Skills, Education, and the Rise of Earnings Inequality Among the “Other 99 Percent”

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SNS Seminar, Stockholm
28 August 2015
The Other 99%

1. Is it all about the ‘One Percent’?
2. Do skill investments still pay off?
3. Why are skill returns so high?
4. Job ‘polarization’ and the middle class
5. Are we running out of jobs?
6. Does inequality impede mobility?
7. Conclusions
Concentration of U.S. Incomes has Risen Dramatically Since the Late 1970s

Figure 2. Decomposing the Top Decile US Income Share into three Groups, 1913–2007

Atkinson, Piketty, Saez 2011
Comparison of U.S., Canada, Spain, Sweden and Finland

Figure 7. Effect of Capital Gains on Share of Top Percentile, 1949–2006

Atkinson, Piketty, Saez 2011
Median Earnings Gap b/w College & High School
Roughly Doubles between 1979 and 2012

College/high school median annual earnings gap, 1979–2012
In constant 2012 dollars

- **Household gap**: $30,298 to $58,249
- **Male gap**: $17,411 to $34,969
- **Female gap**: $12,887 to $23,280

Autor, 2014
Changes in the 90/10 Ratio of Full-Time Male Earnings Across Twelve OECD Countries, 1980-201

Numbers at the base of each bar correspond to the 90/10 earnings ratio in each country in 1980.

OECD Statistical Abstracts, Machin and Van Reenen 2010
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U.S. Has Very High Returns to Skill Relative to Other Industrialized Countries

Cross-national differences in wage returns to skills, 2011–2013

Percentage increase for a one standard deviation increase in skill

Autor, 2014
Inclusive of Tuition, College in the U.S. is a Better Investment Now Than it Was 50 Years Ago

Present discounted value of college relative to high school degree net of tuition, 1965–2008
College/high school difference, 2009 dollars

Avery and Turner, 2012
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Largest Contributor to Widening Earnings Inequality: Deceleration in Supply of U.S. College Graduates

Autor, 2014
Largest Contributor to Widening Earnings Inequality: Deceleration in Supply of U.S. College Graduates

The supply of college graduates and the U.S. college/high school premium, 1963–2012

College share of hours worked (%), 1963–2012:
All working-age adults

College versus high school wage gap (%)

Predicted by Supply-Demand Model

Measured Gap

Autor, 2014
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Michael Polanyi, The Tacit Dimension, 1966

“We can know more than we can tell... The skill of a driver cannot be replaced by a thorough schooling in the theory of the motorcar; the knowledge I have of my own body differs altogether from the knowledge of its physiology.”

Two implications of Polanyi’s Paradox – One technical, one economic

1. *(Technical)* Cannot automate what we don’t explicitly understand

2. *(Economic)* Tasks that are not *substituted* by machines are typically *complemented* by machines
Smoothed Changes in U.S. Employment by Occupational Skill Percentile, 1979–2012

Autor, 2015
Employment Polarization in Sixteen European Union Countries, 1993 - 2010

Goos, Manning and Salomons, 2014
Factors that Shape Impact of Automation on Workers’ Earnings

1. **Substitution versus complementarity**
   - Workers benefit if their job tasks are complemented, but not if tasks are substituted. *Great time to be a CADD operator, bad time to be a paper and pencil draftsperson.*

2. **Elasticity of final demand**
   - Can either dampen or amplify the gains from automation. *Think of agriculture versus health care.*

3. **Labor supply elasticity**
   - Can mitigate wage gains. *Why wages don’t rise rapidly in food service and hair cutting…*

4. **Relevance:**
   - Abstract task-intensive versus Manual task-intensive jobs
Smoothed Changes in U.S. Mean Wages by Occupational Skill Percentile, 1979–2012

Autor, 2015
ATM Deployment and Bank Teller Employment, 1970–2010

Dispensing jobs

As more ATMs were installed in the United States, the number of tellers employed did not drop.


Bessen, 2015
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The ‘Productivity Problem’ of 1964

1964: President Johnson establishes “Blue-Ribbon National Commission on Technology, Automation, and Economic Progress”

The Milwaukee-Matic industrial machining tool, 1963
The Future of Polanyi’s Paradox

- **Computerization has progressed…**
  - Driving vehicles
  - Parsing legal documents
  - Performing agricultural field labor

- **Polanyi’s paradox remains relevant central…**
  - Explain what has not yet been accomplished
  - Illuminates the contours of the technological frontier

- **Overcoming Polanyi’s Paradox**
  1. Environmental Control:
     - *Bows to Polanyi’s paradox*
  2. Machine Learning
     - *Attempts an end-run around it*
Environmental Control -- Kiva Systems Order Fulfilment: Robotic Drive Units Move Shelves to Workers for Picking
Kiva - Worker Interaction: Guided by Laser Pointer, Worker Picks Items from Shelves for Shipping
Machine Learning

- **Machine learning**
  - *Inductive reasoning versus procedural programming*

- **Problem**
  - Cannot program a machine to “simulate” a non-routine task by following a scripted procedure

- **Solution**
  - Program a machine to master the task autonomously by studying successful examples of the task being carried out by others
Images of Cats Successfully Recognized by Google X Labs Team, Using a Neural Network of 16,000 Processors

Le, Ranzato, Moga, Devin, Chen, Corrado, Dean and Ng, 2012
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College Grads are Faring Relatively Well b/c Non-College Workers are Faring Absolutely Worse

Changes in real wage levels of full-time U.S. workers by sex and education, 1963–2012

Real weekly earnings relative to 1963 (men)

Real weekly earnings relative to 1963 (women)

Autor, 2014
Countries with High Inequality and High Skill Returns Have Low Intergenerational Mobility

Earnings inequality and economic mobility: cross-national relationships

- **A**
  - Generational earnings elasticity
  - (higher values imply lower mobility)
  - Income inequality (more inequality →)

- **B**
  - Generational earnings elasticity
  - (higher values imply lower mobility)
  - College earnings premium (men 25 to 34)

Source: Miles Corak


Chetty, Hendren, Kline, Saez and Turner 2014


Chetty, Hendren, Kline, Saez and Turner 2014

Percentage Point Change in Male Employment to Population Rates

Percentage Change in Male Hourly Wages

- White
- Other Non-White
- Black
- Fitted Values

Autor and Wasserman 2013

Percentage Point Change in Female Marriage Rates

Percentage Change in Male Hourly Wages

- White
- Other Non–White
- Black
- Fitted Values

Autor and Wasserman 2013
Per Capita Enrichment Expenditures on Children ($2008) Top versus Bottom Quartile of Households

Source: Duncan and Murnane, 2011
Gap in years of Completed Schooling: Students with family Income in the Top vs. Bottom quintiles (by Year of Birth-14)

Source: Duncan and Murnane, 2011
Fraction of Twelfth-Graders Expecting to Obtain a B.A. by Sex and Parents’ Education, 1979-2007

Source: Brian L. Jacob and Tamara Linkow Wilder, Using data from the Monitoring the Future survey.

Source: Jacob, Linkow and Wilder, 2011
Fraction of Twelfth-Graders Expecting to Obtain a B.A. by Sex and Parents’ Education, 1979-2007

Female/Male Ratio in College Graduation Rates, OECD Countries 2011

Source: OECD
Commuting Zones with Higher Fraction of Mother-Headed HH's Have Lower Mobility

Source: Chetty, Hendren, Kline, and Hendren, 2013
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1. **Encouraging news**
   - Rising inequality is mostly (not entirely) about skills – Still a meritocracy rather than a pure plutocracy

2. **Rising skill returns largely due to two forces**
   - Slowing supply of new college grads after 1980
   - Secularly rising demand for human expertise, creativity, adaptability

3. **Recent technological leads to job polarization**
   - But does not necessarily raise wages for ‘service’ workers

4. **Intergenerational mobility has not (yet) declined**
   - But reason for worry: Labor market → Marriage market → Adverse impact on children
Types of Jobs that Will Surely Exist in 50 Years

I. Technical and creative experts and leaders
II. Medical professionals
III. Developers and testers of new ideas
IV. Teachers, especially K-12
V. Entertainers: Athletes, Musicians, Actors, Chefs, Comedians
VI. Building and installation workers
VII. Skilled repair workers
VIII. Personal helpers, coaches, assistants and consultants
IX. Sex workers