Race Against The Machine

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### Trends in US GDP, Profits, and Investment 1995-2011

<table>
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<th>Year</th>
<th>GDP</th>
<th>Corporate Investments</th>
<th>All Profits After Tax</th>
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- GDP
- Corporate Investments
- All Profits After Tax
- Employment to Population Ratio

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WHAT’S GOING ON?
Our View

“Digital technologies change rapidly, but organizations and skills aren’t keeping pace. As a result, millions of people are being left behind. Their incomes and jobs are being destroyed, leaving them worse off … than before the digital revolution…”
THE DIGITIZATION OF THE ECONOMY
Computers are getting dramatically cheaper and more powerful.
IT Investment Over Time

Two Views of US IT Investment, 1970-2008: Nominal Annual Investment and Investment per Employee

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What are the Economic Consequences of this Rapid Digitization of the Economy?
The Hard Truth

Digital progress makes the economic pie bigger. But there is no economic law that everyone, or even most people, will benefit.
The Great Decoupling

Labor Productivity & Employment, 1947-2010

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Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers
Skill Disparities


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Mid-wage workers have been hit hardest in both employment and wages

Source: Autor and Dorn, MIT Working paper, 2013
Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers
2. Capital vs. Labor
Capital and Labor

Corporate Profits After Tax with Inventory Valuation Adjustment (IVA) and Capital Consumption Adjustment (CCAdj) (CPATAX) Business Sector: Labor Share (PRS84006173)

Shaded areas indicate US recessions. 2012 research.stlouisfed.org

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Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers
2. Capital vs. Labor
3. Superstars vs. Everyone Else

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Superstars

Source: Piketty and Saez
WE AIN’T SEEN NOTHING YET…
The Digital Frontier

Who is Stoker?
(I FOR ONE WELCOME OUR NEW COMPUTER OVERLORDS)

$1,000
Linear versus Exponential Growth
WHAT IS TO BE DONE?
The New Grand Challenge

• Digital technologies will continue to accelerate.
• Our skills, organizations and institutions are lagging.
• Business as usual won’t solve this problem.
Education and Entrepreneurship

Work on both aspects of skill/work mismatch
Education

1. **Focus at all levels**
   - K-12, University, Vocational, On-the-job, Lifelong

2. **Use technology**
   - Education has been a laggard => big upside!
   - MOOCs: MITx, Kahn Academy, Udacity
     1. Low cost replication of best teachers, content and methods
     2. Data gathering creates feedback for continuous improvement
   - Real-time data on skills needed by companies
   - Recommendation systems for courses and jobs using big data

3. **Give vocational schools and colleges “skin in the game”**
   - Tie tuition payment to future earnings: “equity” vs. “debt”
     - Forgivable loans
   - More accountability: separate teaching from evaluation and certification

4. **Simply invest more**
   - Higher teacher salaries to attract best and brightest
     - Very large social returns to better teachers
   - More school hours, long school years, more after school, preschool

Goldin & Katz: *The Race Between Technology and Education*
Entrepreneurship

Boost Entrepreneurship

• Not because everyone can or should be an entrepreneur
  Although more could be!
• Because entrepreneurs lead creative destruction
  90% worked on Farms in 1800, now 2%
  But Ford, Edison, Gates and others created new industries

1. Reduce regulation and certification, esp. at local level
   • Lower all barriers to business formation
   • Each regulation is like pebble in the stream with a cumulative effect.

2. Reduce employment taxes and decouple benefits from employment
   • Employment has positive externalities so we should subsidize, not tax it.

3. Teach entrepreneurship not just in MBA programs, but everywhere

4. Nurture platforms, templates and new ways to organize work
   • App economy, eBay, Facebook,
   • Fold-it, reCAPTCHA, NASA clickworkers
   • oDesk, Kaggle, RelayRides

5. New Grand Challenge for Entrepreneurs, Engineers and Economists
   • Invent complements, not substitute for labor
   • Replace labor saving and automation mindset with maker and creator mindset
MIT Initiative on the Digital Economy

http://digital.mit.edu/IDE
http://digital.mit.edu/erik