

Do not fear the robots: The challenge is good jobs at good wages

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What are the issues?

Automation is a large topic. Robots are a smaller topic: capital replacing human labor and possibly eroding the total number of jobs and the skill composition of jobs.

1. Number of Jobs: Will automation (i.e., Robots!) slow aggregate job growth, raise unemployment?

2. Wage Inequality: Will automation (i.e., Robots!) create only high-skilled, high-wage jobs, leaving non-college-educated workforce behind?

Let's be clear about 'technology': Automation Technology

Types of technology:

- Consumer products: your phones, TVs, stoves, etc. improve;
- Communications: Wi-Fi, internet
- Automation: in workplace the substitution of capital (equipment/software) for labor

Impact of automation/robots?

Joblessness

- **Past**
 - ❖ Recent, 1999-2016
 - ❖ Post WWII
- **Future**
 - ❖ Immediate
 - ❖ Decades away

Inequality

- **Past**
 - ❖ Recent, 1999-2016
 - ❖ Post WWII
- **Future**
 - ❖ Immediate
 - ❖ Decades away

Where can we look for evidence?

- **Recent past, 1999-2007 and 2007-14:** 2MA claims trends are already evident. If not, then why do we think the future will reflect their story?
- **Projections:** 'Oh wow' stories? Examine various projections.
- AI in some uncertain future time

A jobless future? Given did not happen in the past!

Automation eliminates jobs in specific occupations and industries but does it lead to overall joblessness?

- Why have we not seen ever-rising unemployment over last century or more?;
- Or, how did unemployment drop from 10% to under 5% since 2010 if we're in a job-killing automation surge?

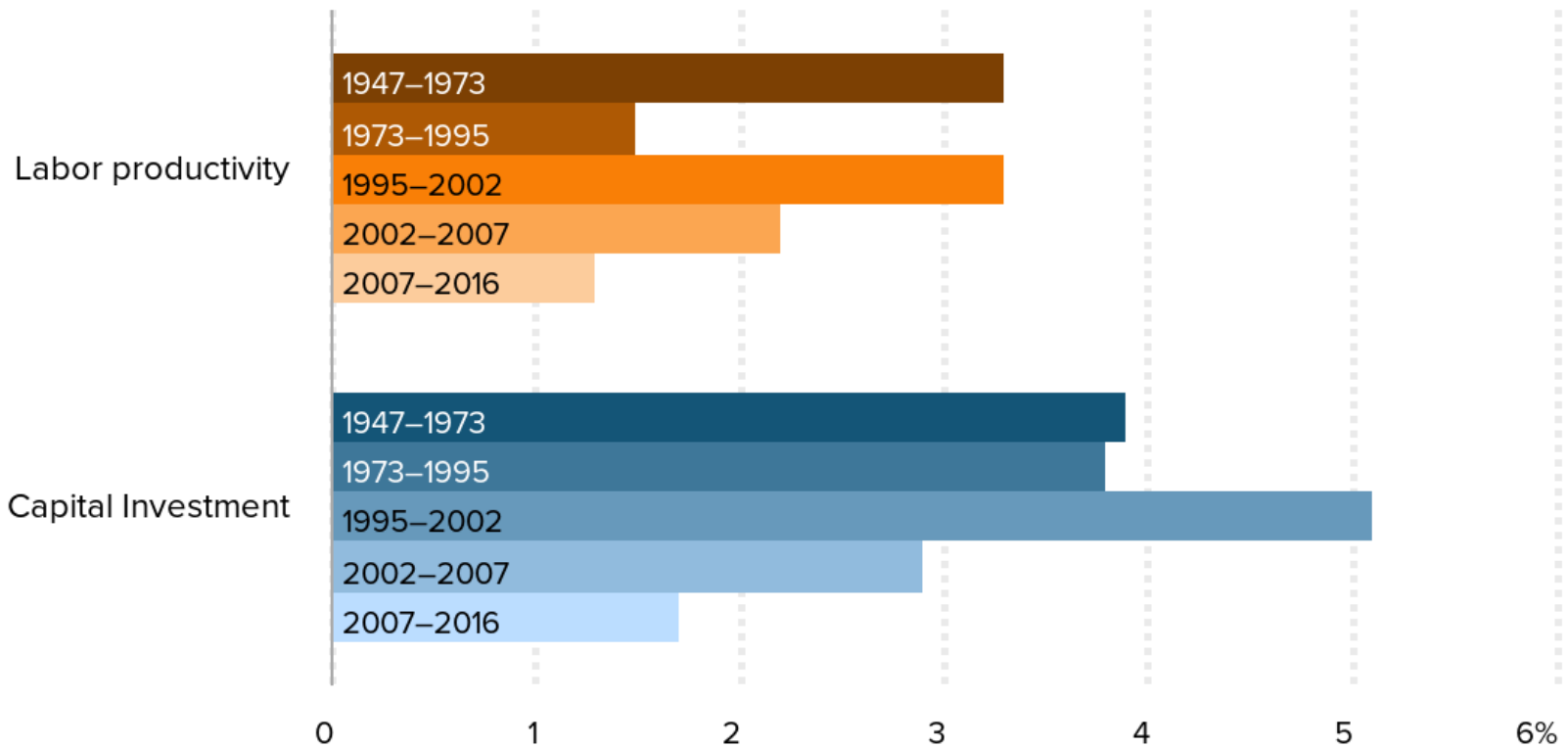
Ok, automation happens but then what?

- Only done to cut costs, right?
- When costs drop then what? **Lower prices, higher incomes, some combo of higher profits and higher wages**
- Those who bought automated good or service in future will buy more of that item, or of other items. Higher incomes spent.
- Unless we have run out of 'needs' and capitalists fail to know how to satisfy them, even invent some;
- Poof: more jobs created.
- **Will next time be different? Why not?**

Where's the Footprint of accelerated automation?

Average annual growth of labor productivity and capital stock, 1973–2016

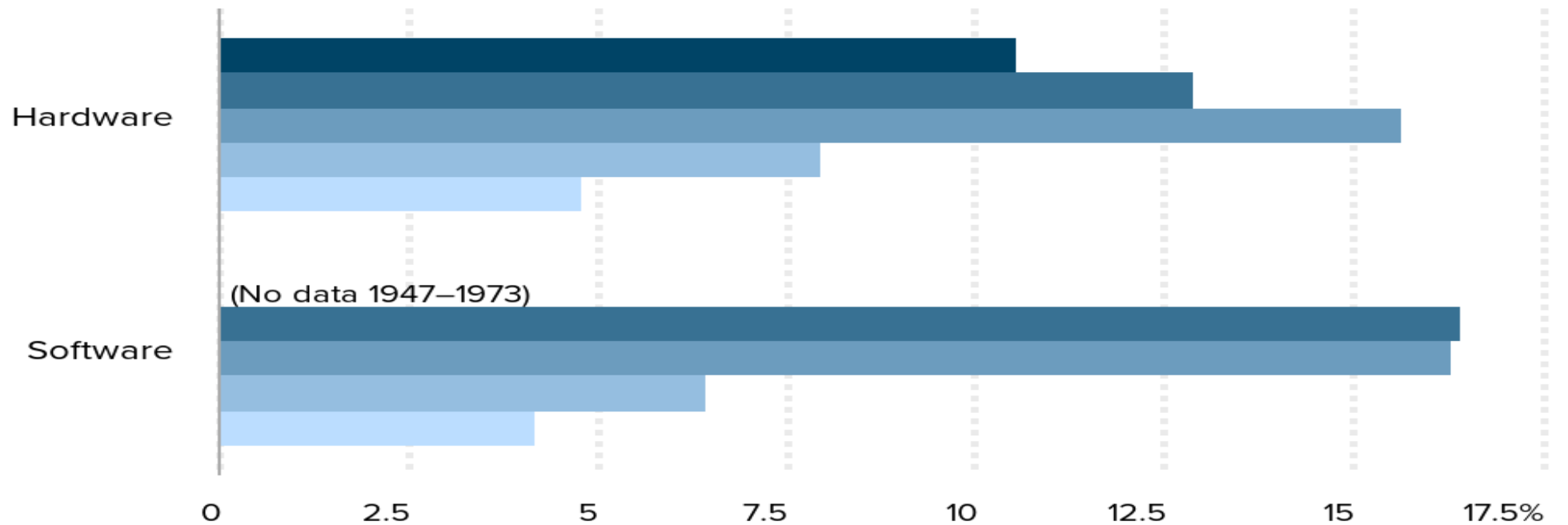
Growth in labor productivity and the capital stock have decreased in recent periods



Note: Using latest available data, 2016 measure includes data from 2015Q4–2016Q3.

Average annual growth rate of information equipment and software, 1973–2016

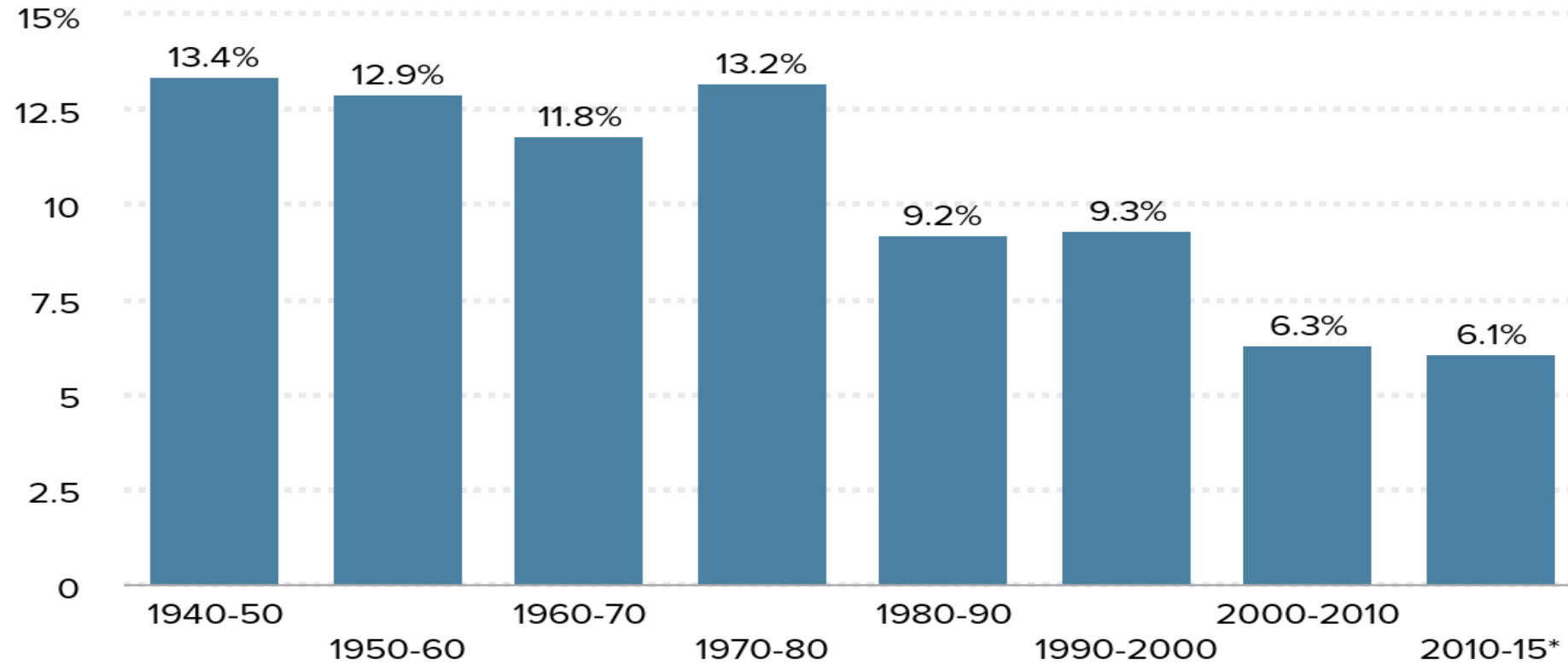
Capital investment in information technology has also slowed



Note: Using latest available data, 2016 measure includes data from 2015Q4–2016Q3.

Source: EPI analysis of [data \(xls\)](#) compiled by John Fernald of the Federal Reserve Bank of San Francisco

Change in occupational employment shares, by decade, 1940–2015



* Converted to decade rate by multiplying by two.

Source: Authors' analysis of data from Atkinson and Wu (2017)

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If not now, in future?

- **Scale of impact**
- **Time frame**
- **First order impact only?**
- **Measured against past trends**

**Does automation, SBTC,
create wage inequality?**

Why the ‘Skills Deficit’ Explanations Fails

1. The 2000’s Do Not Fit the
Stories being Told
2. A Clear Slowdown in Growth of
Relative Demand for
‘Skill’/Education

Two Stories

- 1. Education**—need for college graduates—driven by technology/computers
- 2. Occupations**—job polarization: computers erode *middle*, expand relative demand for non-routine, cognitive skills expands at *top* and do not affect routine, manual work at *bottom*

Two stories about wage inequality

1. **Education**—need for college graduates—driven by technology/computers
2. **Occupations**—job polarization computers erode *middle*, expand relative demand for non-routine, cognitive skills expands at *top* and do not affect routine, manual work at *bottom*

Polarization?

Occupational employment polarization can't possibly explain wage trends since 1999

1. Silent on top 1.0%;
2. Polarization not present since 1999;
3. Occupational employment patterns unrelated to relative wage trends.

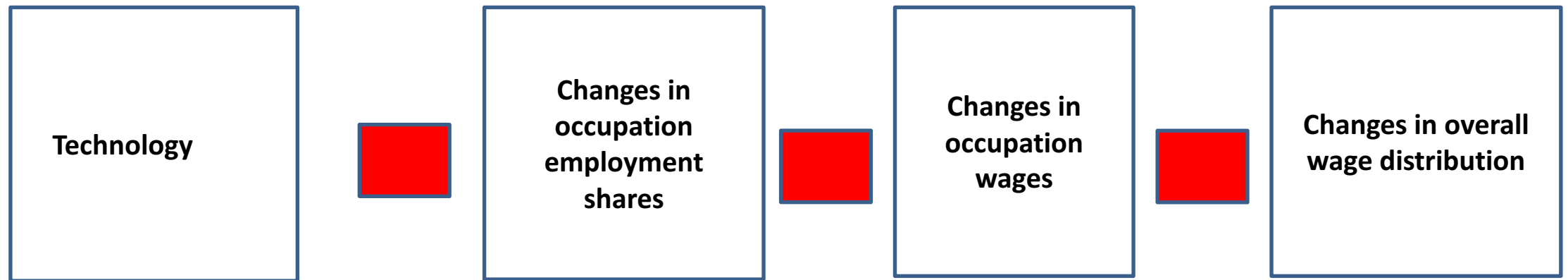


Figure 7.

Smoothed Employment Changes by Occupational Skill Percentile, 1979 – 2012

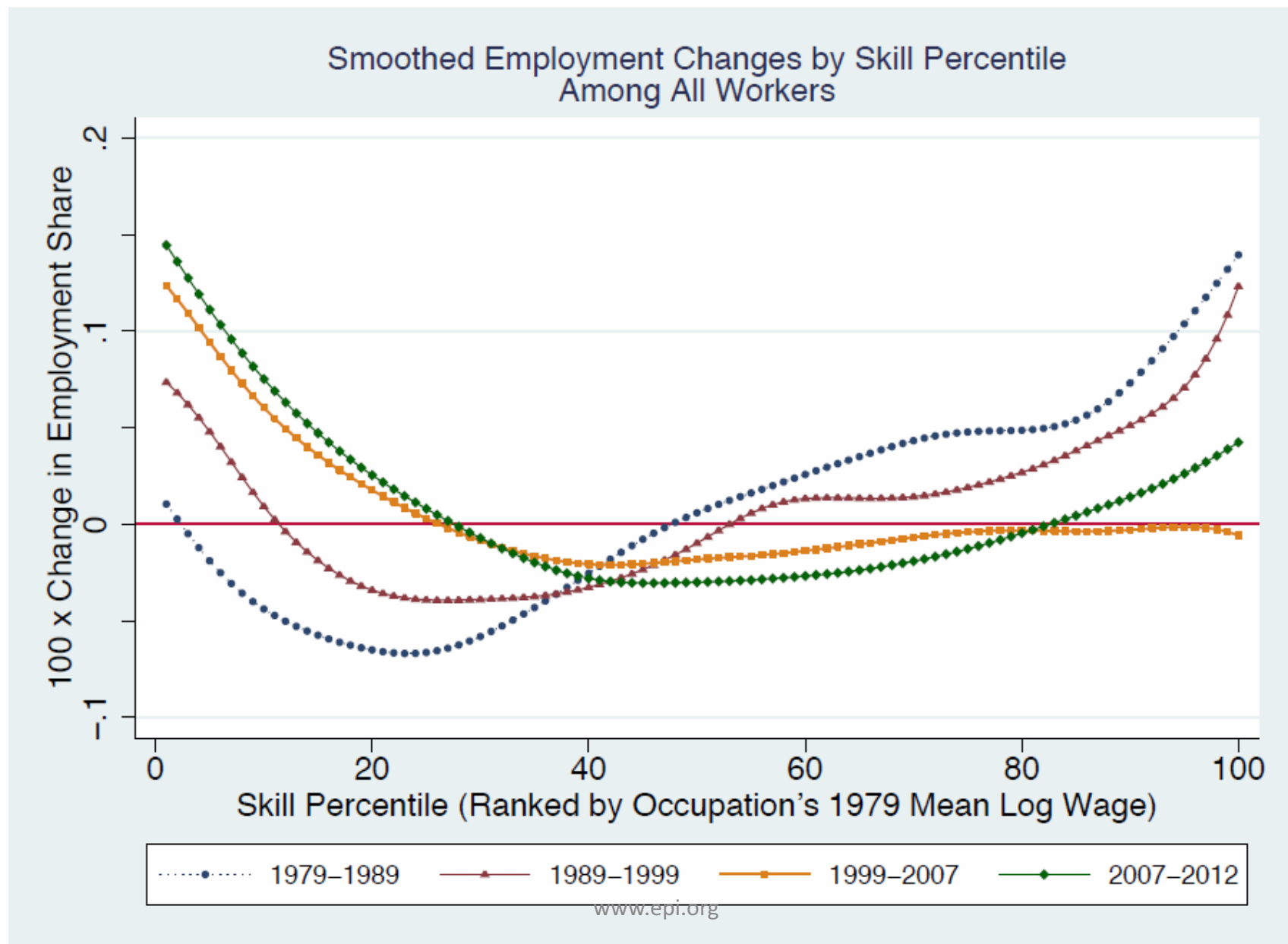
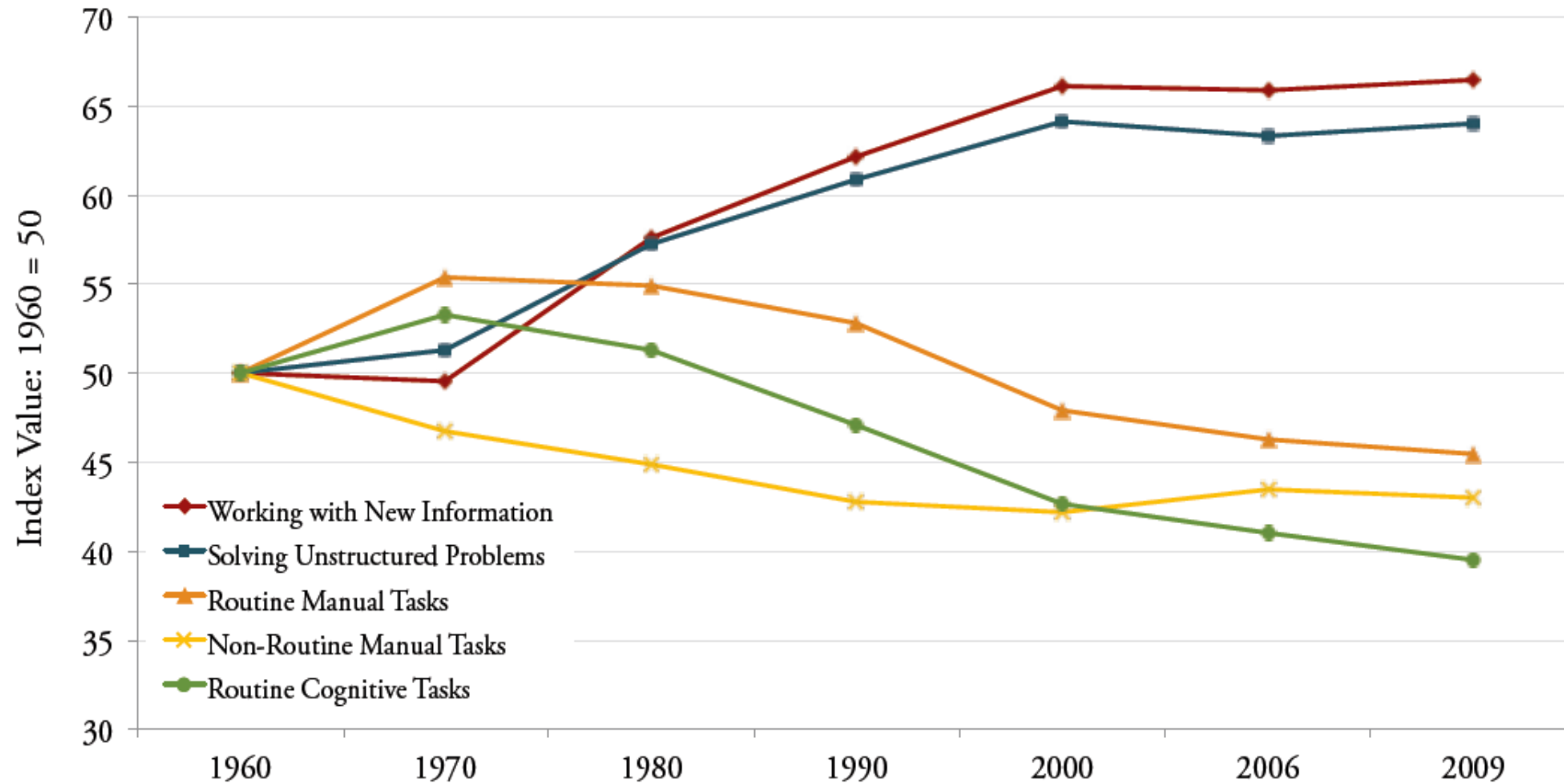


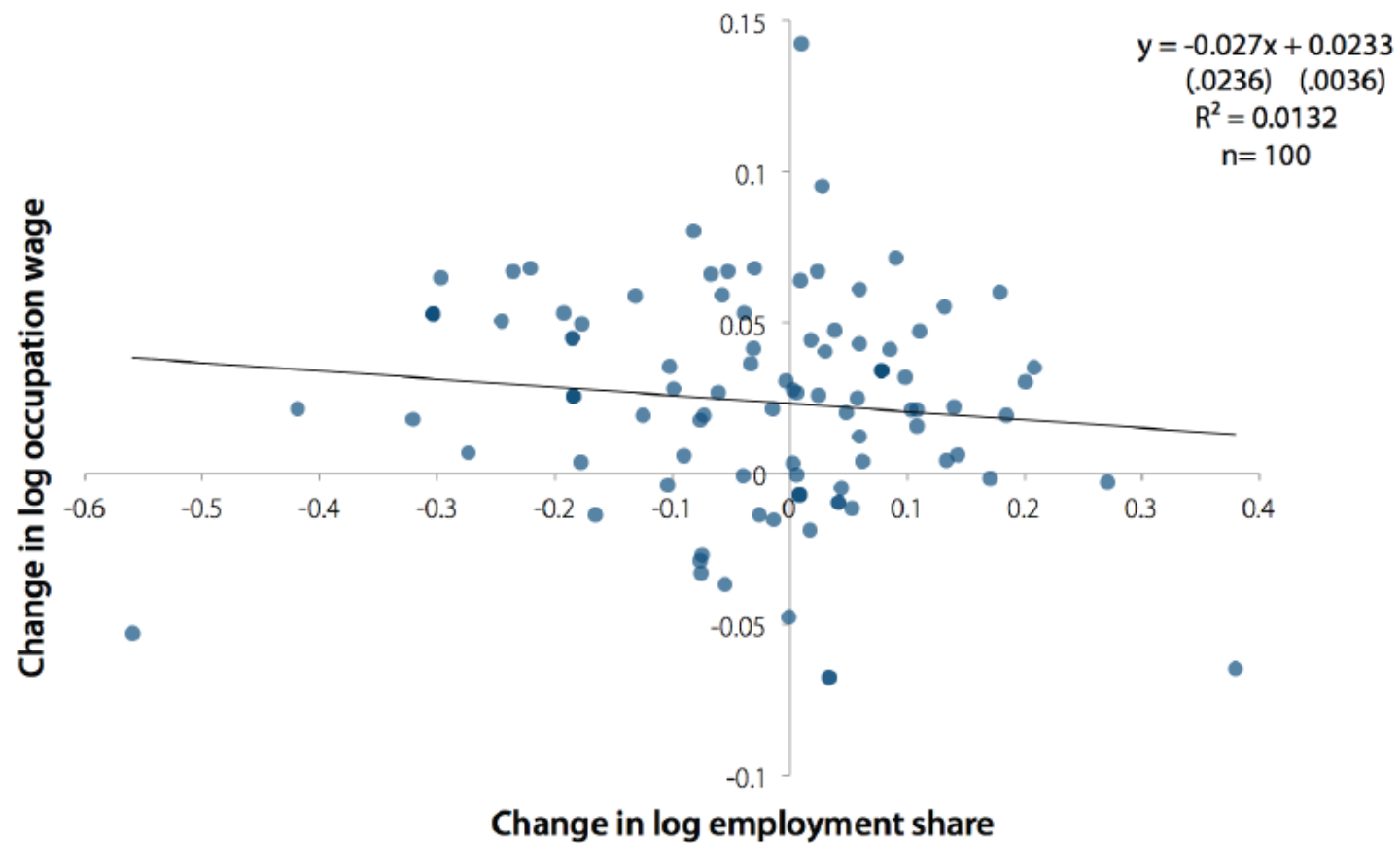
Figure 3: Index of Changing Work Tasks in the U.S. Economy 1960-2009²¹



Source: Reproduced from Levy and Murnane (2013)

FIGURE HC

Change in log occupation wage by change in log employment share, 2000–2007



Note: The regression line is from a simple linear regression of change in log occupation wage on change in log employment share. Observations are the 100 occupation percentiles. Standard errors are in parentheses.

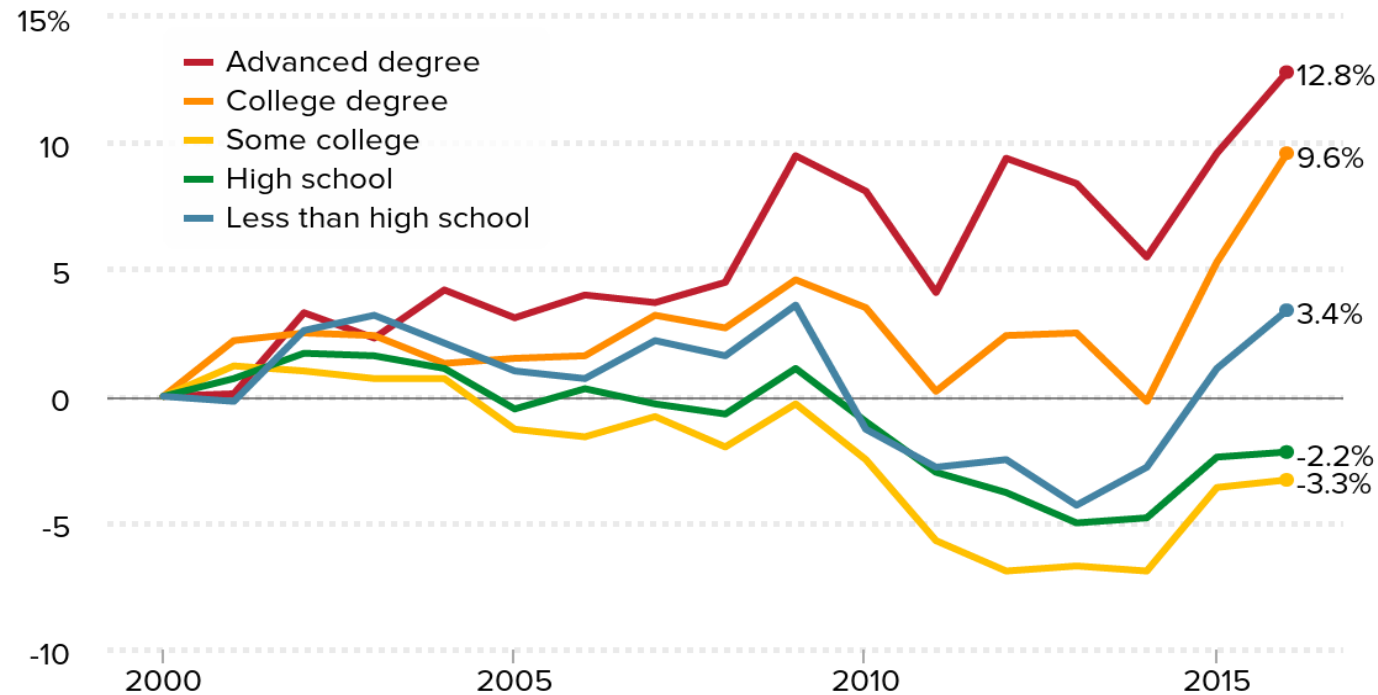
Source: Author's analysis of Current Population Survey Outgoing Rotation Group microdata

Why the ‘Skills Deficit’/Education Explanation Fails

1. College (4 year) wage premium flattened after mid-90s, but wage gap still grew strongly;
2. College wages flat, at best, for many years
3. No explanation for the top 1%

Wages for men with more education continued to pull ahead in 2016 as high school and some college wages were lower than in 2000

Cumulative percent change in real average hourly wages of men, by education, 2000–2016

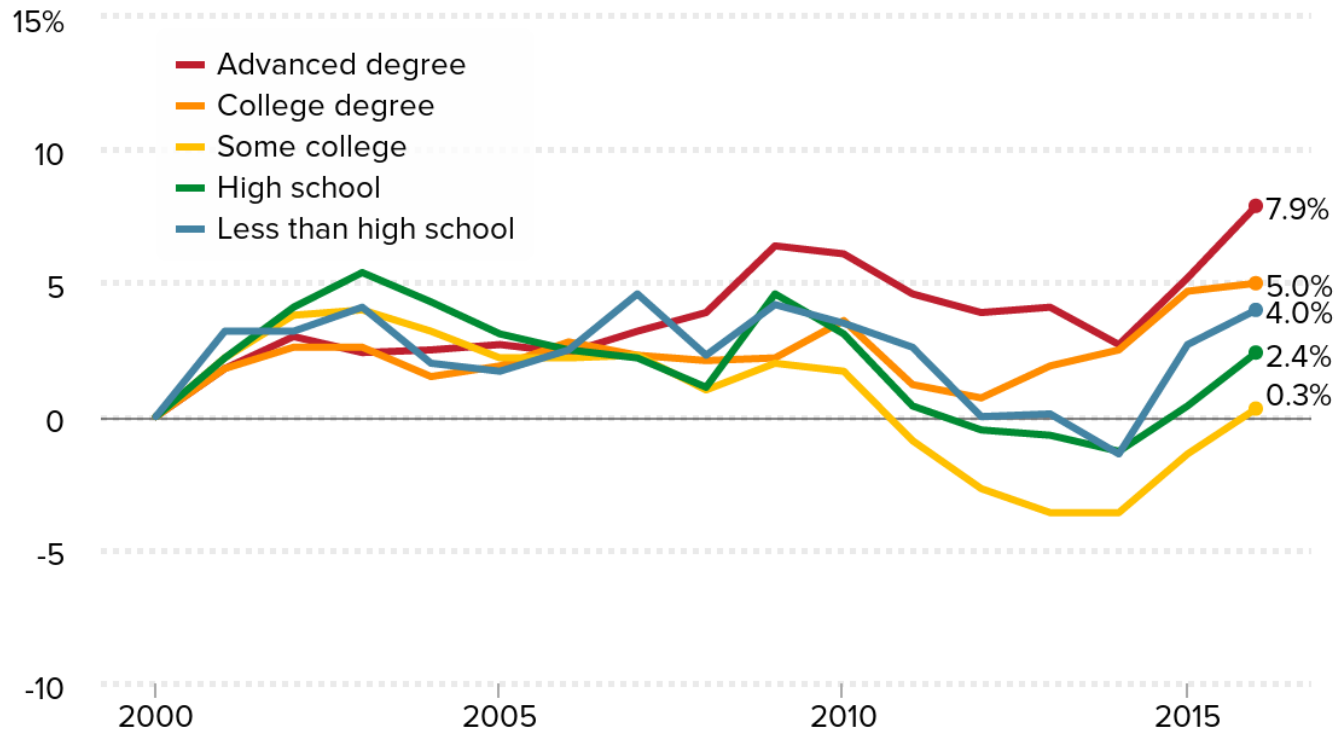


Note: Sample based on all workers age 18–64.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

For women at all levels of education, wages were higher in 2016 than in 2000

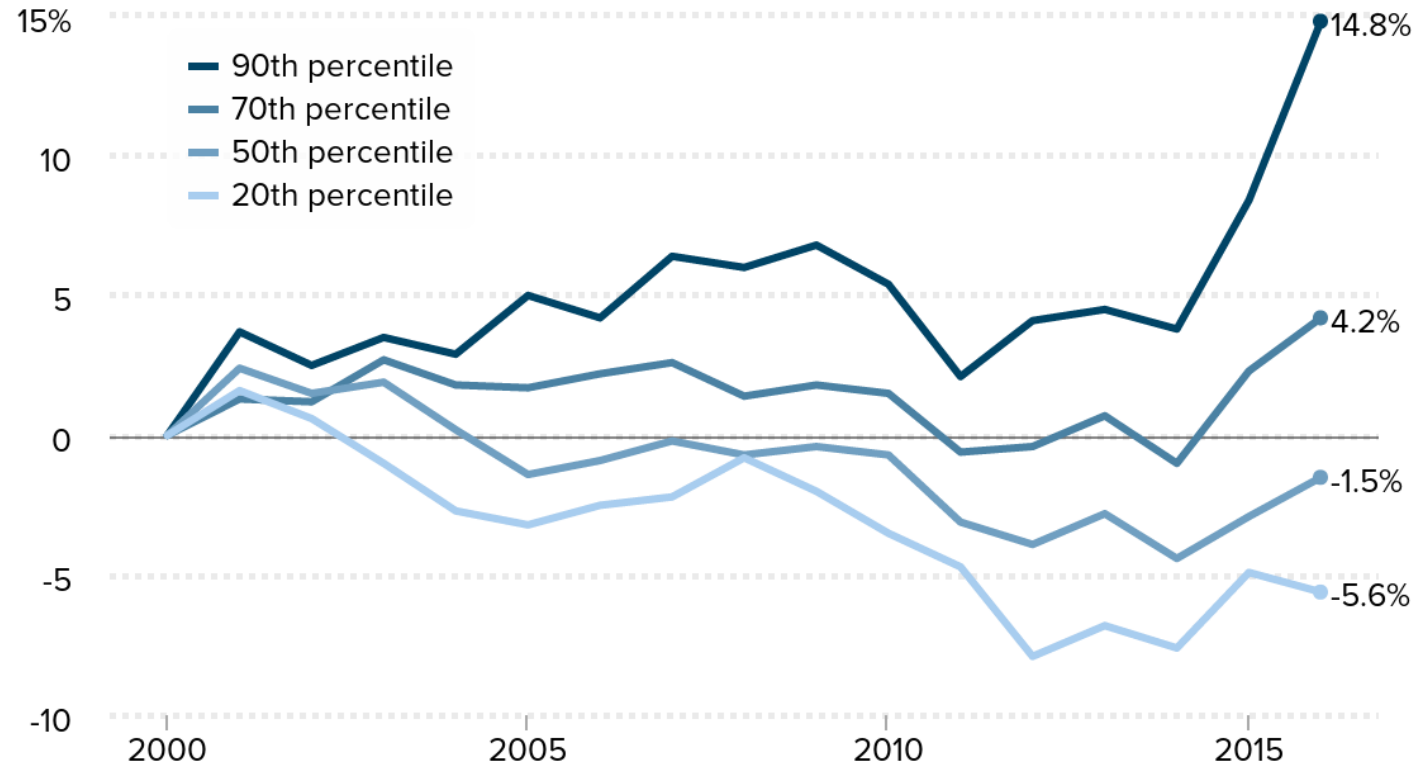
Cumulative percent change in real average hourly wages of women, by education, 2000–2016



Note: Sample based on all workers age 18–64.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

Cumulative percent change in real hourly wages of college graduates, by wage percentile, 2000–2016

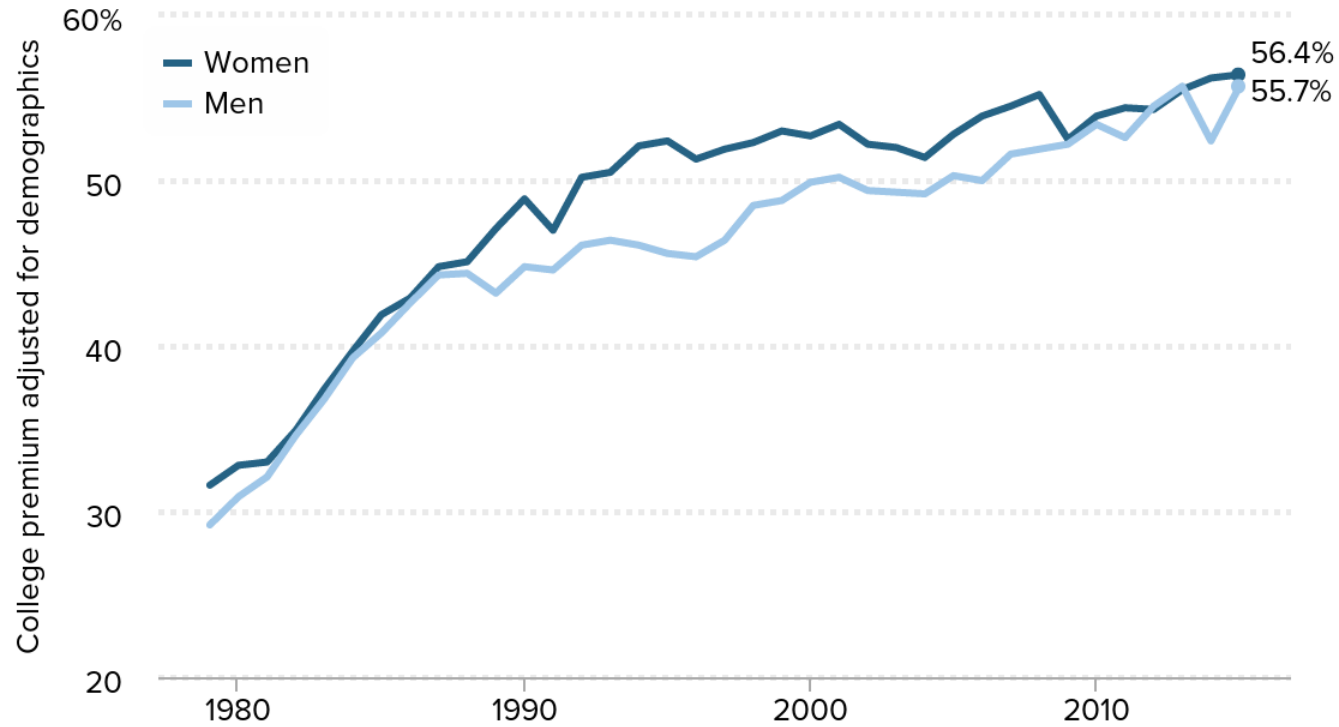


Note: Sample based on all workers age 18–64 with a bachelor's degree. The xth-percentile wage is the wage at which x% of wage earners earn less and (100 - x)% earn more.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

College wage premium

College wage premium, by gender, 1979–2015

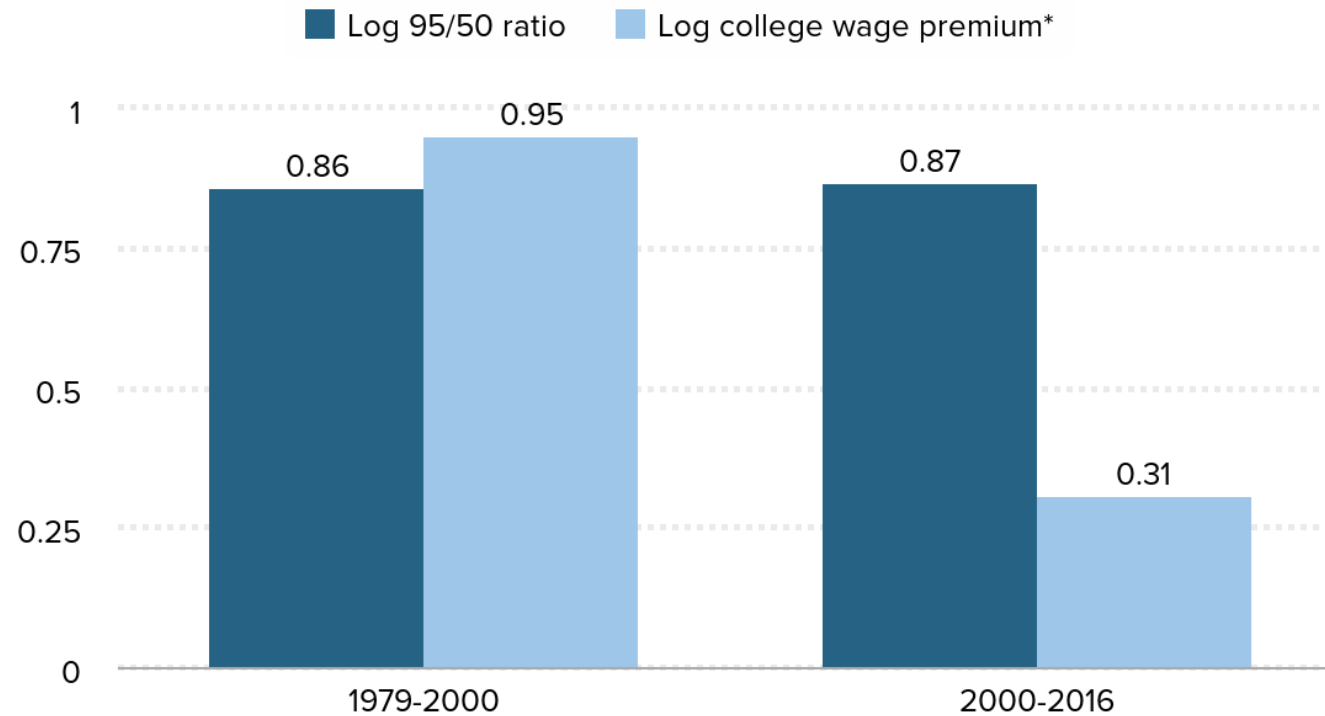


Note: The college wage premium is the percent by which wages of college graduates exceed those of otherwise equivalent high school graduates, regression adjusted.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

The college wage premium cannot explain growing wage inequality since 2000

Average annual percentage-point changes in wage gaps, 1979–2000 and 2000–2016



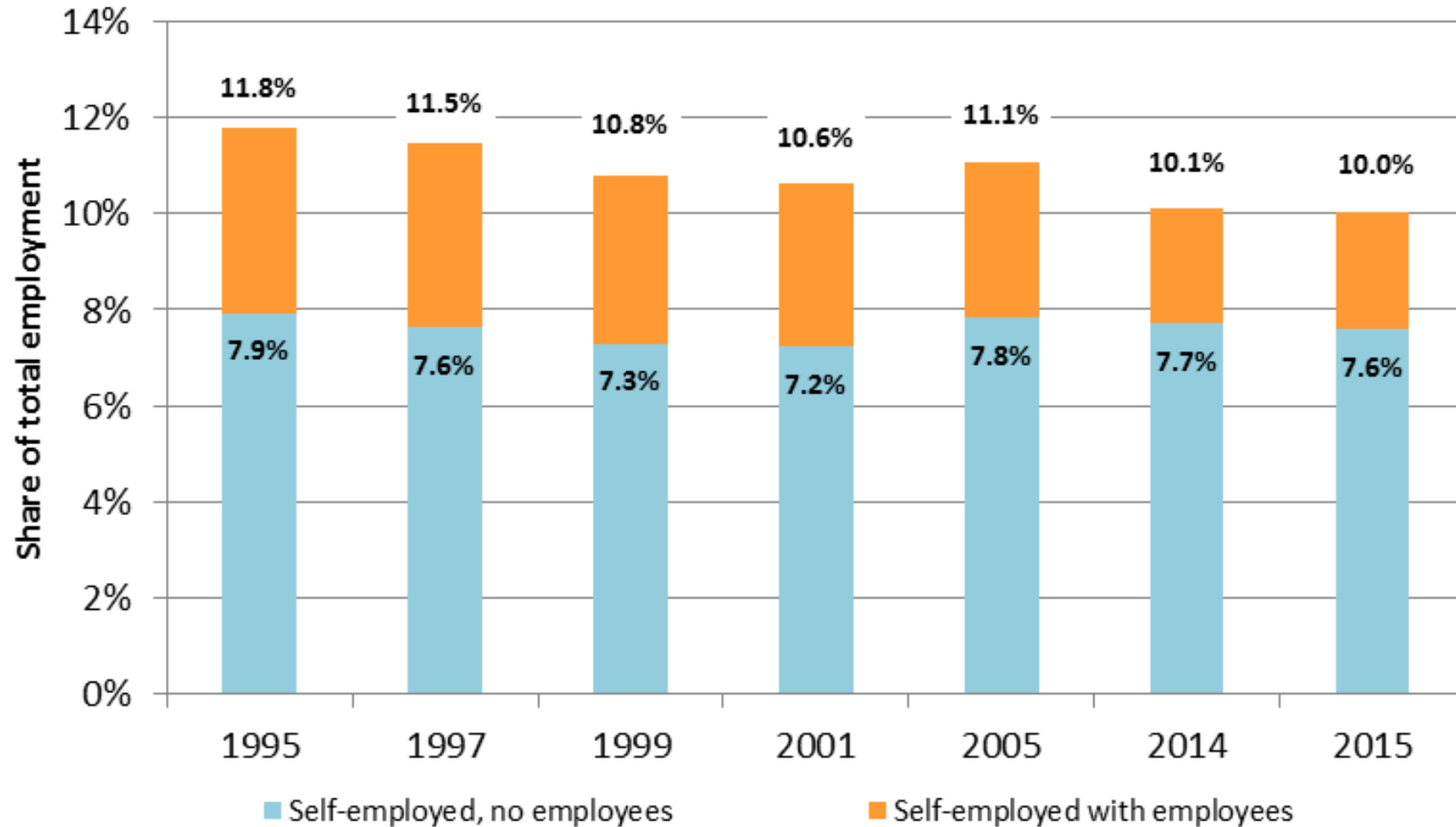
*Regression-adjusted college wage premium using log hourly wages.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

Gig Economy, Self-Employment are not Future of Work!

“At a ‘Future of Work’ conference the gig economy or freelancing deserves workshops, not a plenary”

Self-employed share of employment, 1995-2015



Growth of Alternative Work Arrangements, 1995-2015

Type	Percent of Employment			Change
	1995	2005	2015	2005-15
All alternative work arrangements	10.0	10.7	15.8	5.1
<i>Independent contractors</i>	6.3	6.9	8.4	1.5
<i>On-call workers</i>	1.6	1.7	2.6	0.9
<i>Temporary help agency workers</i>	1.0	0.9	1.6	0.7
<i>Workers provided by contracting firms</i>	1.3	1.4	3.1	1.7
Memo:				
Work through online intermediary	0.0	0.0	0.5	0.5

Source: Katz and Krueger, September 2016

Scaling Uber and gig employment

Estimate Source	Uber Drivers	Hrs/wk	Uber FTE	U.S. FTE*	Uber share of FTE	Total Gig FTE
<i>Krueger-Hall end, 2014</i>	160,000	20.0	80,000	129,971	0.062%	0.09%
<i>Plouffe end, 2015</i>	400,000	18.0	180,000	132,681	0.136%	0.20%

*Full-time equivalents in thousands.

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Scaling Uber and Gig wages paid

Uber driver pay, 2015

- Annual pay: \$4.70 Billion
- Pay net of expenses: \$3.76 Billion

Uber pay relative to economy:

% private wages 0.06%, **(i.e. .0006 of total)**

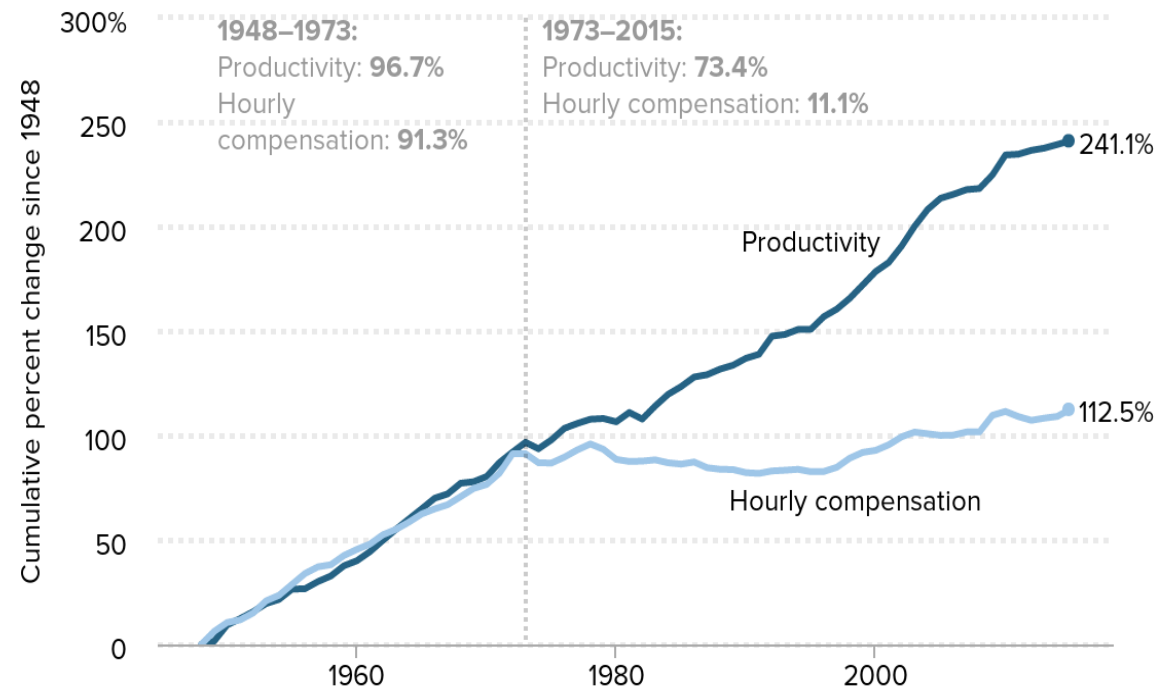
% private compensation 0.05%

Uber is two-thirds of gig economy, so Gig Economy was about 0.1% of private wages in 2015

The Wage Patterns to be Explained

Productivity-pay gap

Disconnect between productivity and a typical worker's compensation, 1948–2015



Note: Data are for average hourly compensation of production/nonsupervisory workers in the private sector and net productivity of the total economy. "Net productivity" is the growth of output of goods and services minus depreciation per hour worked.

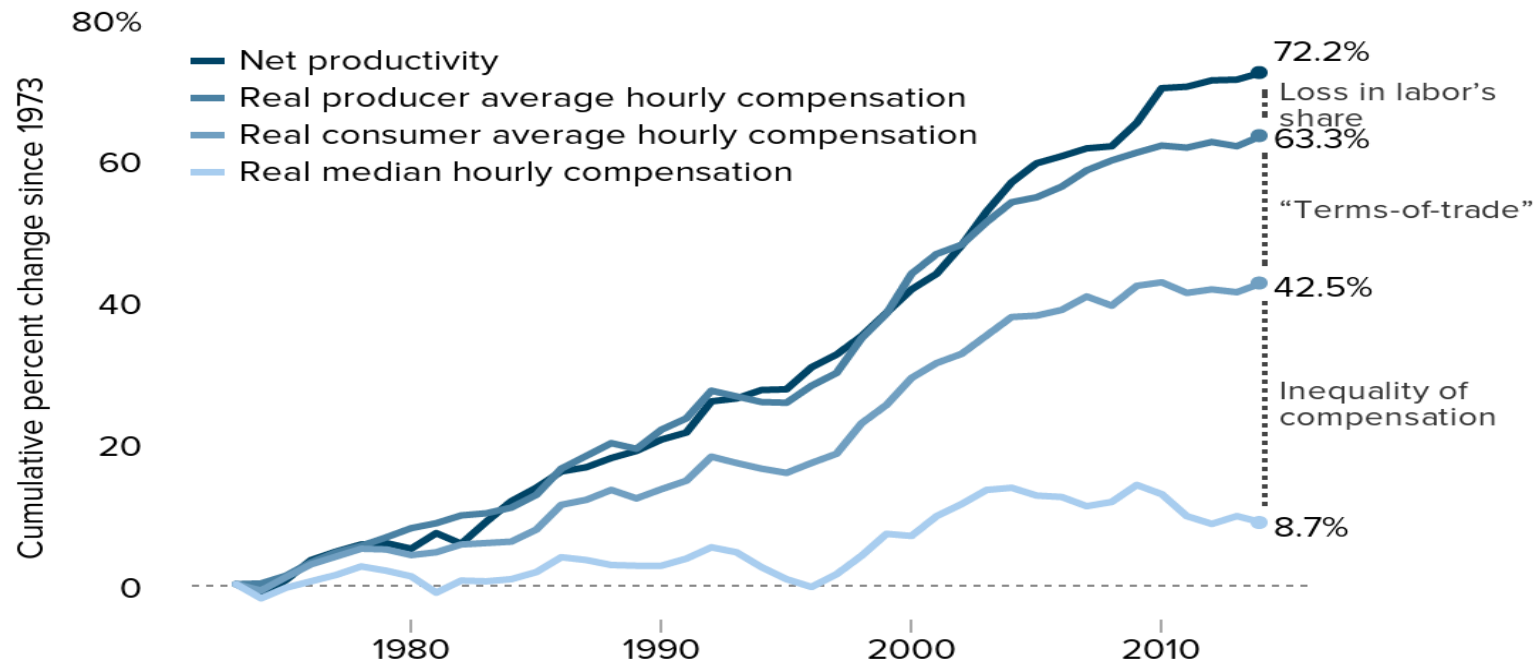
Source: EPI analysis of data from the BEA and BLS (see technical appendix of *Understanding the Historic Divergence Between Productivity and a Typical Worker's Pay* for more detailed information)

The Productivity-Pay Gap

1. Stagnant Compensation (wages & benefits) stagnation not due to failure of economy to expand productivity. There was lots of income and wealth produced.
2. Gap primarily due to rising inequality, especially in 2000s:
 - a. Inequality of compensation
 - b. Decline of labor's share

Decomposing Productivity-Median Hourly Compensation Gap

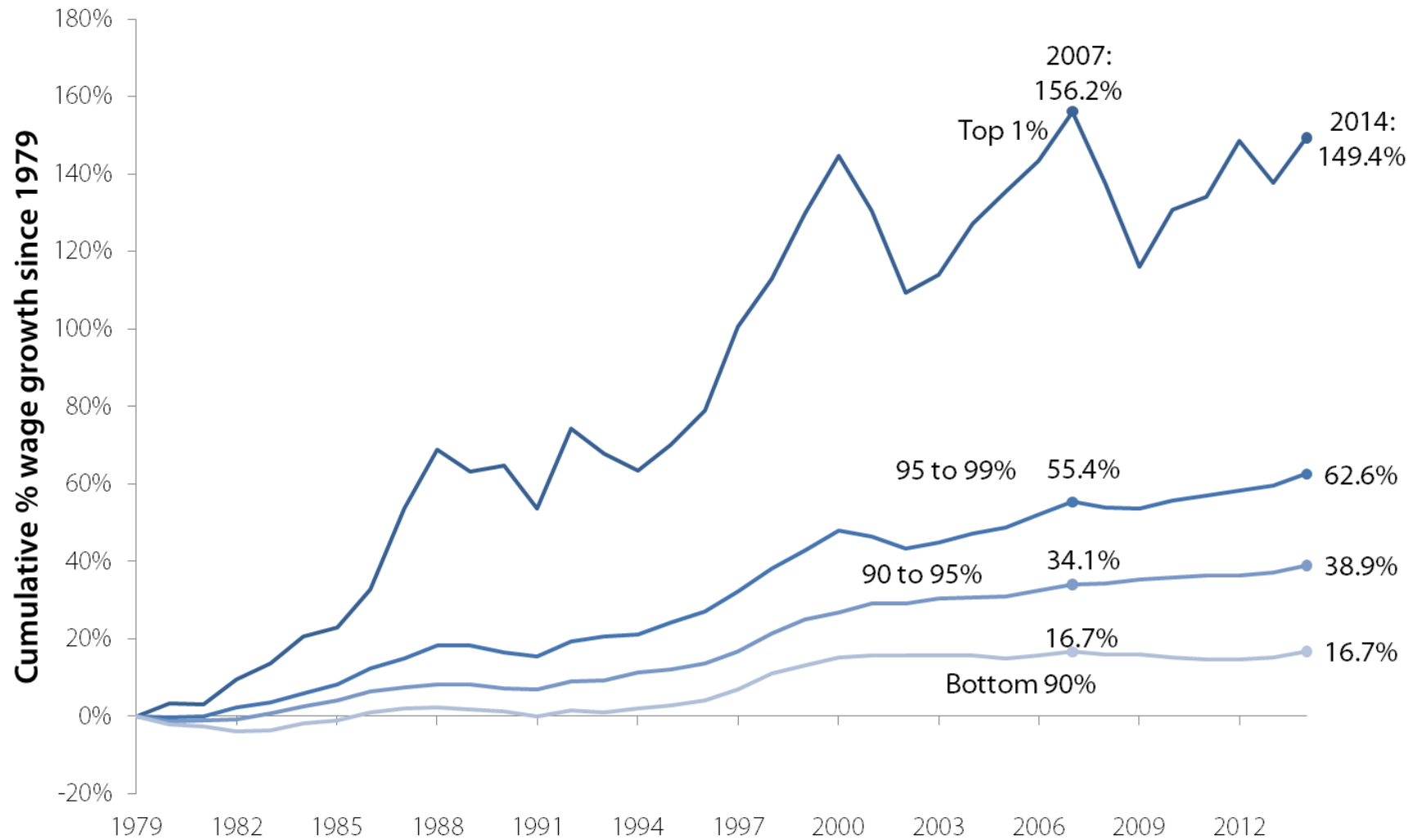
Growth of productivity, real average compensation (consumer and producer), and real median compensation, 1973–2014



Note: Data are for all workers. Net productivity is the growth of output of goods and services minus depreciation, per hour worked.

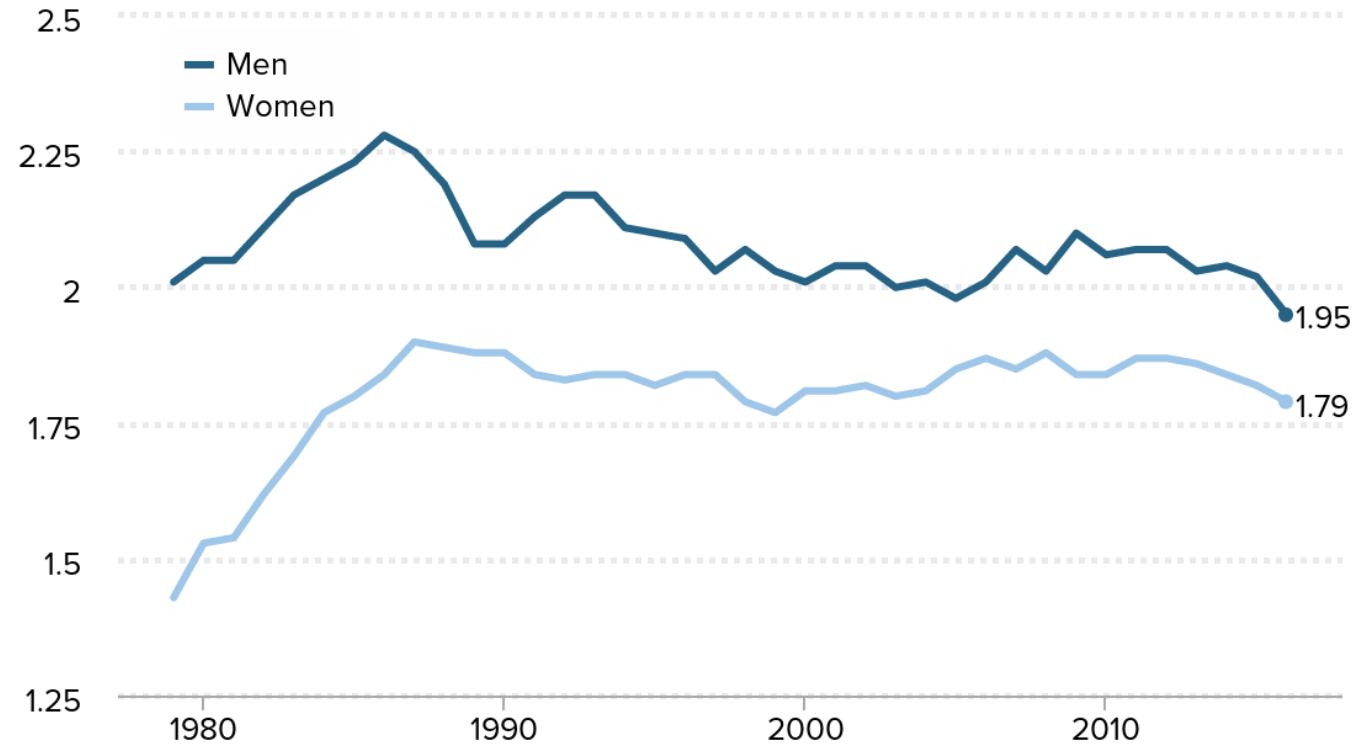
Source: EPI analysis of data from the BEA, BLS, and CPS ORG (see technical appendix for more detailed information)

Cumulative percent change in real annual wages, by wage group, 1979–2014



Source: EPI analysis of Kopczuk, Saez, and Song (2010, Table A3) and Social Security Administration wage statistics

50-10 wage ratios, by gender, 1979–2016

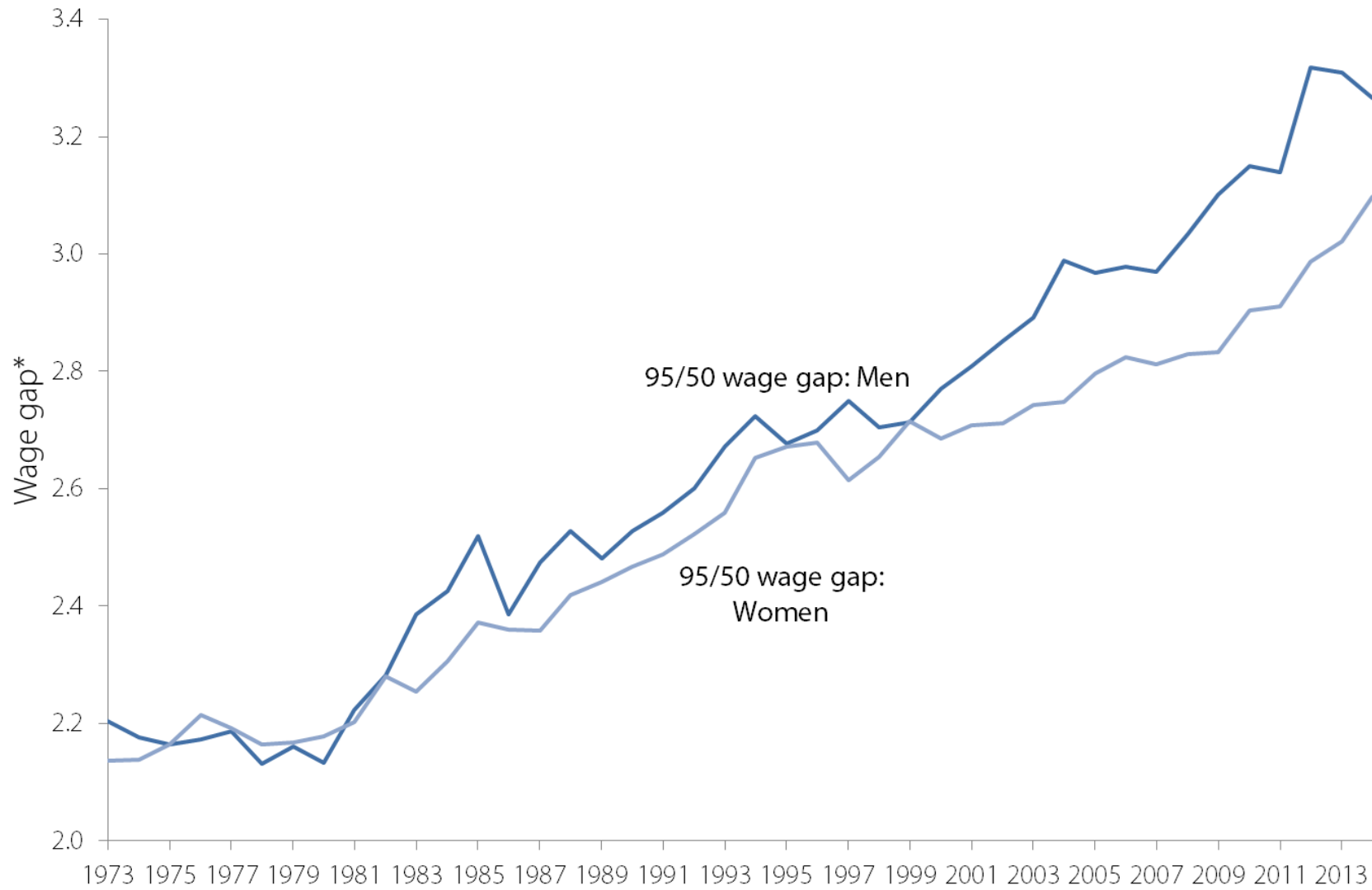


Note: Sample based on all workers age 18–64.

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

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Wage gap between the 95th and 50th percentiles, by gender, 1973–2014



*Ratio of workers' wages at the 95th earnings percentile to wages at the 50th percentile

Source: EPI analysis of Current Population Survey Outgoing Rotation Group (ORG) microdata

**Policy choices, on behalf of those with most wealth and power,
that have undercut wage growth of a typical worker:**

1. Excessive unemployment;
2. Fissured economy/Corporate Legal Disruption
3. Weakened labor standards;
4. Globalization;
5. Eroded institutions: collective bargaining
6. Top 1.0% wage/income growth

Raising America's Pay

- Full Employment
- Restrain top 1% incomes (Finance, Executive pay)
- Restore labor standards (min wage, OT, wage theft, misclassification, forced arbitration, undocumented workers)
- Modernize labor standards (earned sick leave, family leave, fair work week/scheduling)
- Rebuild collective bargaining

See: <http://www.epi.org/pay/>

End

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