

AI and the Economy

How can we grow our prosperity through automation without leaving people lacking income or purpose?

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MIT
INITIATIVE ON THE
DIGITAL ECONOMY

**The
Economist**

JANUARY 12TH-18TH 2013

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

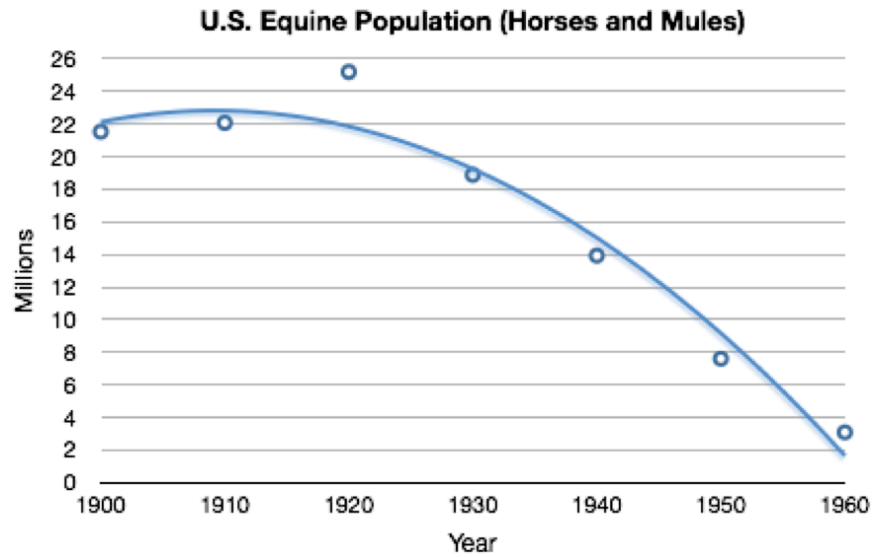
Obama's controversial new men
Pressure for change builds in China
Men close the longevity gap
The ghastry gurus of personal finance
Microchipping your children

**Will we ever
invent anything this
useful again?**

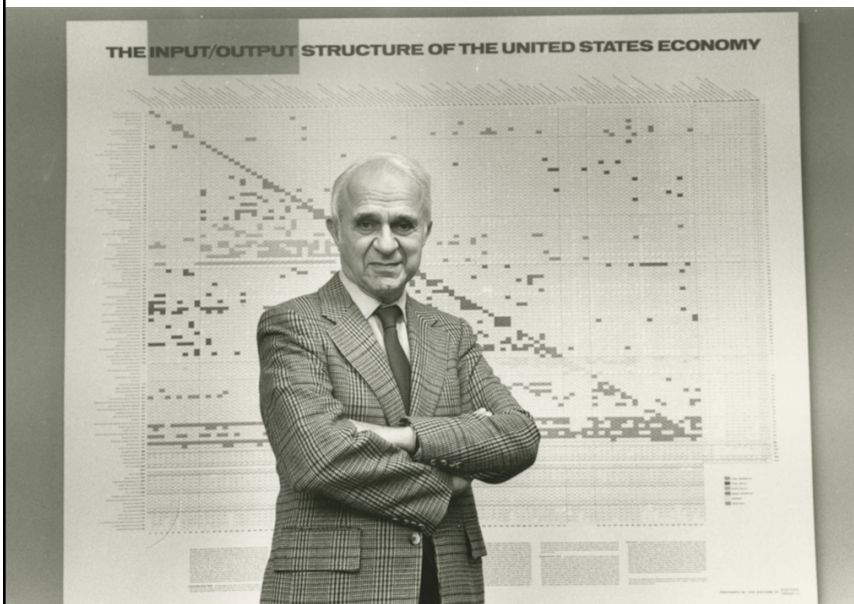


The growing debate about
dwindling innovation

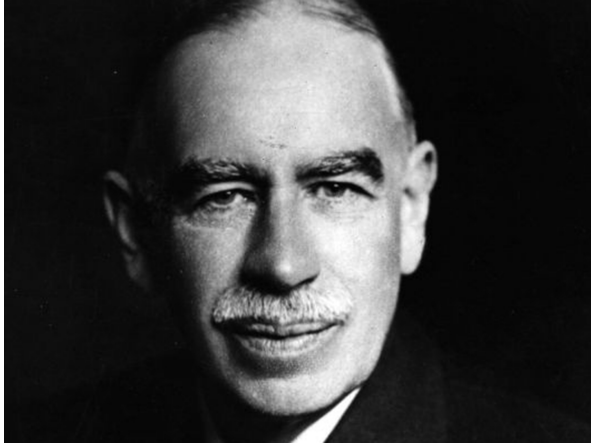




Sources: Kilby, 2007, Wisdom, 2014.



“The human worker will
go the way of the horse”
– Wassily Leontief
Nobel Prize, 1973



We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come-- namely, **technological unemployment**.

-- John Maynard Keynes,
1930



When there's no other dude in the car, the cost of taking an Uber anywhere becomes cheaper than owning a vehicle.

-- *Travis Kalanick CEO, Uber*

Why not?

Why not?



1. The Argument from History

“There are more net jobs in the world today than ever before, after hundreds of years of technological innovation and hundreds of years of people predicting the death of work.”

– Marc Andreessen, 2016

Why not?

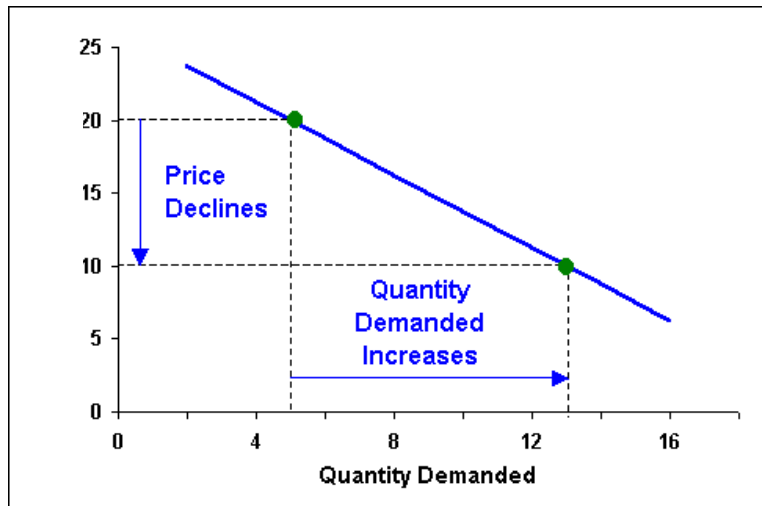
2. Challenge the Lump of Labor Fallacy



“By reducing the costs of production and thereby lowering the price of a particular good in a competitive market, technological change frequently leads to increases in output demand: greater output demand results in increased production, which requires more labor.”

- National Academy of Sciences, 1987

The Law of Demand

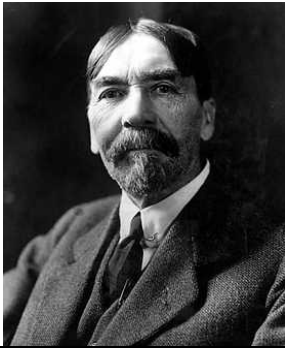
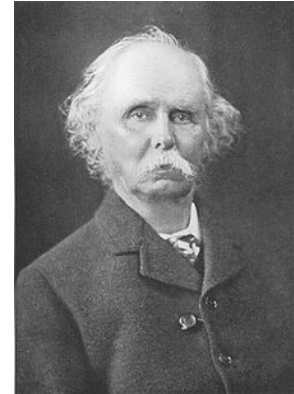


Why not?

3. Human Needs are Infinite

“Human wants and desires are countless in number and very various in kind”

- Alfred Marshall, 1890



“Invention is the mother of necessity.”

- Thorstein Veblen, 1914

Why not?

4. Essential Human Skills



“There are more bank tellers, sales clerks and receptionists and secretaries in 2009 than in 1999, according to the Bureau of Labor Statistics. The reason: demand.”

- Jim Bessen, Boston University

Why not?

5. Humans can change the rules



“A final important difference between horses and humans will become clear: humans can revolt.”

- Erik Brynjolfsson and Andrew McAfee, 2015

BREXIT



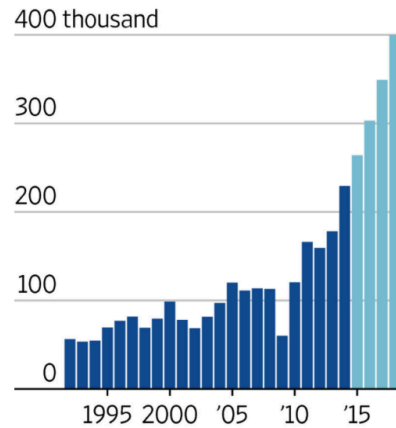
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The Robot Revolution has Barely Begun



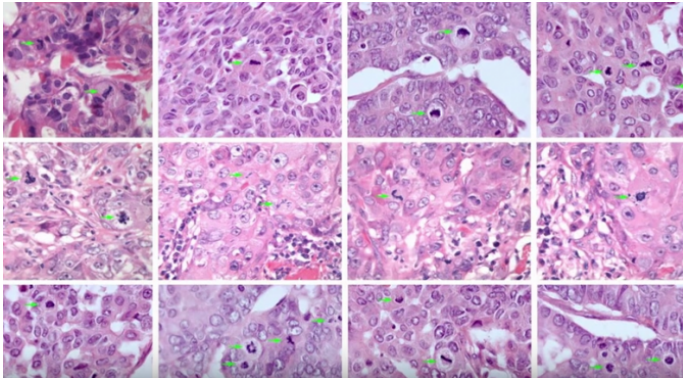
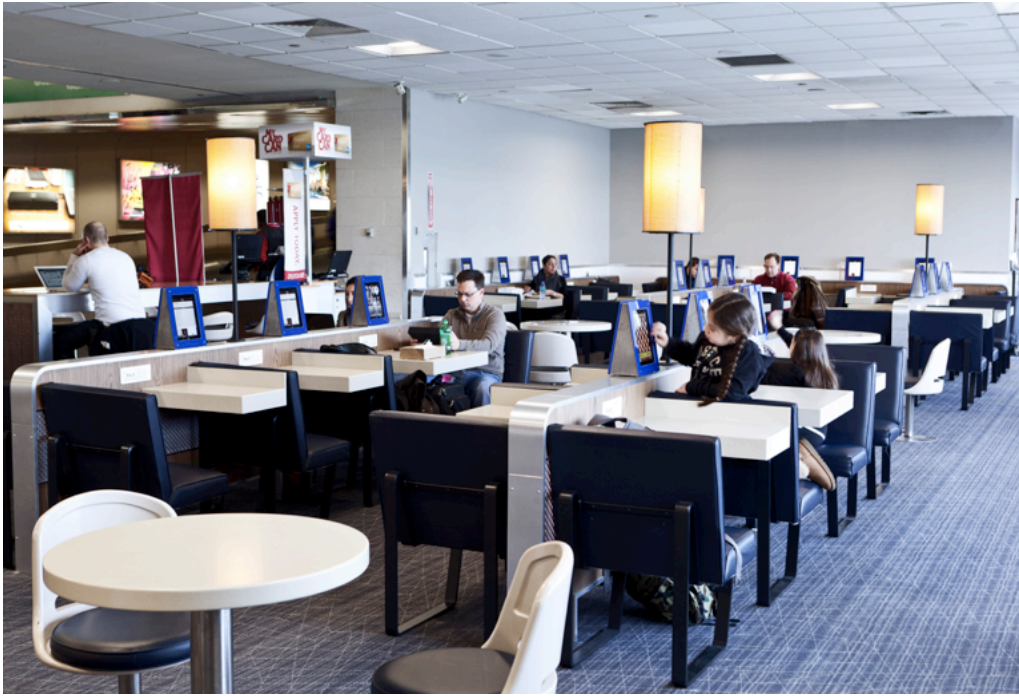
World-wide industrial robot shipments



Note: 2015 and later are projections.

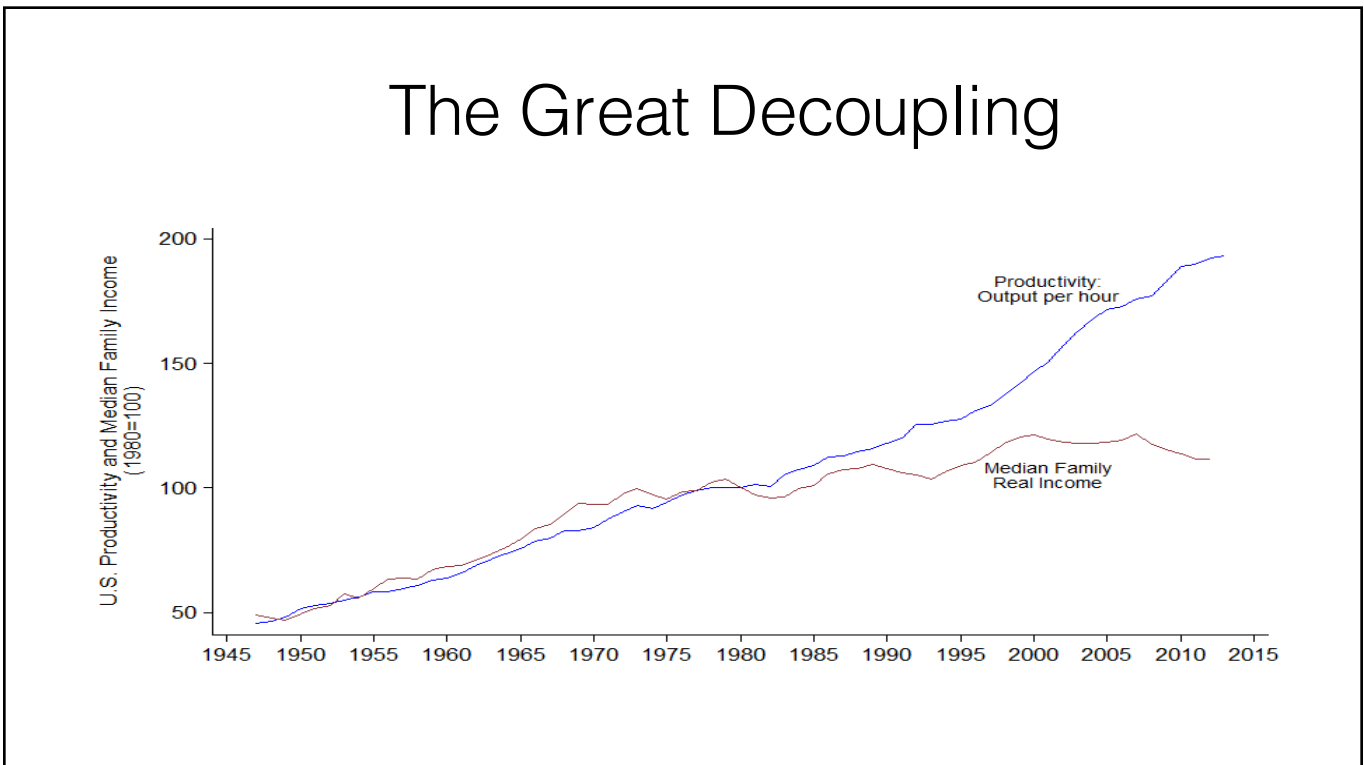
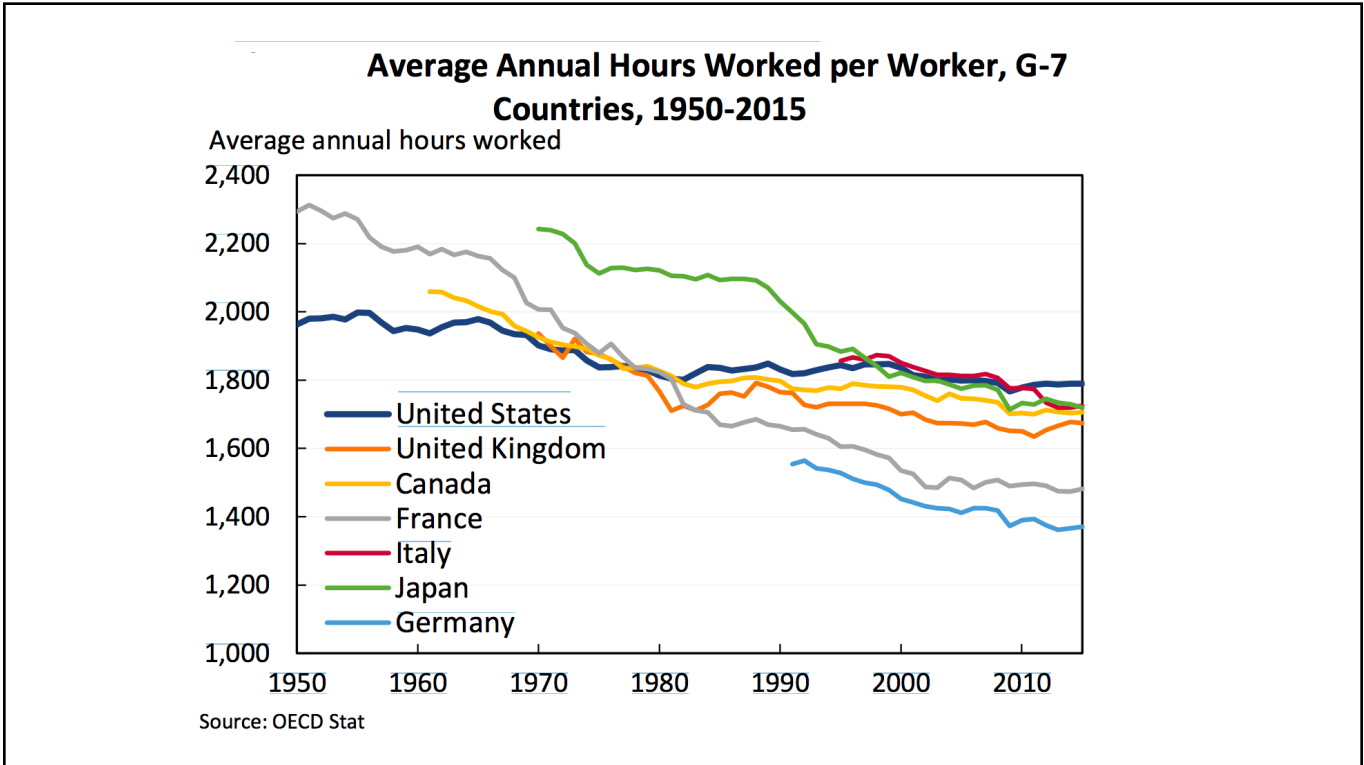
Source: International Federation of Robotics





“The economic effects of AI on cognitive human jobs will be analogous to the effects of automation and robotics in manufacturing jobs.”

– *AI100 Report, 2016*



The Hard Truth

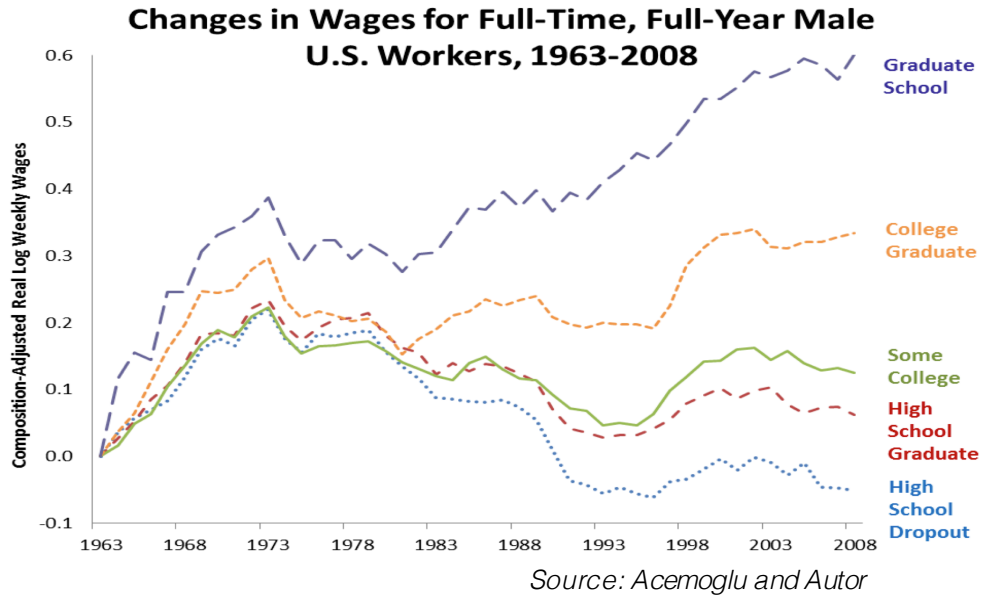


Digital progress makes the economic pie bigger.

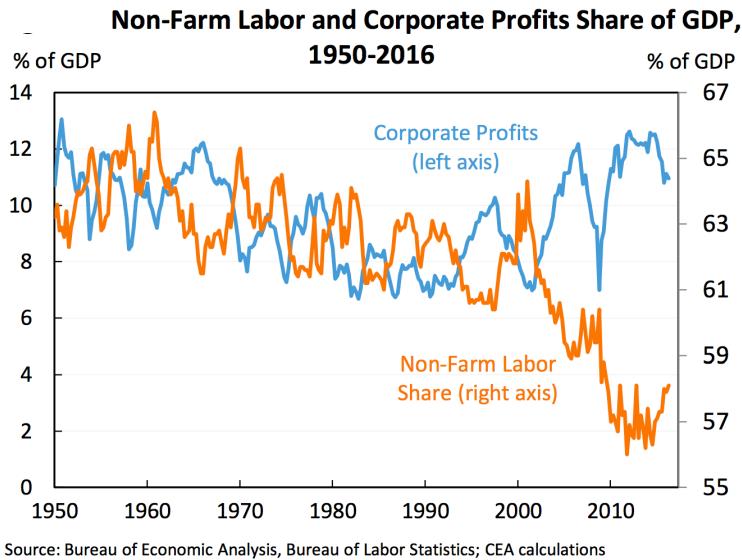
But there is no economic law that everyone, or even most people, will benefit.

Key Concept:
Biased Technical Change

1. Skill-biased Technical Change

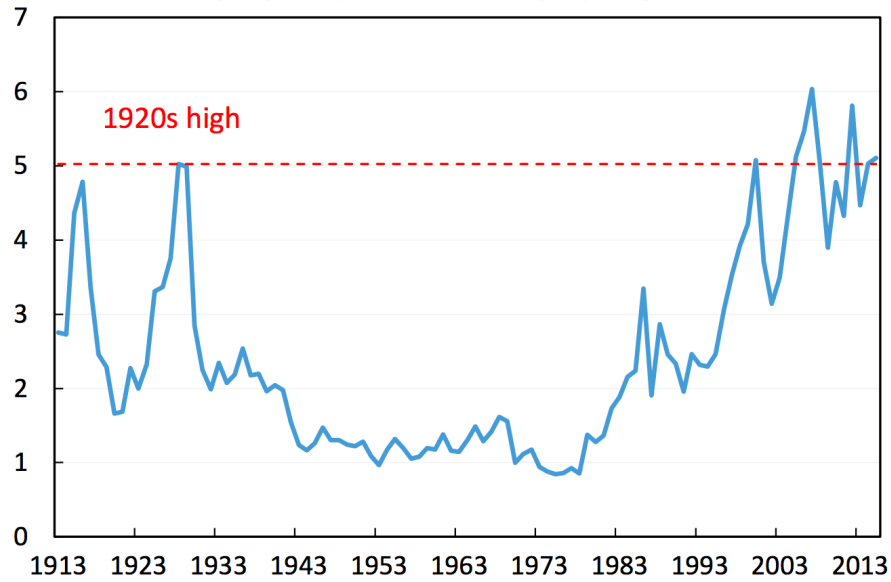


2. Capital-biased Technical Change



3. Superstar-biased Technical Change

Share of income going to top 0.01% (including capital gains)



Source: Piketty and Saez (2003), data update as of June 2016.

What's Changed
since BAI '15?

From Lonely Voices to a Growing Chorus

- “I don’t think that globalisation is anywhere near the threat that robots are.”
– Angus Deaton, 2016 Nobel Prize winner
- “Over the long haul, clearly automation’s been much more important — it’s not even close”
– Larry Katz, Editor of *Quarterly Journal of Economic*
- According to our estimates, each additional robot reduces employment by about seven workers, and one new robot per thousand workers reduces wages by 1.2% to 1.6%
– Daron Acemoglu and Pascual Restrepo, 2016
- Our simple model illustrates the range of things that smart machines can do for us and to us. Its central message is disturbing. Absent appropriate fiscal policy that redistributes from winners to losers, smart machines can mean long-term misery for all.
– Jeff Sachs et al., 2016

What’s New in Economics of AI since BAI’15?

National Academy on Sciences, Engineering and Medicine

- Forthcoming report on IT and the Workforce

White House

- Two Reports on AI
- Four workshops on AI

AI 100 committee

- Report on AI in 2030
- Index of AI Progress

MIT Initiative on the Digital Economy

- 35 research projects
- Inclusive Innovation Challenge 2016, 2017
- Open Letter on the Digital Economy
- Workshop AI Disruption and Solutions, March 8, 2017

AAAS, AAI, IJCAI, Rice, NBER, AEA,

- AEA Session at on AI and Economics right now

Growing set research papers

- Assembling a list at <http://digital.mit.edu>

Unconditional Optimism



Mindful Optimism



The Economic Grand Challenge

- **AI and digital technologies will continue to accelerate**
- **Our skills, organizations and institutions are lagging**
- **Business as usual won't solve this problem**

How can we create prosperity for the many, not just the few?

Design Parameters for Mindful Optimists

- Universal Basic Income
- Earned Income Tax Credit
- Minimum Wage
- Education Investment
- Educational Transformation
- Anti-trust and Competition Policy
- Intellectual Property Protection
- Progressive Income Taxes
- Wealth Taxes
- Property Taxes
- Distributed Capital (Robot) Ownership
- R&D investment
- Infrastructure and Public Goods
- Privacy and Surveillance
- Federalism
- Trade policies
- Occupational licensing
- Etc.