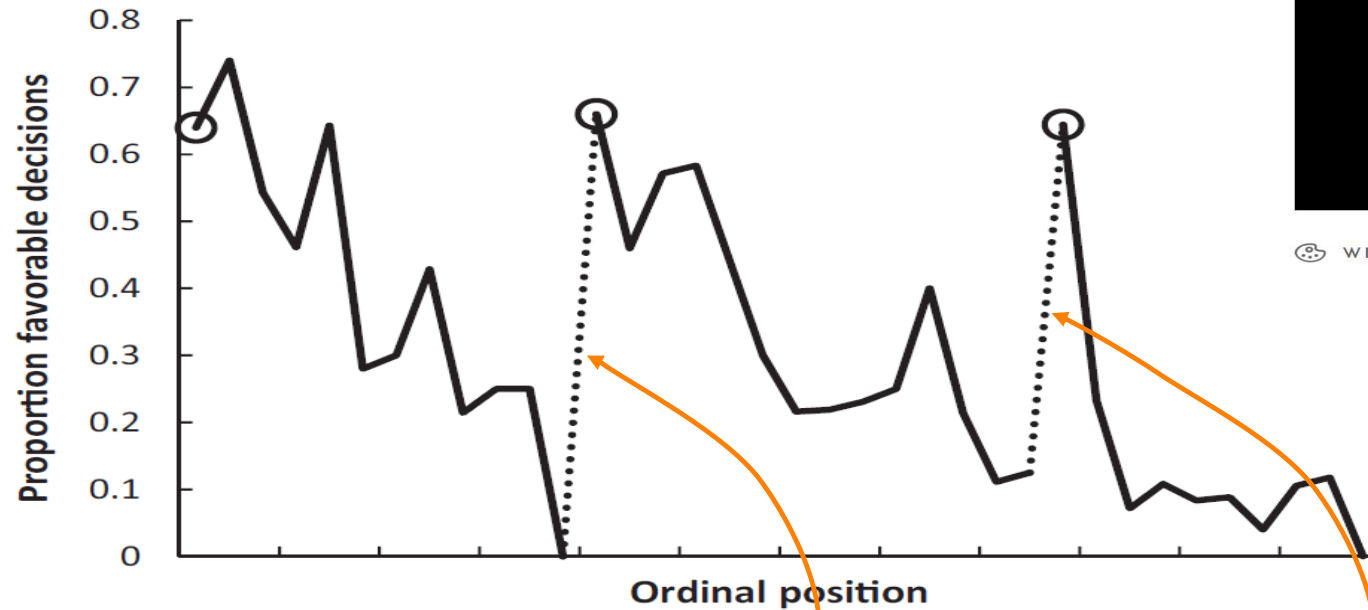


Google
Translate

Break through language barriers.

CAN AI BE A FAIR JUDGE IN COURT? ESTONIA THINKS SO

Israeli judges are significantly more lenient after a food break (Danziger et al 2011).



Morning snack

Lunch



WIRED STAFF; GETTY IMAGES

Simplification is how automation happens

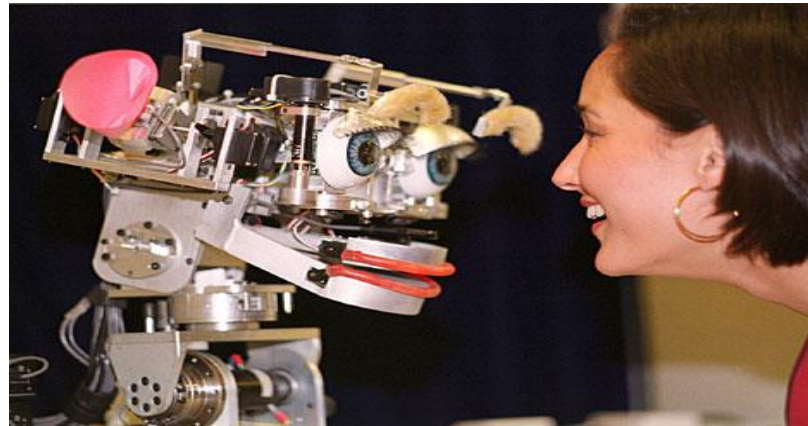


The Human Advantage

Creativity



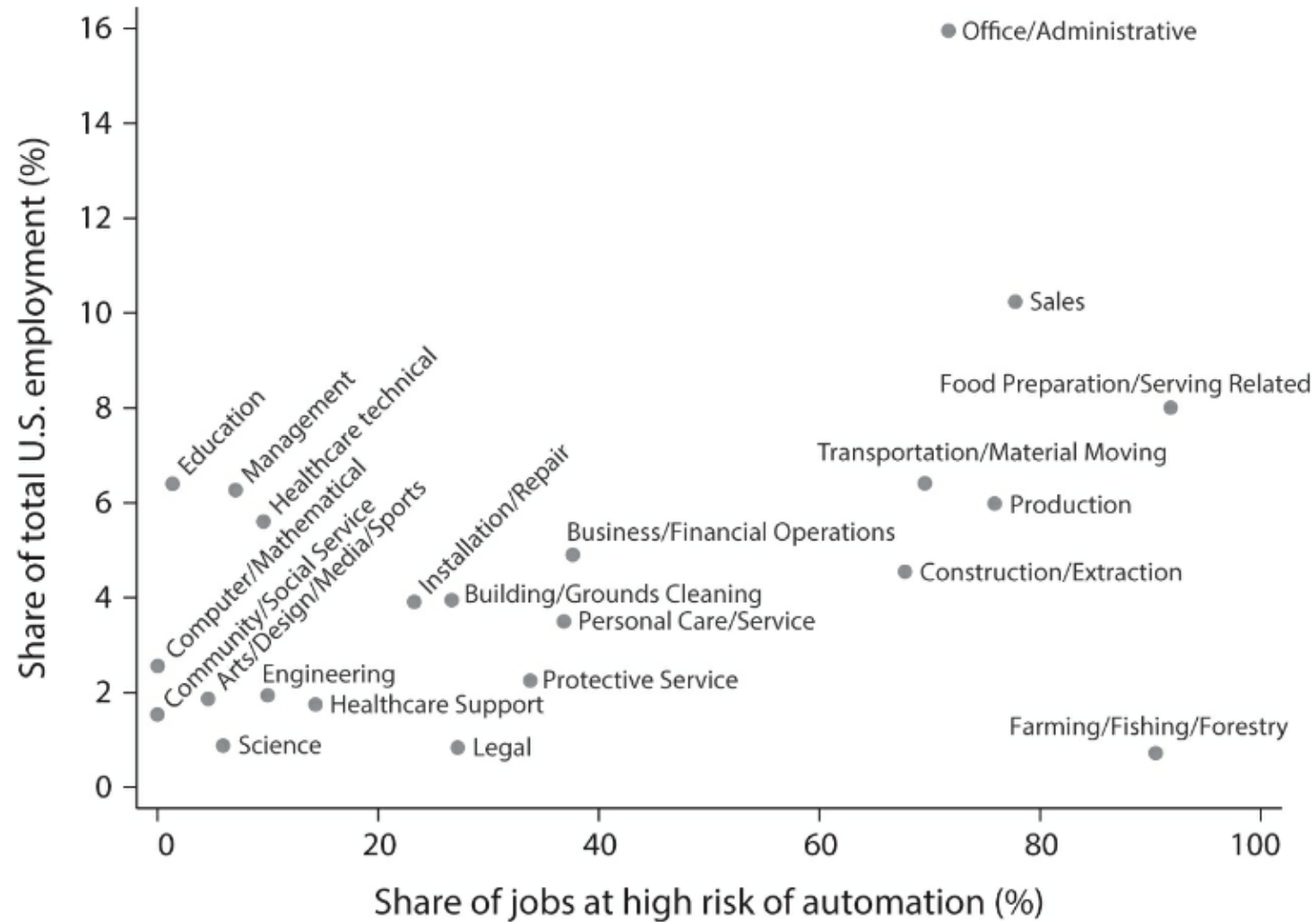
Social intelligence



Perception and manipulation

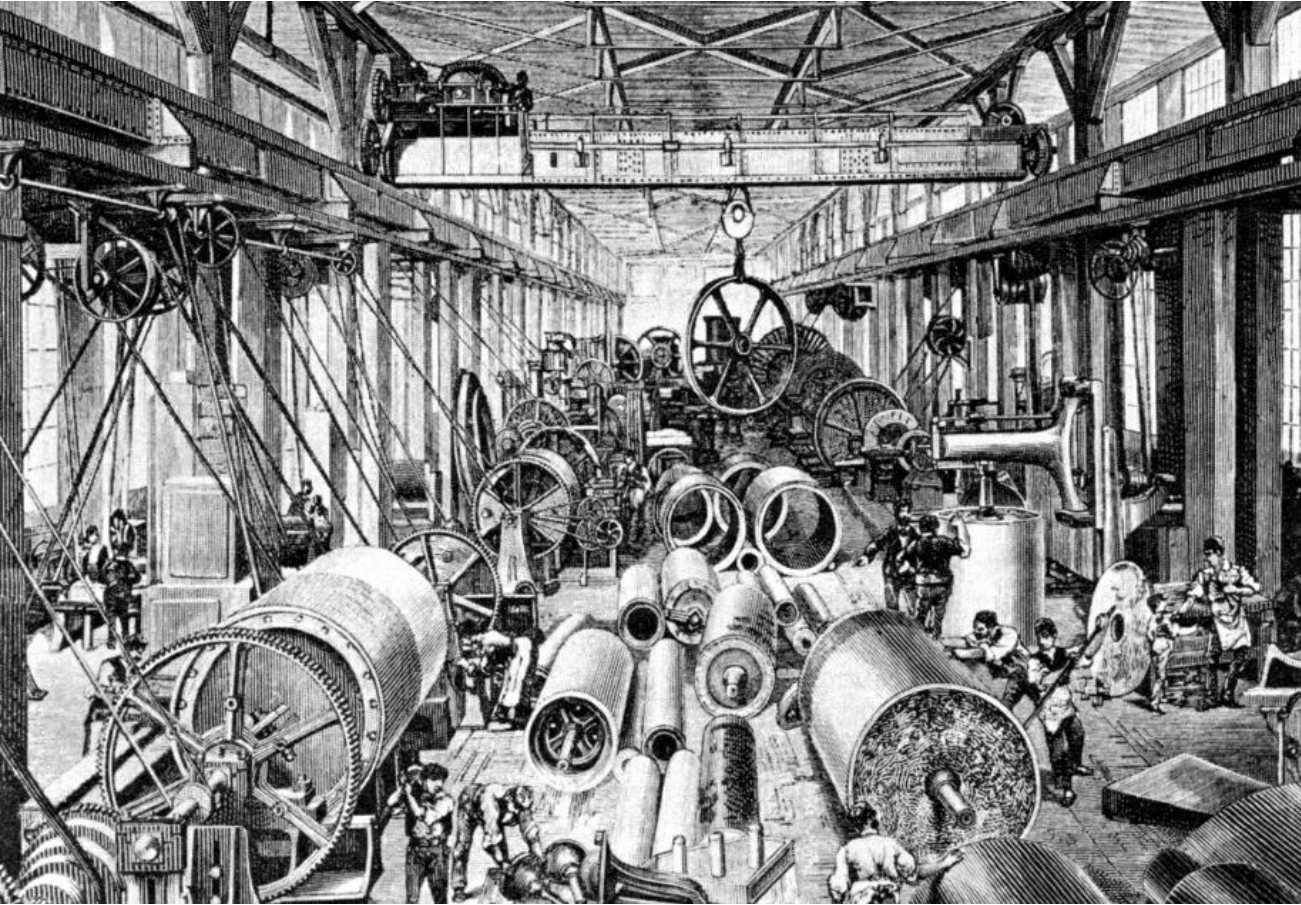


Jobs at Risk





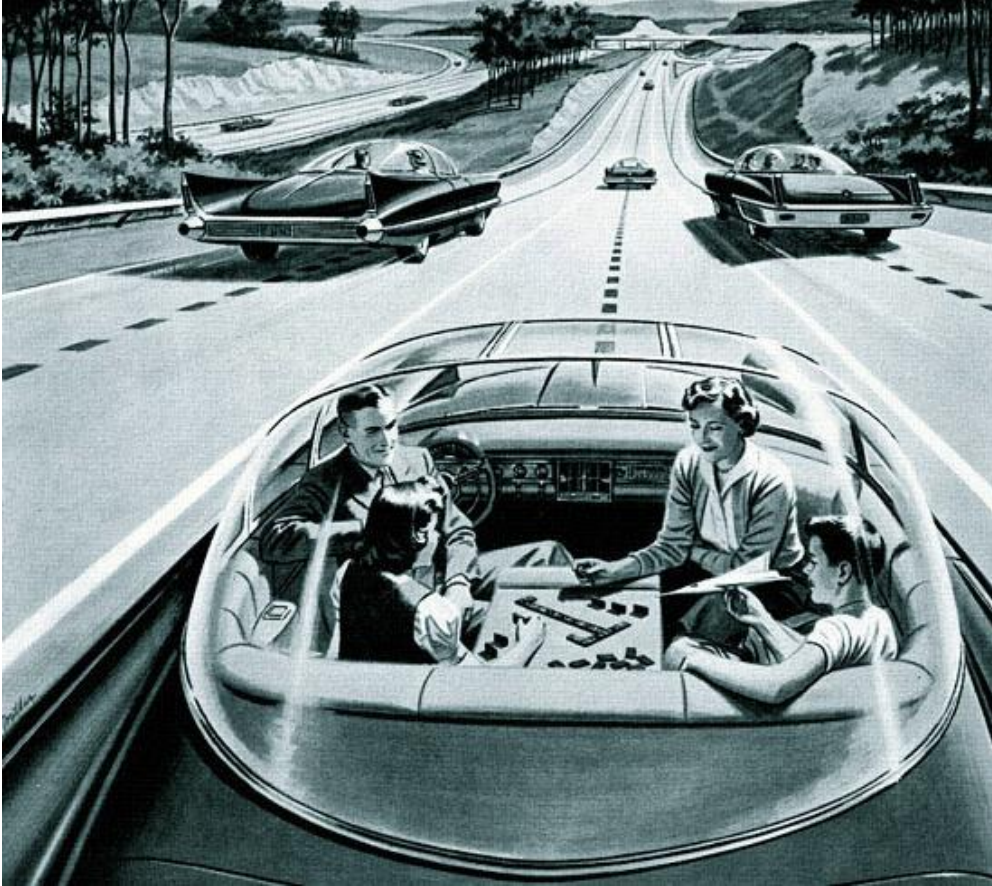
Redesigning the Factory



Redesigning the Cities

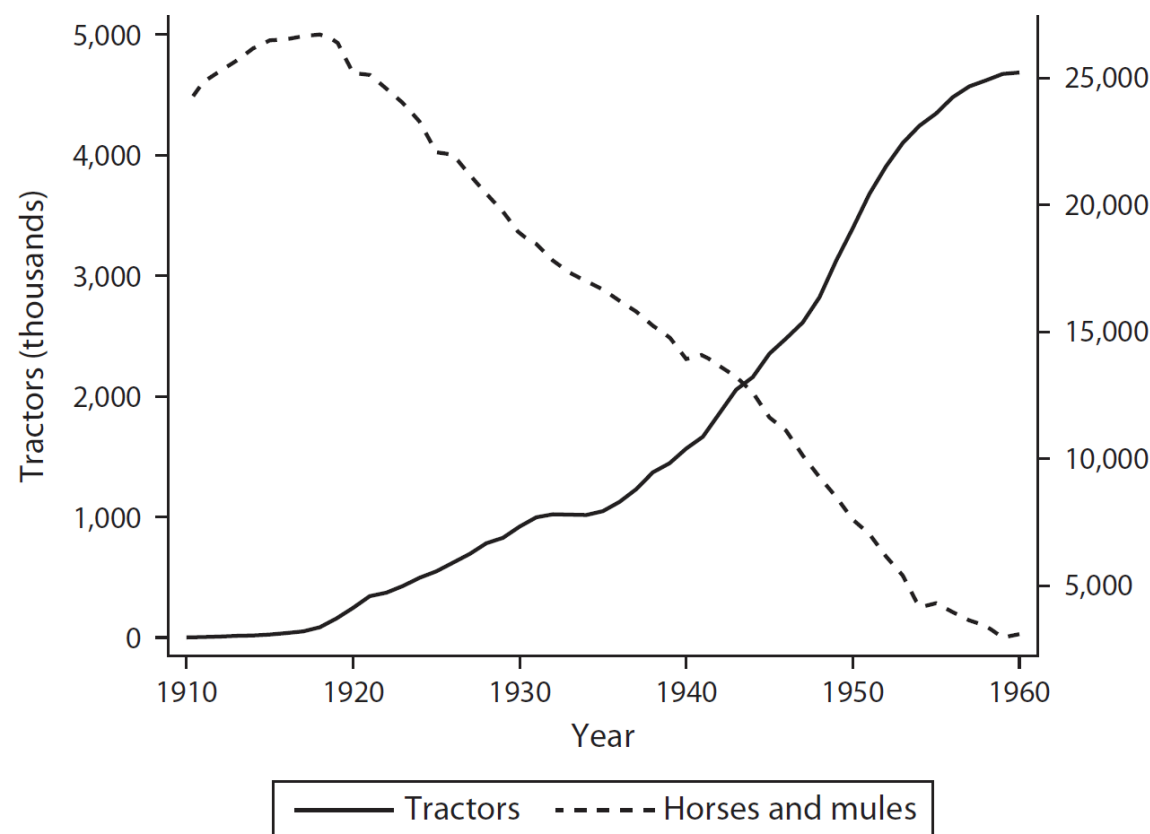


Rethinking Transportation



“If horses could have joined the Democratic party and voted, what happened on farms might have been different.”

- Wassily Leontief



...THE...
Horseless Age

VOLUME 11. JANUARY 7, 1903. NUMBER 1.

WATERLESS KNOX.
THE IDEAL DOCTOR'S CARRIAGE.



(TESTIMONIAL.)
Boston, Mass., August 27, 1902.
AUTOMOBILE HEADQUARTERS, Boston, Mass.:
Dear Sirs—The Runabout which I purchased of you about three months ago has given perfect service, and I am entirely satisfied with it. I consider it the ideal carriage for a physician. The absence of water and its attendant troubles remove about half the anxiety of care necessary to keep it in good running order. I have not had any trouble of any kind with it, although I have run it about 1,000 miles since June. I have not even cleaned the spark plug once in that time. There is no overheating of the engine, in fact, the engine is so cool that I usually open the throttle and allow the engine to take a charge by its momentum after removing the circuit making plug, and am able to start the engine next time by simply pulling the crank one-quarter of a turn. The ease and quickness of the control make it a pleasure to run the carriage. I consider the Knox far ahead of any carriage on the market at the present time for the use to which a physician would put it in his professional work. It is always ready at an instant's notice and I have found it thoroughly reliable.
Yours truly,
GEO. T. CUSHMAN, M. D.

One-quarter of our 1902 output was sold to Doctors.

SEND FOR CATALOG AND TESTIMONIALS.

KNOX AUTOMOBILE CO., Springfield, Mass.

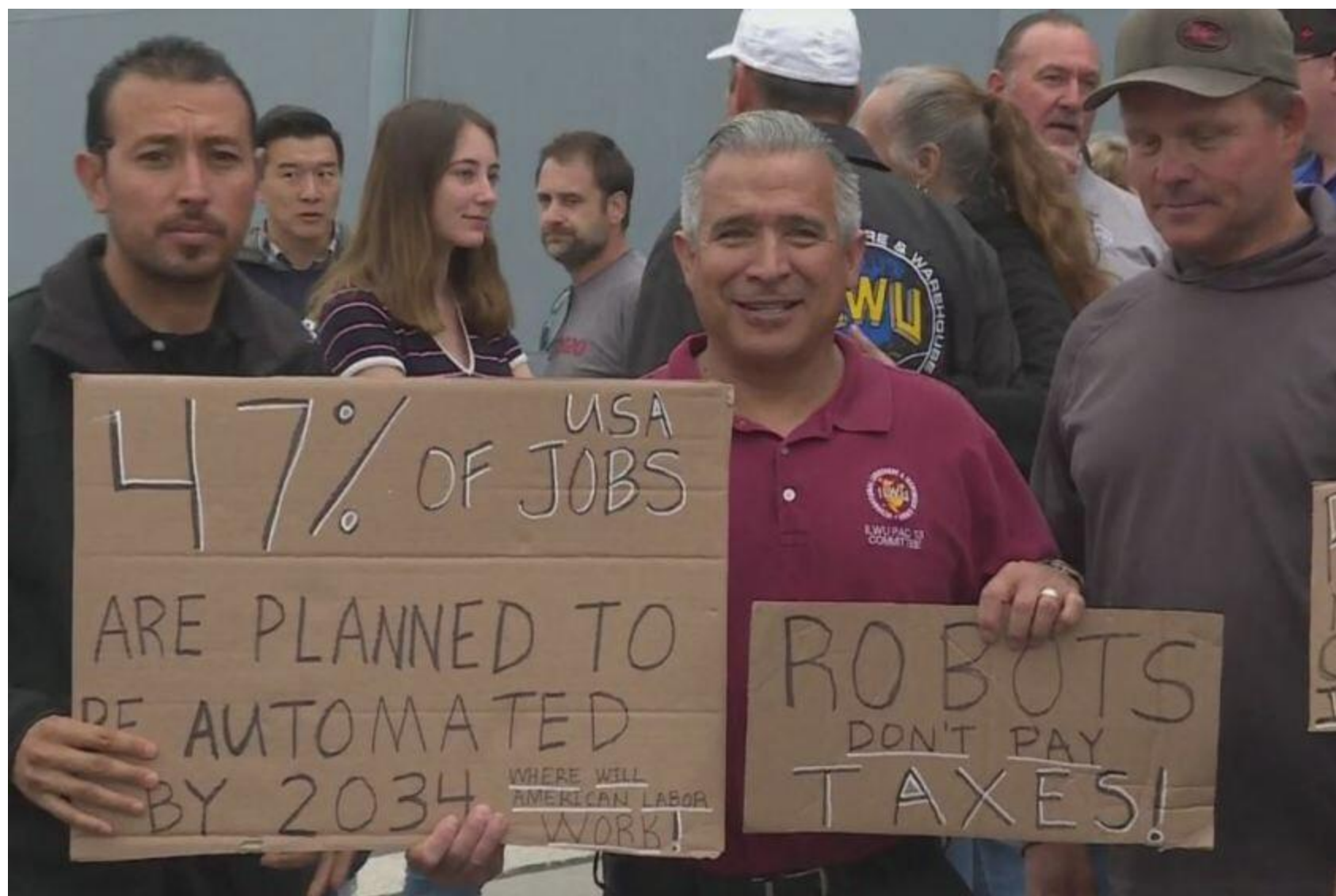
NEW YORK: 152 West 38th Street.
February 1,
140 West 39th Street.

WESTERN AGENCY:
National Automobile and Mfrs. Company,
20 Fremont St., SAN FRANCISCO, CAL.

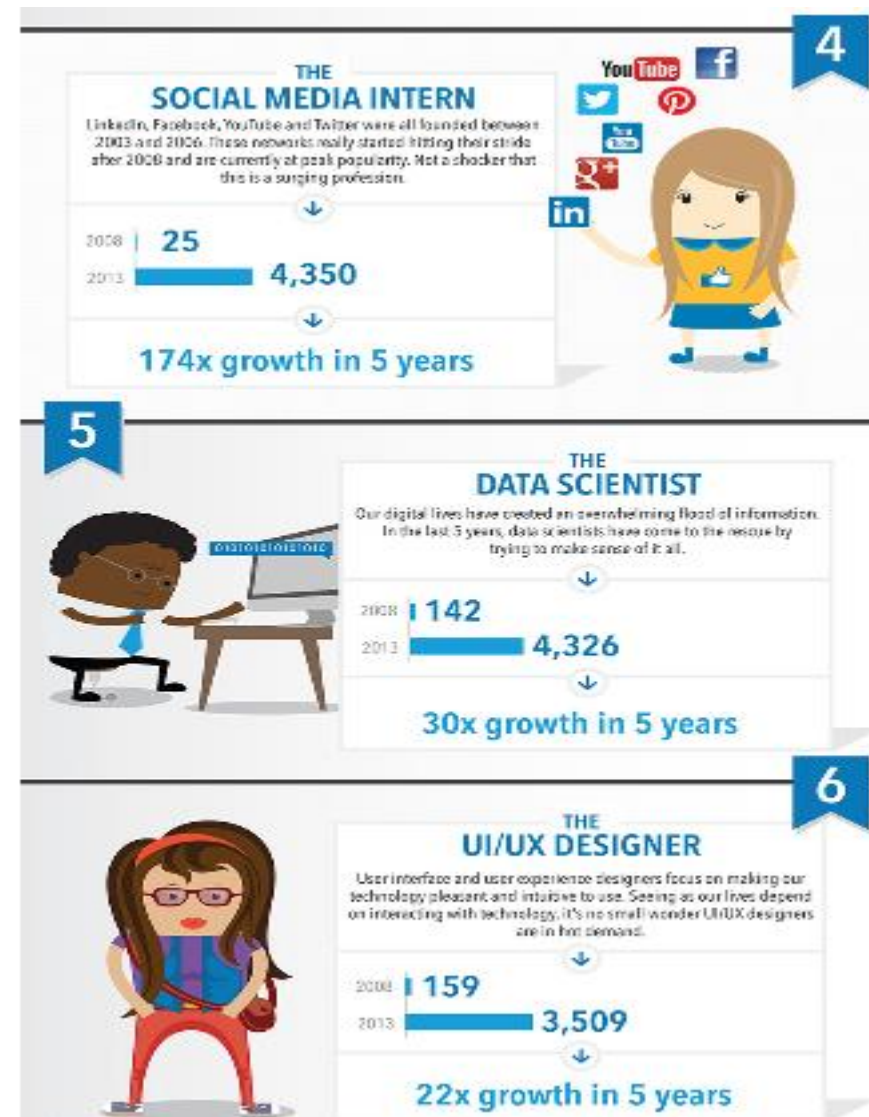
COPYRIGHT, 1903, BY E. F. INGERSOLL.



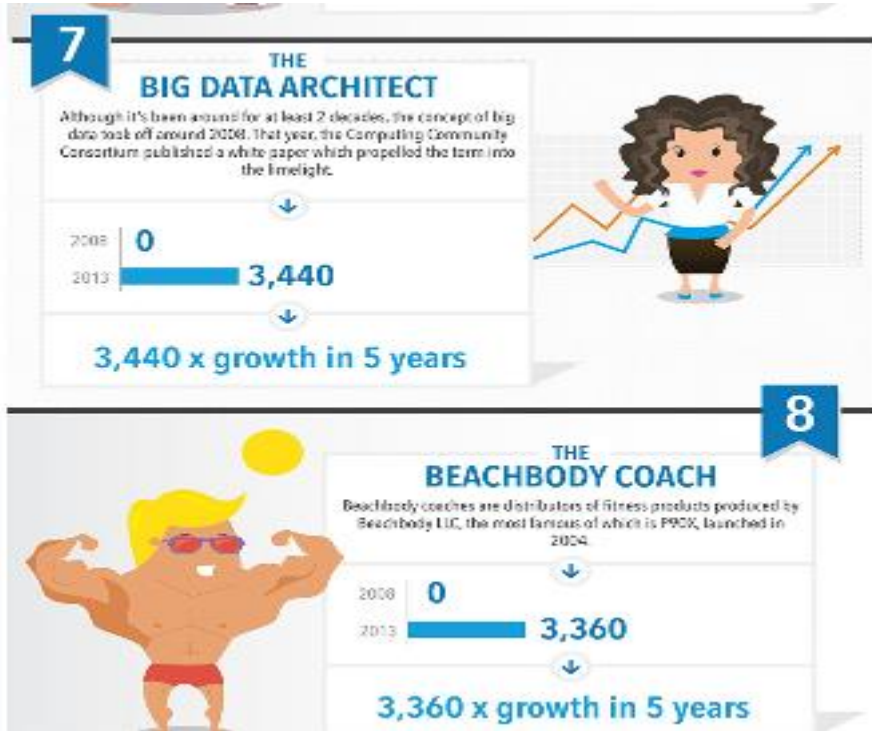
Truckers gather at Capitol to push for new bill prohibiting driverless trucks



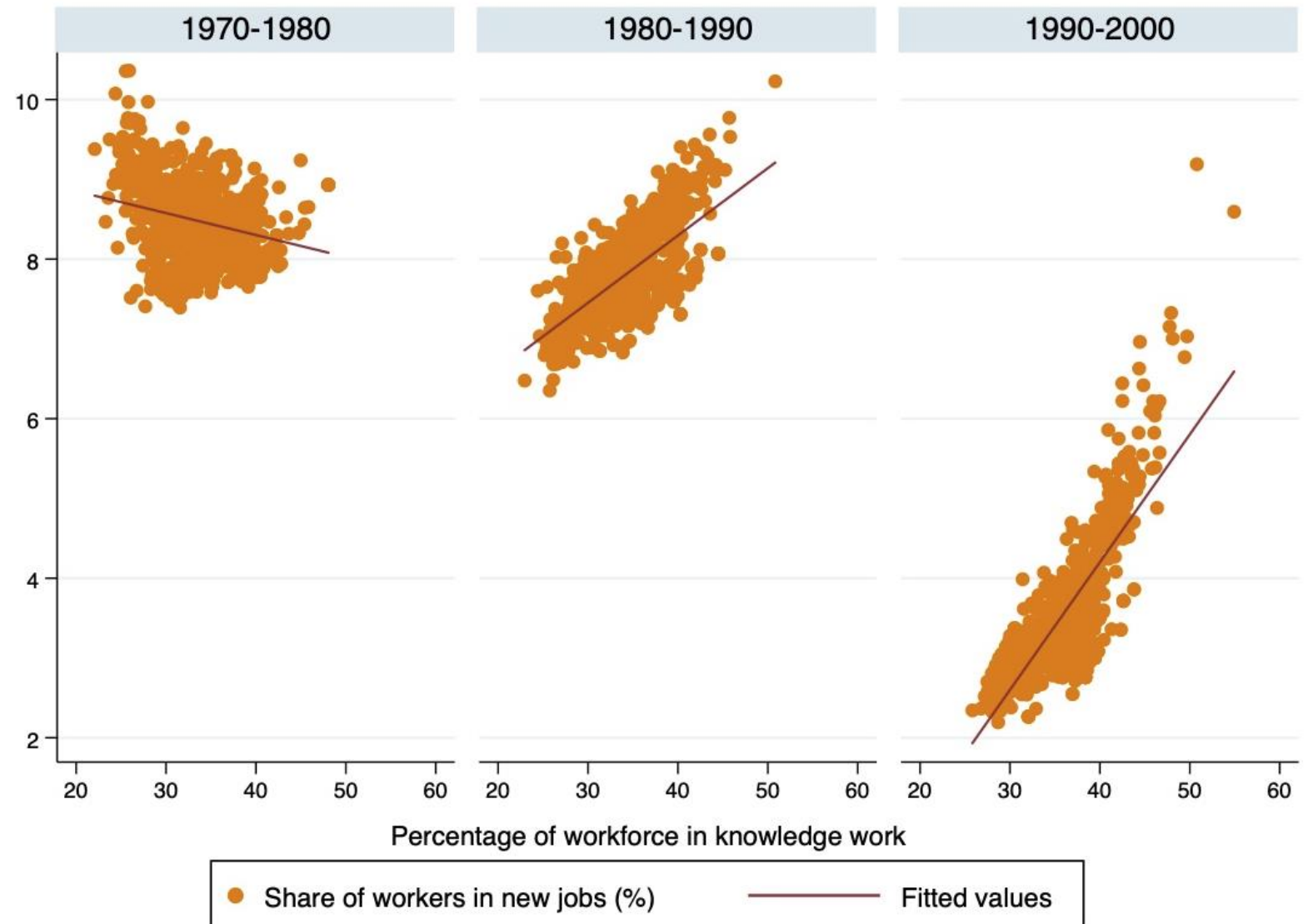
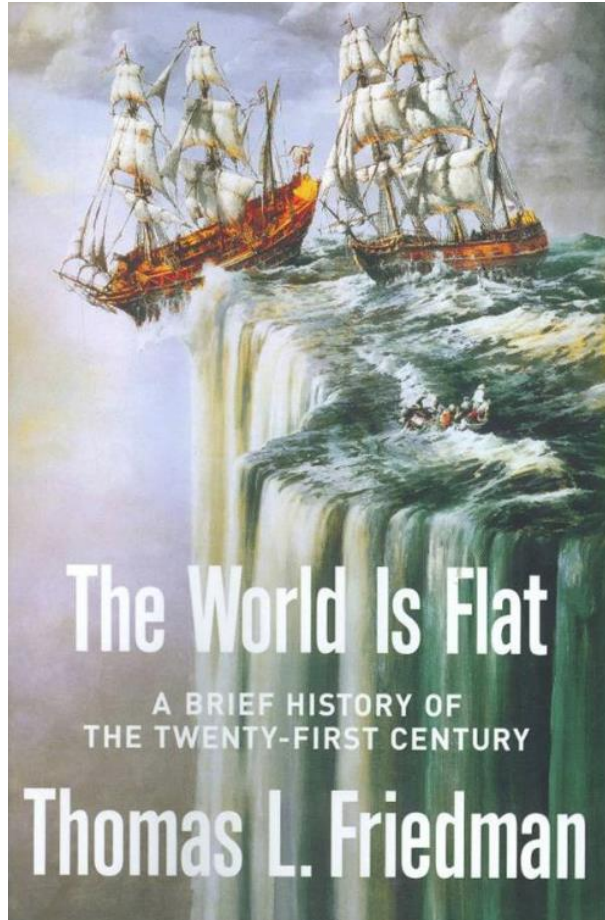
Jobs of the Future?



Jobs of the Future?



The Great Divergence



Source: Berger and Frey (2016)



THE TECHNOLOGY TRAP



CAPITAL, LABOR, AND POWER IN THE AGE OF AUTOMATION



CARL BENEDIKT FREY



Rethinking the Internet

