The Rise of Artificial Intelligence

Implications for Jobs and the Economy

Martin Ford

2015 Economic Outlook Conference - University of South Carolina
Labor hours in the U.S. business sector

1998: 194 billion hours of labor
2013 -- 15 years later:

- Business output up by 42% or $3.5 trillion
- U.S. population up by over 40 million people
“no growth at all in the number of hours worked over this 15-year period, despite the fact that the U.S population gained over 40 million people during that time, and despite the fact that there were thousands of new businesses established during that time.”

What makes IT different?

■ Exponential -- at least 27 doublings
■ Delivers machine intelligence -- substitutes for cognitive labor
■ General purpose technology -- invades every business and economic sector
Historical examples

■ Mechanization of Agriculture
  ■ Specialized / Mechanical
  ■ Manufacturing and service sectors available to absorb workers

■ Most jobs are routine on some level
  ■ 1900: farm worker
  ■ 1950: factory worker
  ■ 2014: Walmart / Routine White collar
New industries not labor intensive

General Motors 1979 (Peak Jobs)
- 840,000 workers
- $11 billion in earnings (2012 dollars)

Google 2012
- 38,000 workers (4.5% of GM)
- $14 billion in earnings (20% > GM)
Old vs New: Occupations & Jobs

Source: Gerald Huff, based on an analysis of BLS data
Productivity vs. Compensation

Cumulative percent change since 1948

Source: Economic Policy Institute
U.S. Labor’s Share of National Income

Source: Bureau of Labor Statistics, St. Louis Federal Reserve
Global Labor’s Share

Source: Loukas Karabarbounis and Brent Neiman
U.S. Job Creation by Decade

Source: Bureau of Labor Statistics, St. Louis Federal Reserve

Source: Bureau of Labor Statistics, St. Louis Federal Reserve
U.S. Jobless Recoveries & Polarization

U.S. Recessions - Months for Employment to Recover

Source: Bureau of Labor Statistics, St. Louis Federal Reserve
Innovations in Robotics

- Industrial Perception
  - 3D Machine Vision, Dexterity
  - Moves up to 1 box every second
  - Never tires; no injuries
White-collar Automation

The New Bookkeeper Is a Robot

In corporate finance departments, software does tasks that once took armies of people.

By VIPAL MONGA
Updated May 5, 2015 1:50 p.m. ET

Five years ago, 80 clerks and salespeople at Pilot Travel Centers LLC spent a combined 3,200 hours a week tracking and paying for orders for thousands of goods, ranging from candy bars to diesel fuel.

Source: Hackett Group, Wall Street Journal
White-collar Automation

- Machine Learning / Specialized AI
  - Huge amounts of data being collected
  - eDiscovery, Wall Street Trading

- Automation + Crowdsourcing
  - WorkFusion platform
  - Incremental automation
Earnings for College Graduates 25-34

Real Earnings Keep Falling for Young College Grads*

*Average annual earnings for full-time workers aged 25-34 with a Bachelor's degree, In 2013$

Source: Progressive Policy Institute, Census Bureau
Machines do not consume

Only people and governments provide final demand for the economy

Businesses must be able to sell their output

Global Impact
U.S. Corporate Profits vs. Retail Sales

Source: St. Louis Federal Reserve
What Should We Do?

- **Near Term: Enhance the Safety Net**
- **Longer Term: Decouple Jobs from Income**
  - Guaranteed basic income
  - Incorporate incentives, especially for education