

# CS440/ECE448

## Lecture 35:

# The Future of Work

Mark Hasegawa-Johnson, 4/2024

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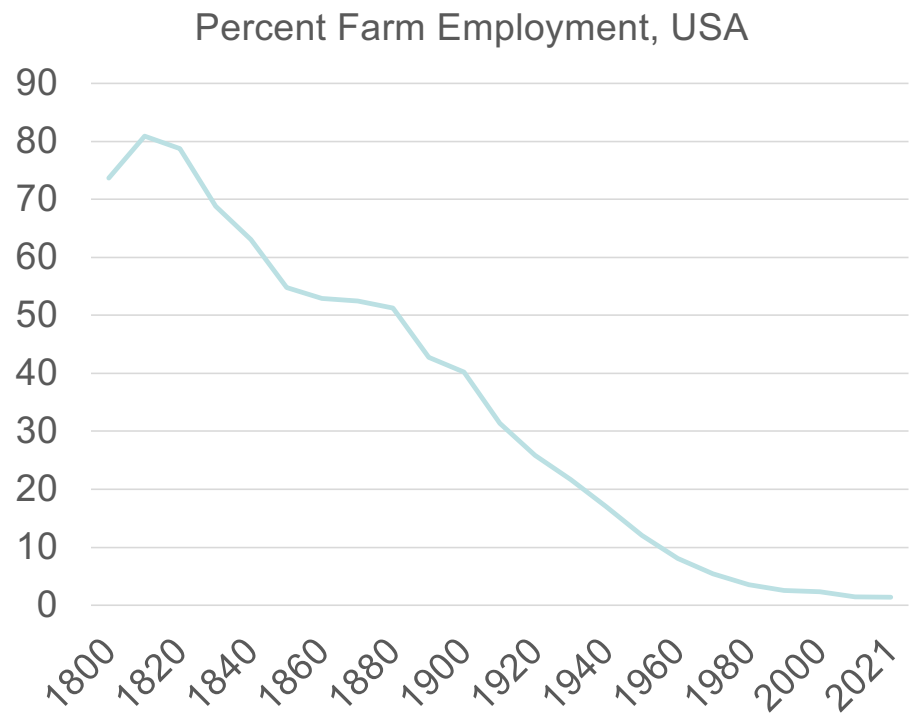
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# Outline

- The history of work
- The Luddite revolution
- Say's Law
- Universal basic income and Flextime
- Income inequality

# Percentage of the labor market employed on farms, USA, 1800-2021

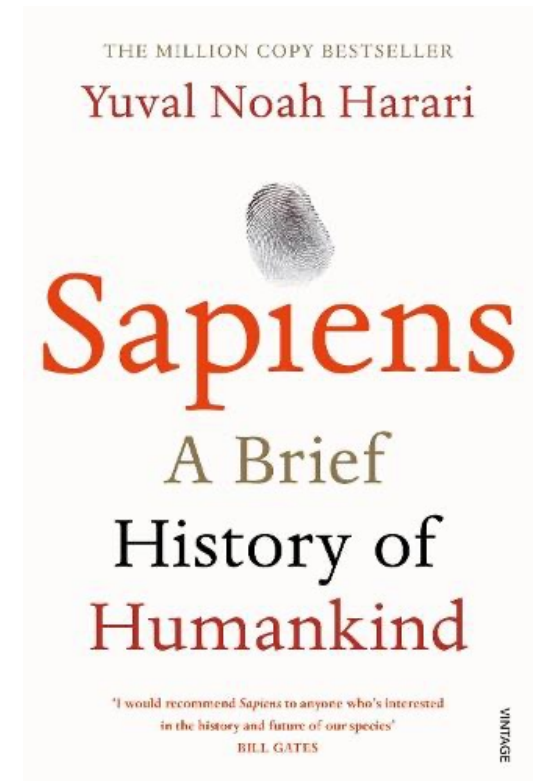
- From 9000BCE until 1880, more than half of all people worked on farms
- In 2021, 1.4% of people in the USA work in farming, forestry, or mining



Stanley Lebergott, "Labor Force and Employment, 1800-1960," 1966

# A brief history of humankind

- **100,000–10,000ya: Hunters & Gatherers**
  - If hungry: go to nearest bush, pick fruit
  - World population: 10,000
- **10,000–100ya: Farmers**
  - If hungry: plant, water, weed, harvest, store, cook
  - World population: 10,000,000
- **100ya – now: Employers & Employees**
  - If hungry: work, earn money, buy food
  - World population: 10,000,000,000



# Brief history of work

- “Work” meaning “employment” is a recent invention: about 150 years old
- It need not be what it currently is.

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# The Luddites

- The Luddites were craftsman weavers who lost work because of new weaving factories.
- They organized a secret army to smash factory looms.



[https://commons.wikimedia.org/wiki/File:Blue\\_Plaque\\_for\\_Westhoughton\\_Mill.JPG](https://commons.wikimedia.org/wiki/File:Blue_Plaque_for_Westhoughton_Mill.JPG)



# Gandhi

"What I object to, is the craze for machinery, not machinery as such. The craze is for what they call labour-saving machinery. Men go on 'saving labour', till thousands are without work and thrown on the open streets to die of starvation." — Gandhi, 1924



By Unknown author - gandhiserve.org, Public Domain,  
<https://commons.wikimedia.org/w/index.php?curid=6367822>



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# Say's Law

A product is no sooner created, than it, from that instant, affords a market for other products to the full extent of its own value. – Jean-Baptiste Say, 1834

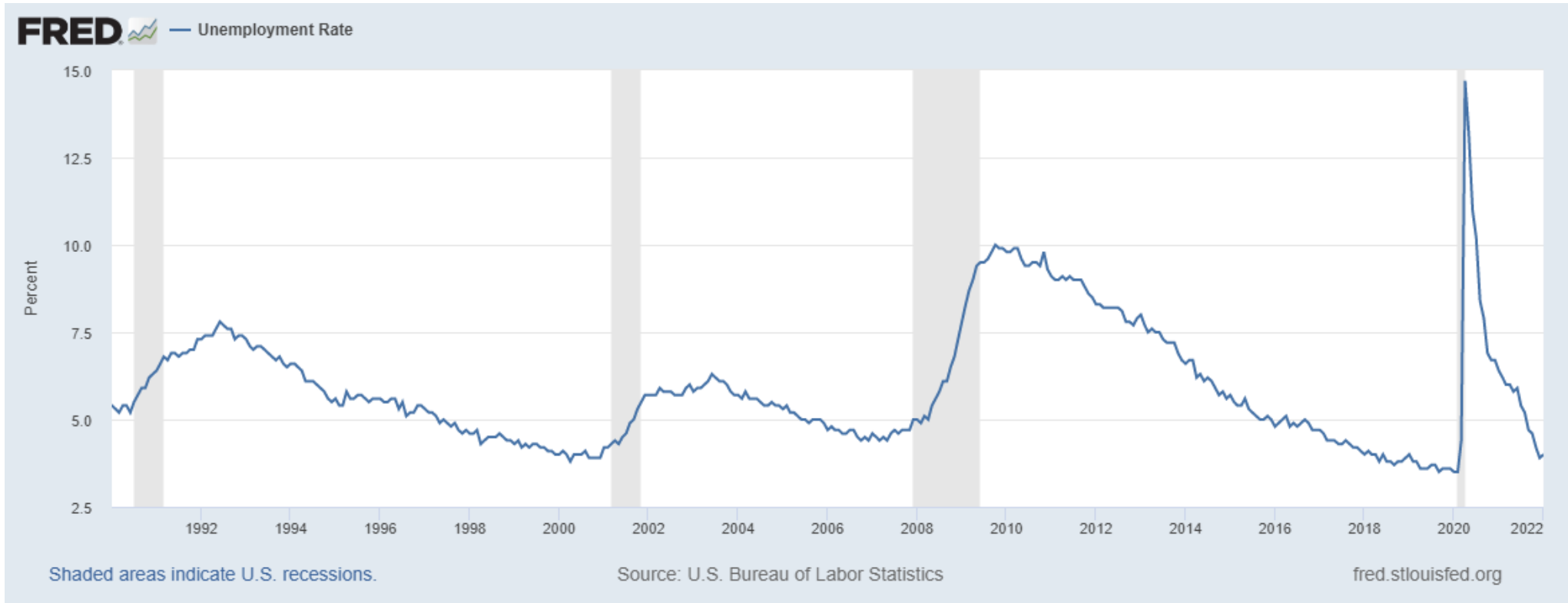


[https://commons.wikimedia.org/wiki/File:Jean-baptiste\\_Say.jpg](https://commons.wikimedia.org/wiki/File:Jean-baptiste_Say.jpg)

# Technological Unemployment vs. Say's Law

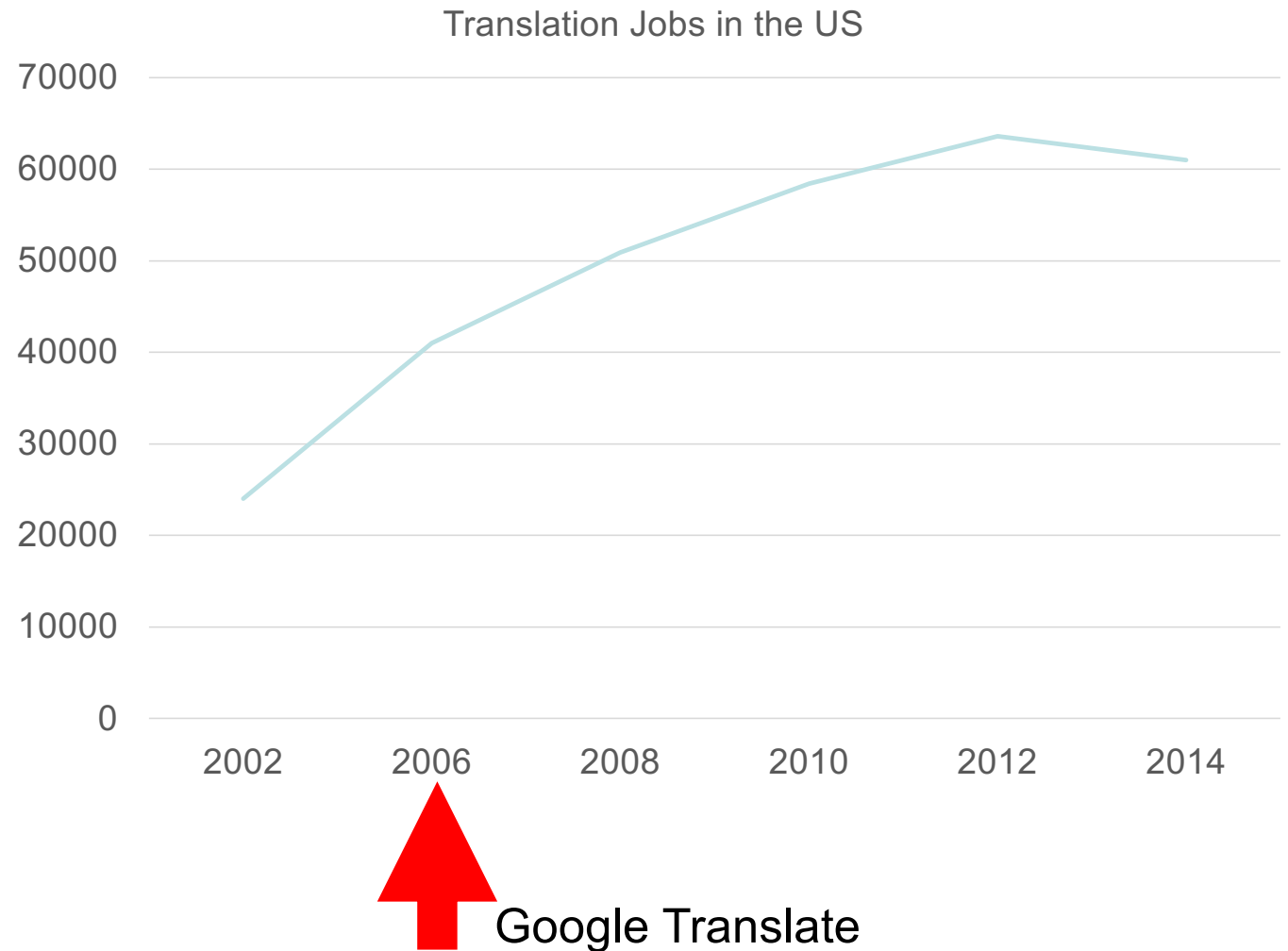
- Technological unemployment results when a new machine puts people out of work.
- Say's Law introduced the idea that the efficiency of the new machine creates the opportunity for new products that will employ people in new jobs.

# The economic cycle: Job gain follows job loss



US Unemployment rate, January 1990 to December 2021. Public domain image, <https://fred.stlouisfed.org/graph/?g=FfBh>

- ‘Labor-saving’ technologies can, in some cases, result in a significant increase in the number of available jobs.
- Example: Google Translate.
- Data from Tamara Cabrera, “The Translating and Interpreting Industry in the United States,” 2014



# Mina Lee, Percy Liang and Qian Yang, “Co-Author: Designing a Human-AI Collaborative Writing Dataset for Exploring Language Model Capabilities,” CHI 2022

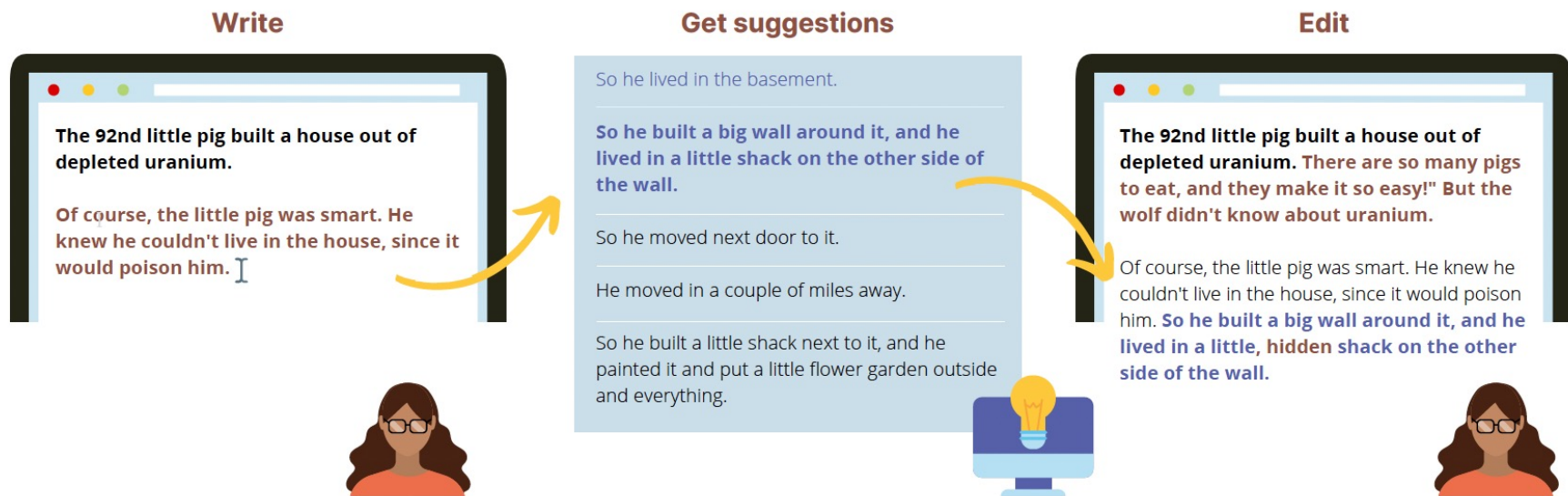
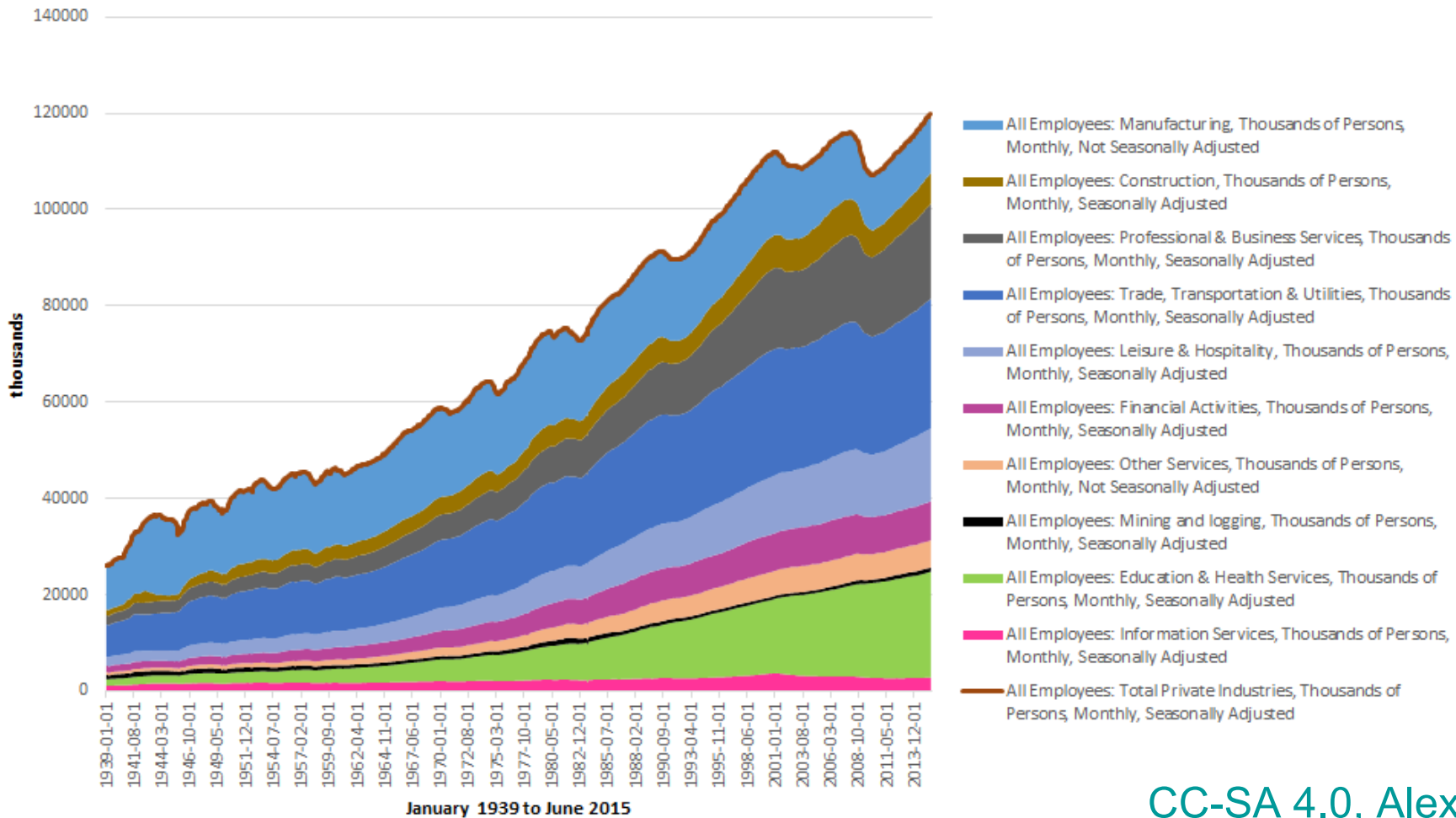


Figure 1: We present CoAUTHOR, a dataset designed for revealing GPT-3’s generative capabilities for interactive writing. It contains rich interactions between 63 writers and 4 instances of GPT-3 across 1445 writing sessions. Each session starts with a prompt (black text). Writers then freely write (brown), request suggestions from GPT-3 (blue), accept or dismiss suggestions, and edit accepted suggestions or previous texts in any order they choose.

# All employees, private industries, by branches

USA

source of data Fredgraph St. Louis



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# Universal basic income

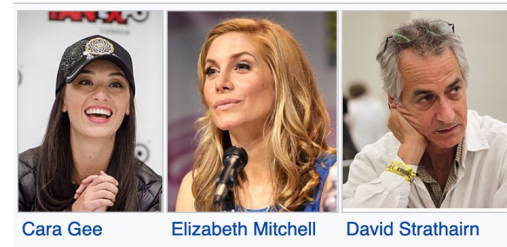
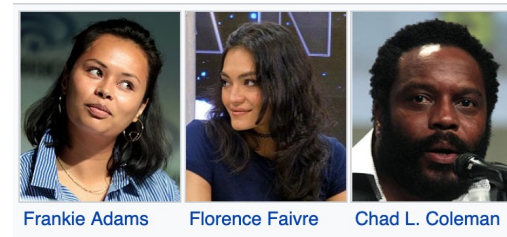
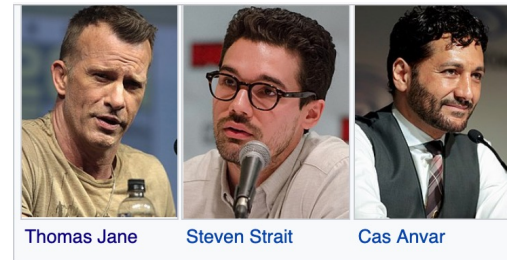
- In “Utopia,” Thomas More’s imaginary country, theft is abolished by giving every citizen enough to eat.
- Philosophers including Thomas Paine and Bertrand Russell wrote about UBI.
- William Beveridge was perhaps the first economist to support it; it then became popular in the United States during discussions of Lyndon Johnson’s “New Deal”



Utopia by Thomas More. Transferred from it.wikipedia by User:Marcok., Public Domain, <https://commons.wikimedia.org/w/index.php?curid=3893696>

# UBI in Science Fiction

- In *The Expanse*, Daniel Abraham and Ty Franck predict that most people will live on “basic income” provided by the government.
- People who want to earn more, by working, must first go to college.
- People who want to go to college must first work for a trial year in an uneducated job, to prove that they have the will to work.



Actors from The Expanse TV series. Images contributed CC-SA by many contributors: [https://en.wikipedia.org/wiki/The\\_Expanse\\_\(TV\\_series\)](https://en.wikipedia.org/wiki/The_Expanse_(TV_series))

# Flextime—the New Work Schedule?

*By Edgar T. Busch\**

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*In this article the author discusses flextime, an alternative to today's working conditions. Flextime is a developing trend and one which is being tried in some work—most notably in West Germany. [Reprinted from the December 1973 issue of the U.S. Army Audit Agency Pamphlet.]*

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The CPA Journal 44:57, 1974,

<https://www.proquest.com/docview/214923720>

# 4 Day Week

- Another alternative is the 4 Day Week
- 4 Day Week is a non-profit seeking to perform research in support of a new global standard supporting 4-day work weeks.



**DAY WEEK GLOBAL**

<https://www.4dayweek.com/>

# 4-Day Week

“Netherlands is among the nations with the shortest work weeks, according to *CNN Money*. Netherlands has an average of 29 working hours per week and an average annual income amounting to \$47,000.” –

<https://nltimes.nl/2013/07/11/worlds-shortest-work-weeks>

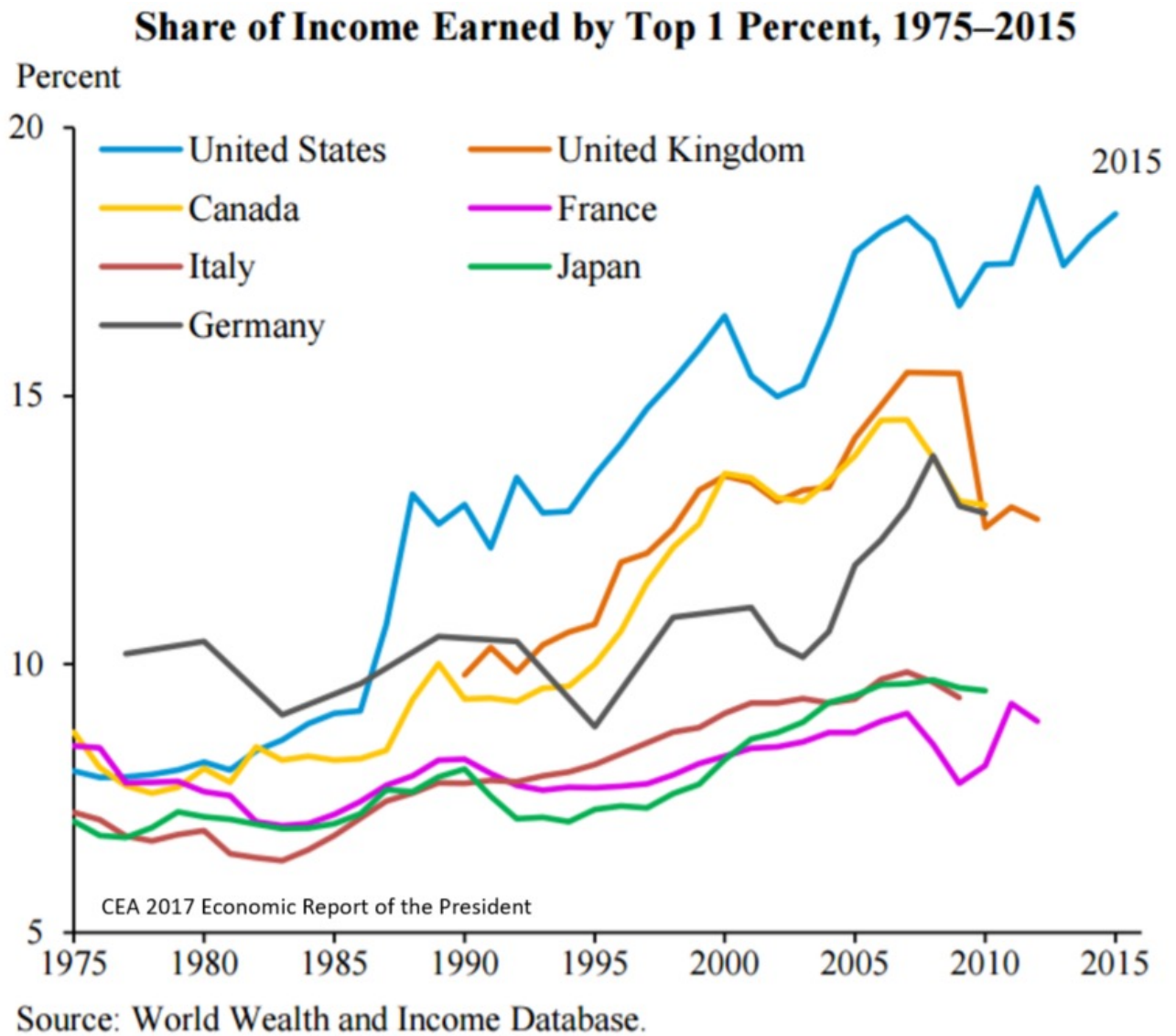
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# Income Inequality

By U.S. Council of Economic Advisers - 2017 Economic Report of the President - 2017 Economic Report of the President, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=54550890>



# Some advantages and disadvantages of income inequality

- Advantages:
  - Income concentrated in the hands of the most creative individuals tends to encourage economic growth
  - A rational agent takes risk only if  $(\text{probability of success}) \times (\text{possible gain}) > 1$ , so income inequality encourages people to take risks, up to a point
- Disadvantages:
  - Income concentrated in the hands of non-creative individuals stifles growth
  - Inequality decreases trust in society
  - Inequality increases crime
  - Inequality is correlated with the probability of violent revolution

# Relationship of AI to income inequality

- “Artificial Intelligence Has Caused A 50% To 70% Decrease In Wages—Creating Income Inequality And Threatening Millions Of Jobs.”
  - Jack Kelly, Forbes, June 2021
- “AI can reduce economic inequalities by helping small businesses compete with larger ones.”
  - Quantilus Innovation, December 2022

# How to Solve AI's Inequality Problem

“When you look at AI research, and you look at the benchmarks that are used pretty much universally, they’re all tied to matching or comparing to human performance. Benchmarks are super important to AI developers—especially for young scientists, who are entering en masse into AI and asking, ‘What should I work on?’”

- Katya Klinova, Technology Review, April 2022

“But benchmarks for the performance of human-machine collaborations are lacking.”

- David Rotman, Technology Review, April 2022

# Readings about the Future of Work

Collected by Svetlana Lazebnik

- [Moshe Vardi talk](#) (YouTube)
- [AI NOW report](#) (2017)
- [Technological unemployment](#) (Wikipedia)
- [A world without work](#) (The Atlantic, July 2015)
- [The automation paradox](#) (The Atlantic, Jan. 2016)
- [AI will transform the economy. But how much, how soon?](#) (New York Times, Nov. 2017)
- [Welcoming our new robot overlords](#) (New Yorker, Oct. 2017)
- [The great tech panic: robots won't take all our work](#) (Wired, Aug. 2017)