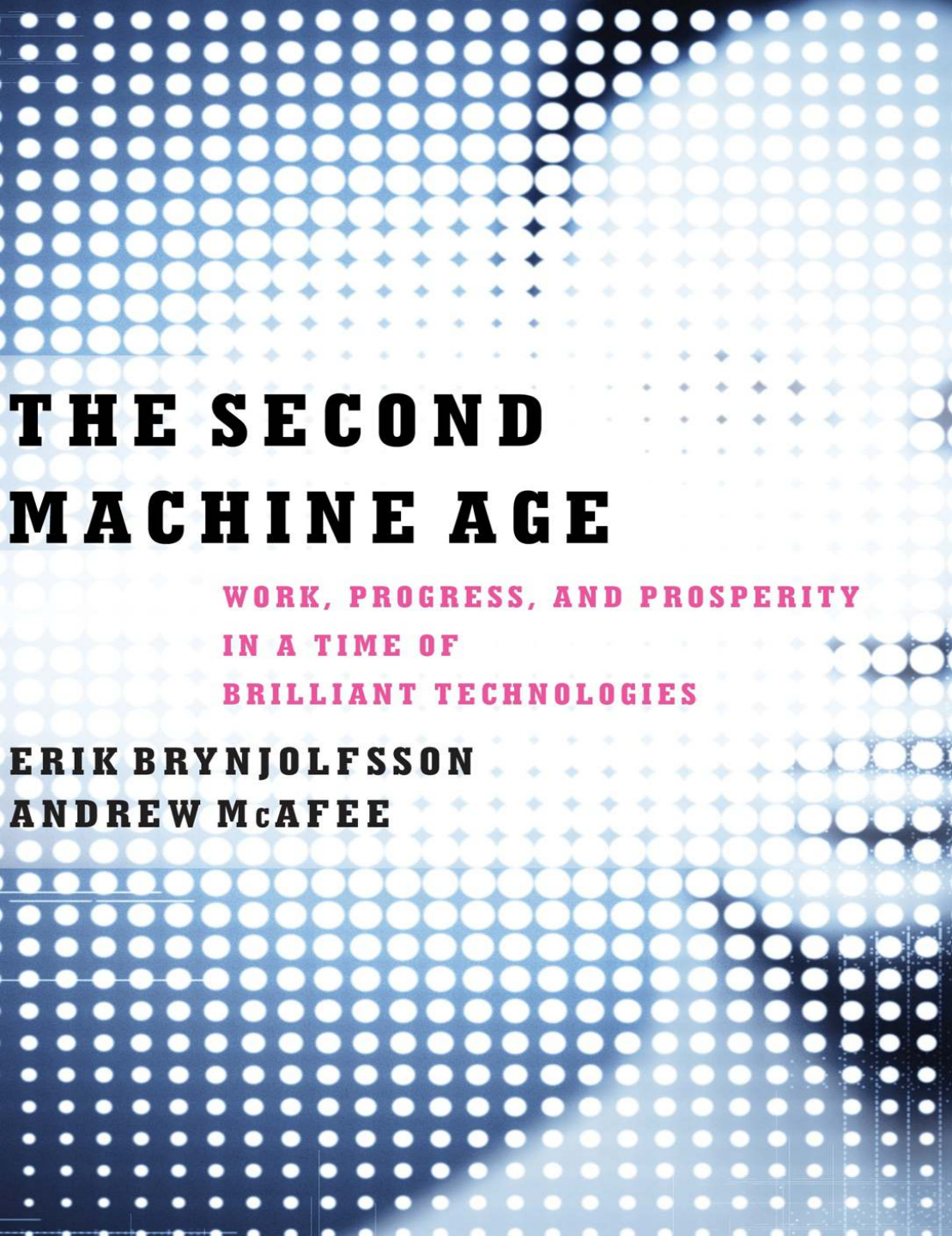




THE SECOND MACHINE AGE

**WORK, PROGRESS, AND PROSPERITY
IN A TIME OF
BRILLIANT TECHNOLOGIES**

**ERIK BRYNJOLFSSON
ANDREW McAFEE**

A FAQ on tech, jobs, and wages

Andrew McAfee, MIT

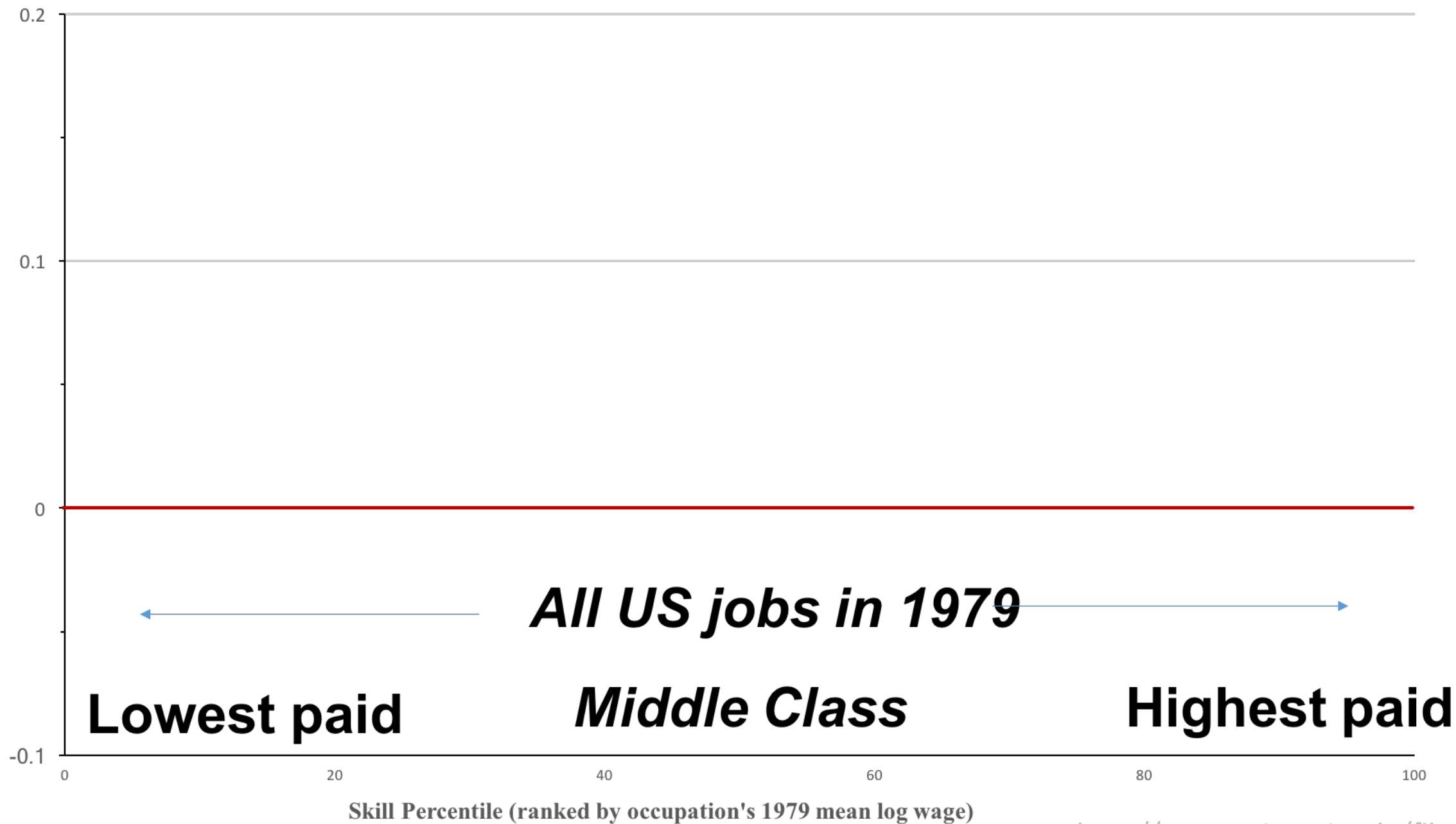
amcafee@mit.edu

@amcafee

What's going on?

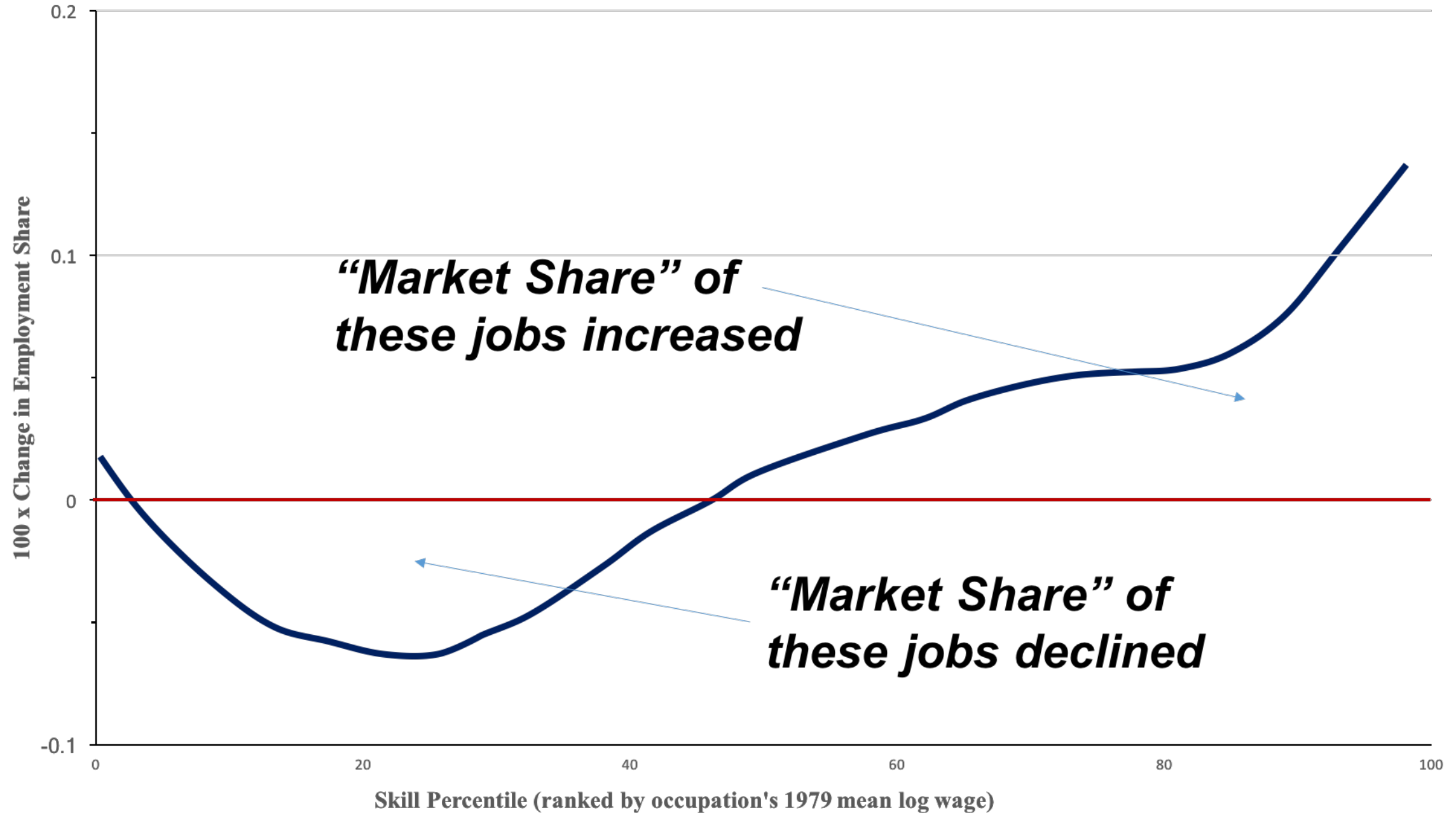
What's going on?

*The polarization or “hollowing out”
of the workforce*



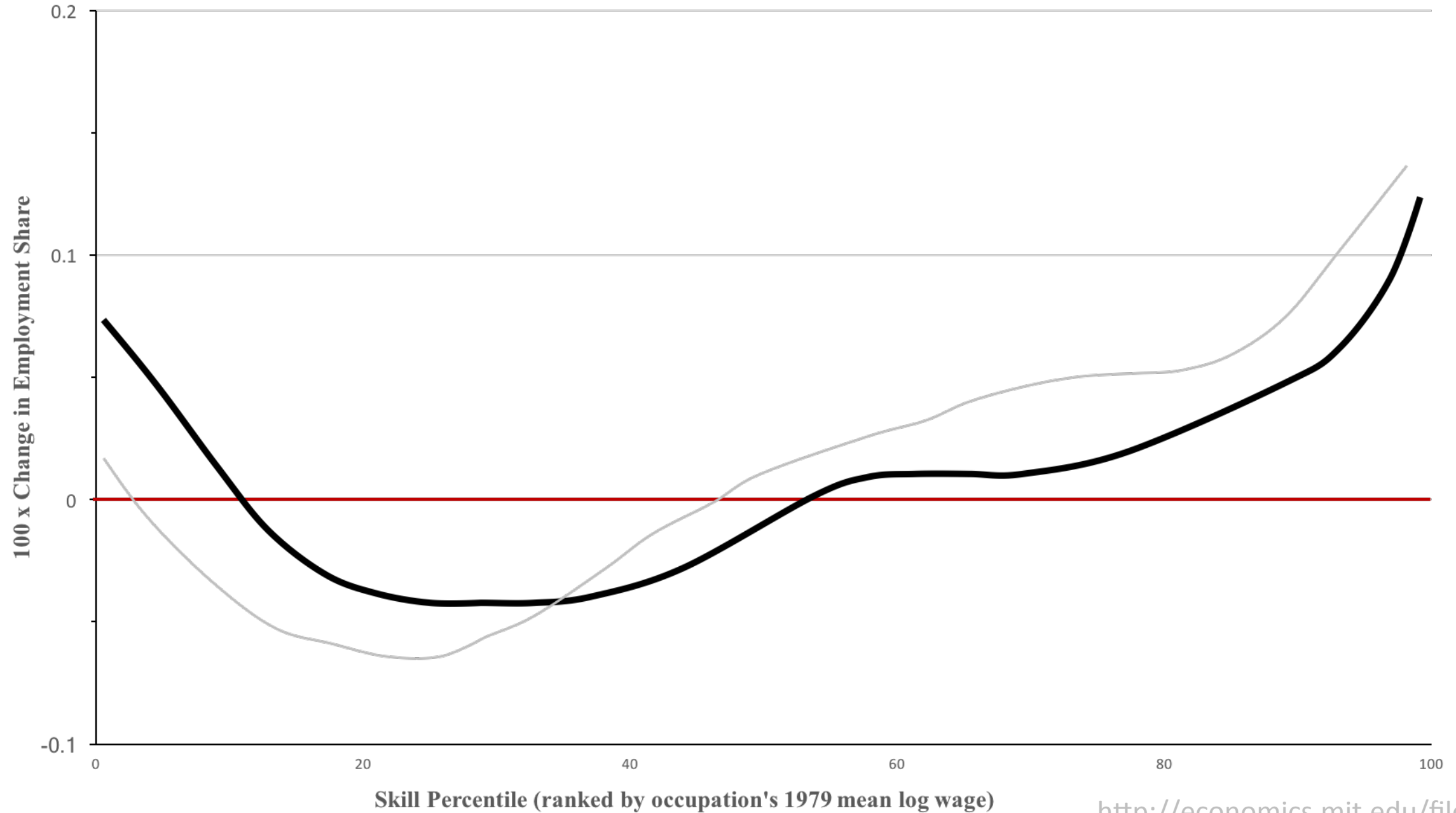
Smoothed Employment Changes, 1979-1989

Autor, 2016



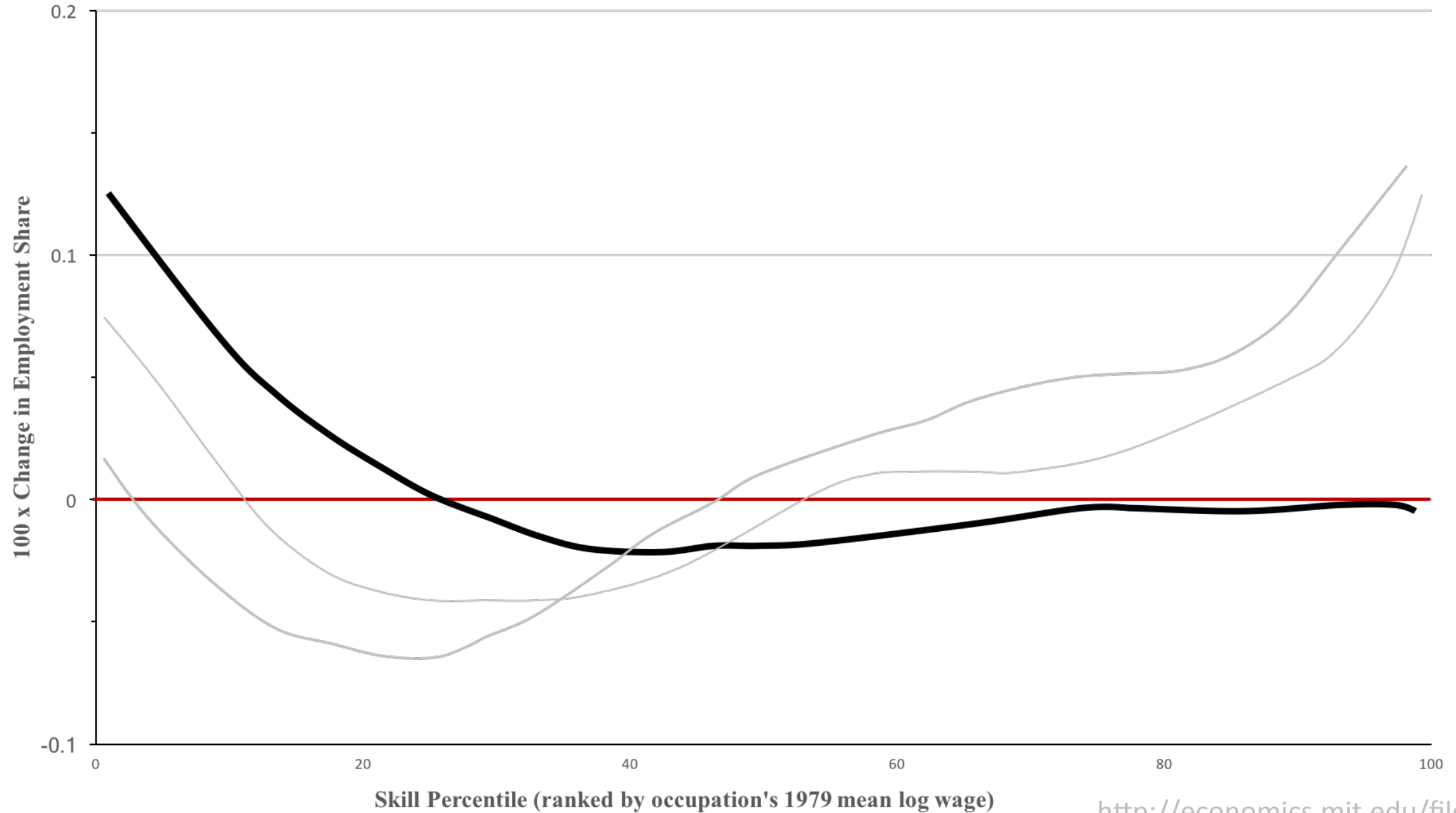
Smoothed Employment Changes, 1989-1999

Autor, 2016



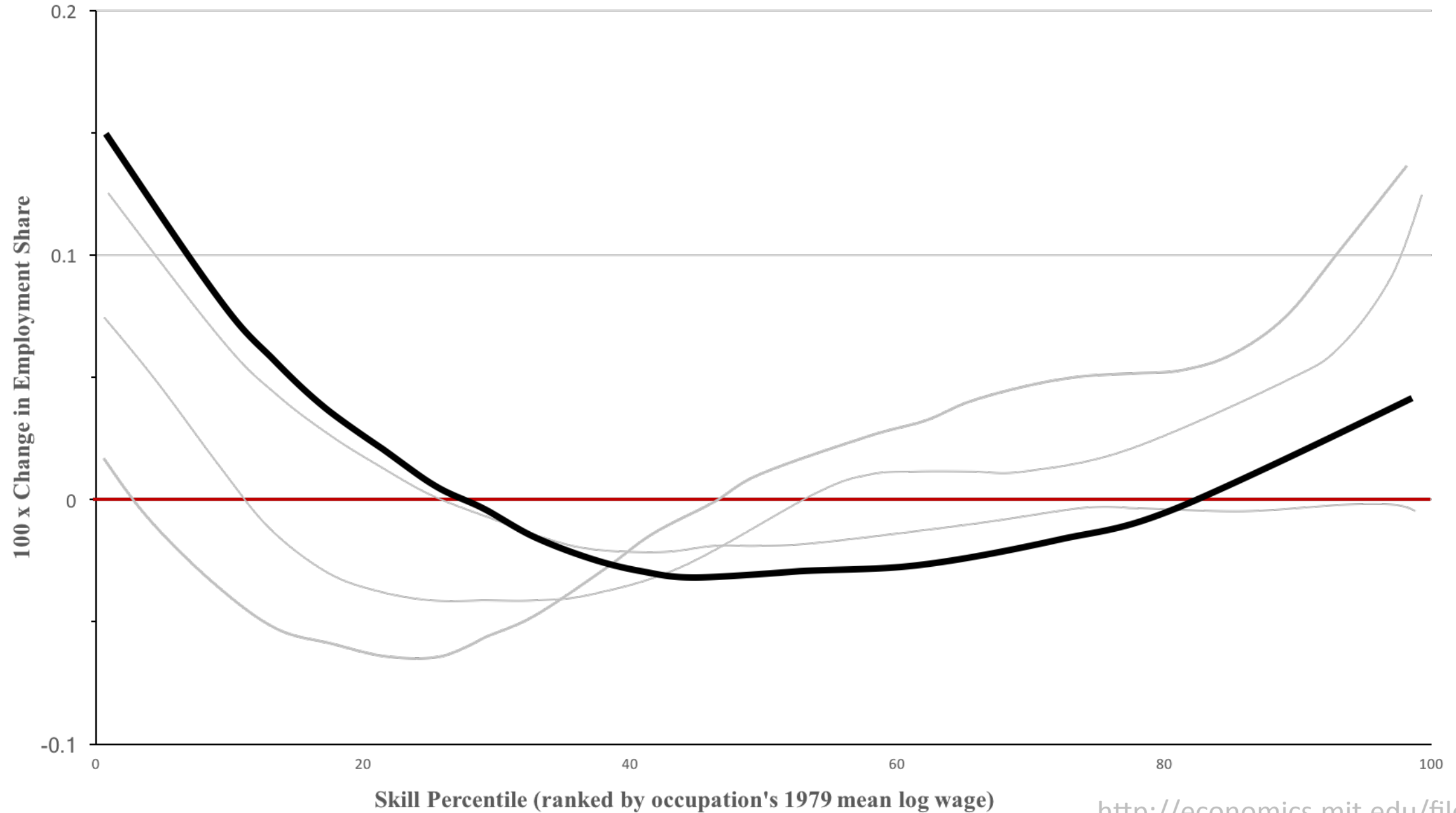
Smoothed Employment Changes, 1999-2007

Autor, 2016



Smoothed Employment Changes, 2007-2012

Autor, 2016

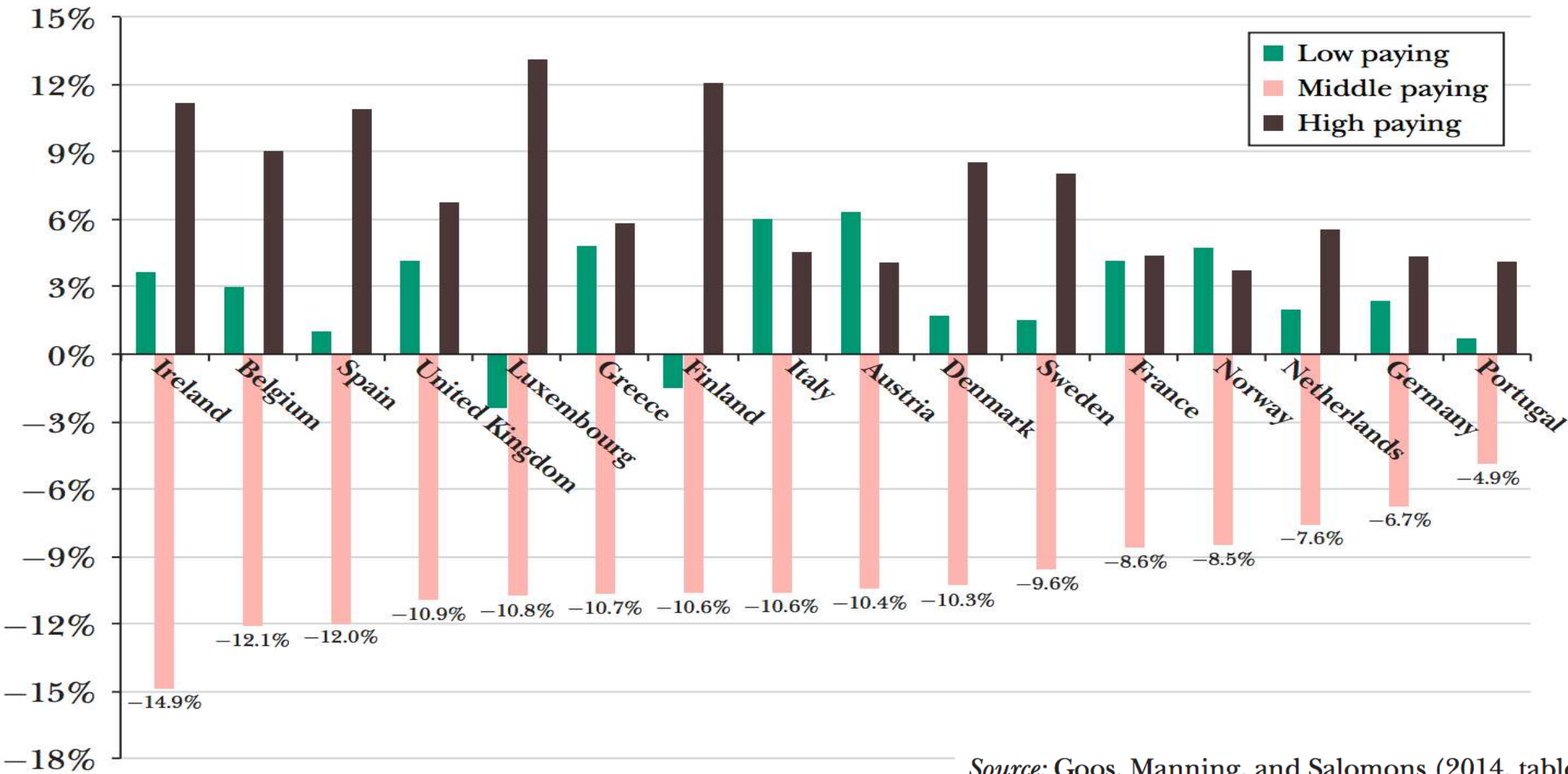


Is this a US-only
phenomenon?

Is this a US-only
phenomenon?

No

Change in Occupational Employment Shares in Low, Middle, and High-Wage Occupations in 16 EU Countries, 1993–2010



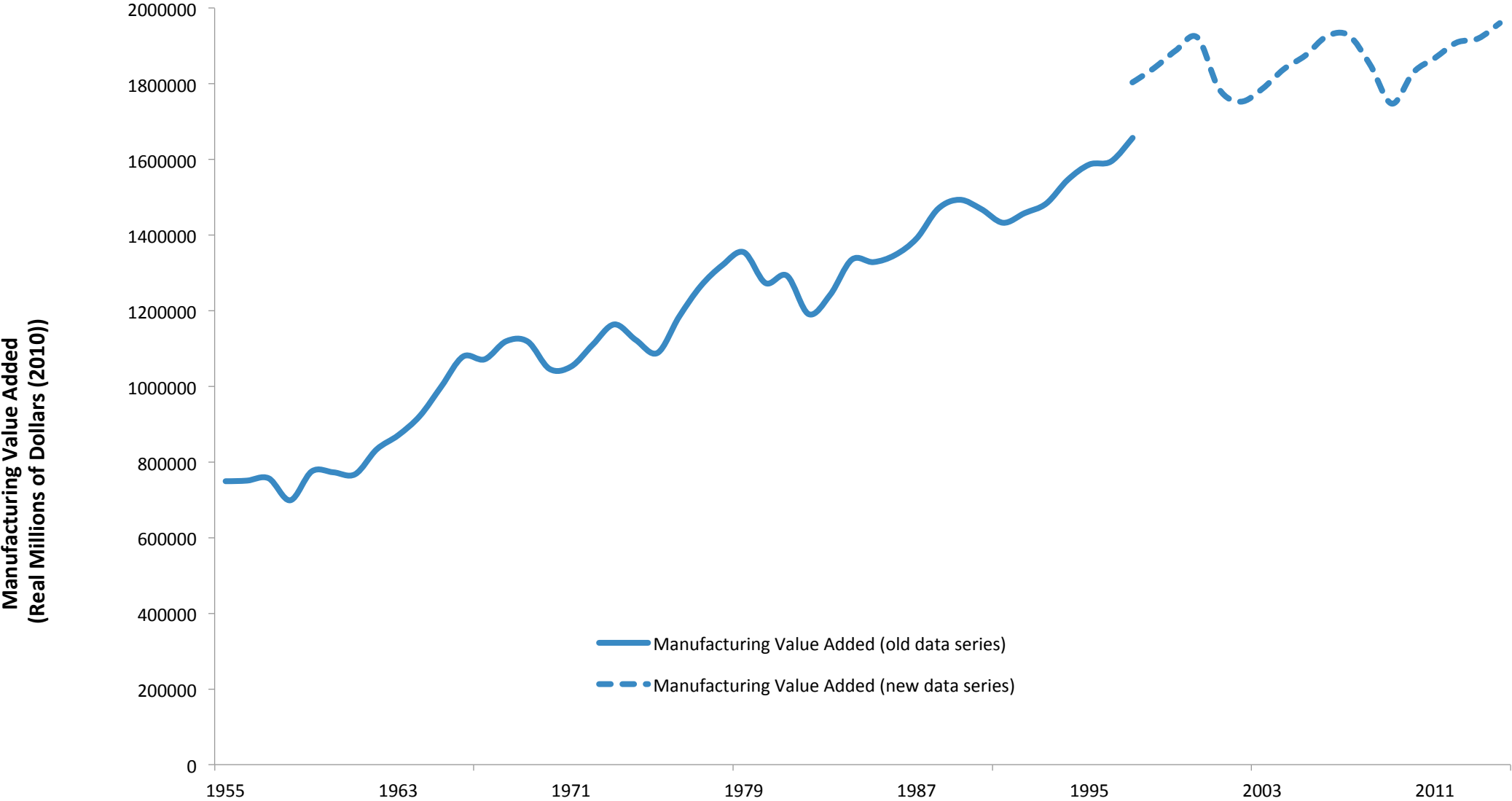
Source: Goos, Manning, and Salomons (2014, table 2).

Isn't this mainly because of
globalization / China?

Isn't this mainly because of
globalization / China?

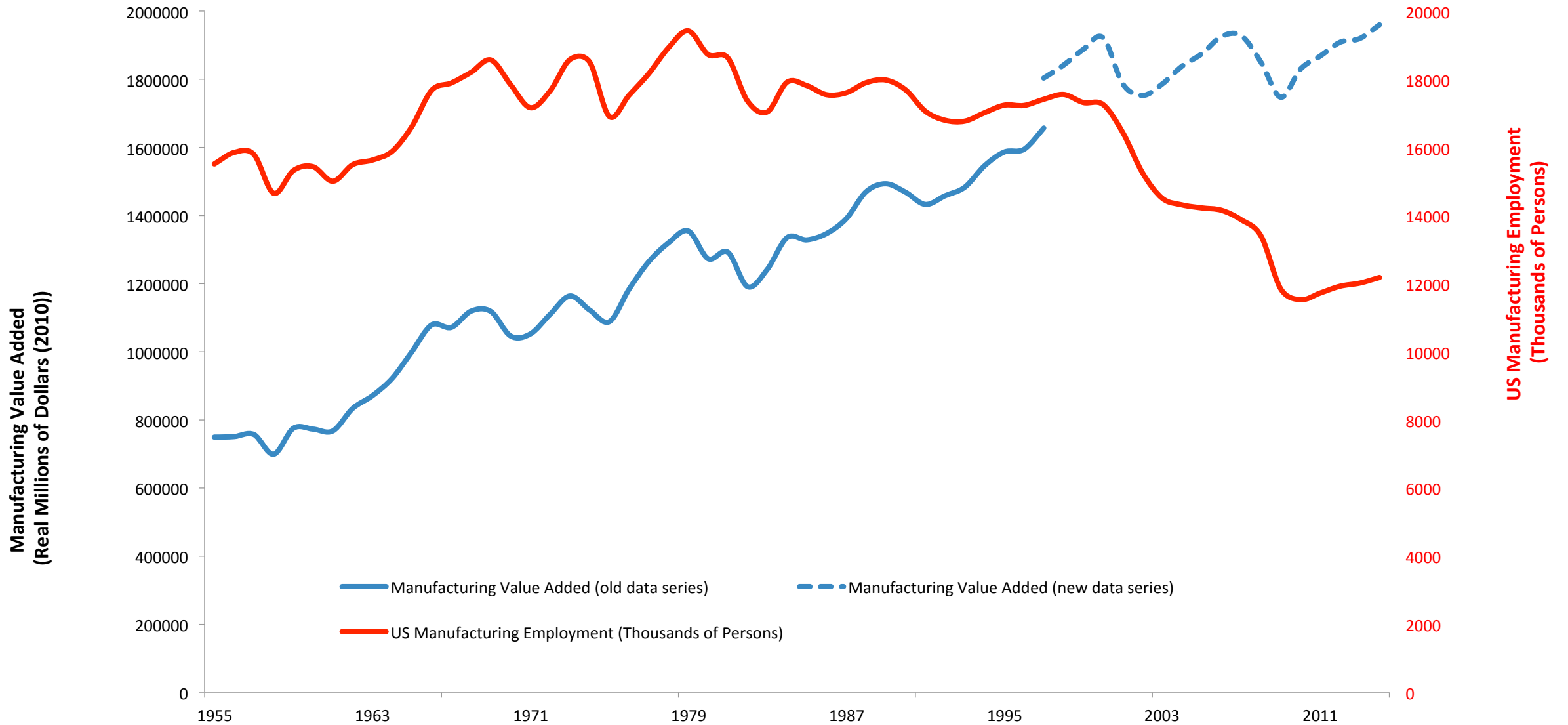
No

US Manufacturing Value Added, 1955-2015



Source: Federal Reserve Bank of St. Louis, Bureau of Economic Analysis

US Manufacturing Employment vs. Value Added, 1955-2015



Source: Federal Reserve Bank of St. Louis, Bureau of Economic Analysis

So what *is* the cause?

So what *is* the cause?

Automation of routine work

“The adoption of computers substitutes for... workers performing routine tasks—such as bookkeeping, clerical work, and repetitive production and monitoring activities—which are readily computerized because they follow precise, well-defined procedures.”

- Autor and Dorn, 2013

“We evaluate numerous alternative explanations for the pronounced differences in wage and employment polarization... including deindustrialization, offshoring, ... and growing low-skill immigration. None of these alternatives appears central to our findings.”

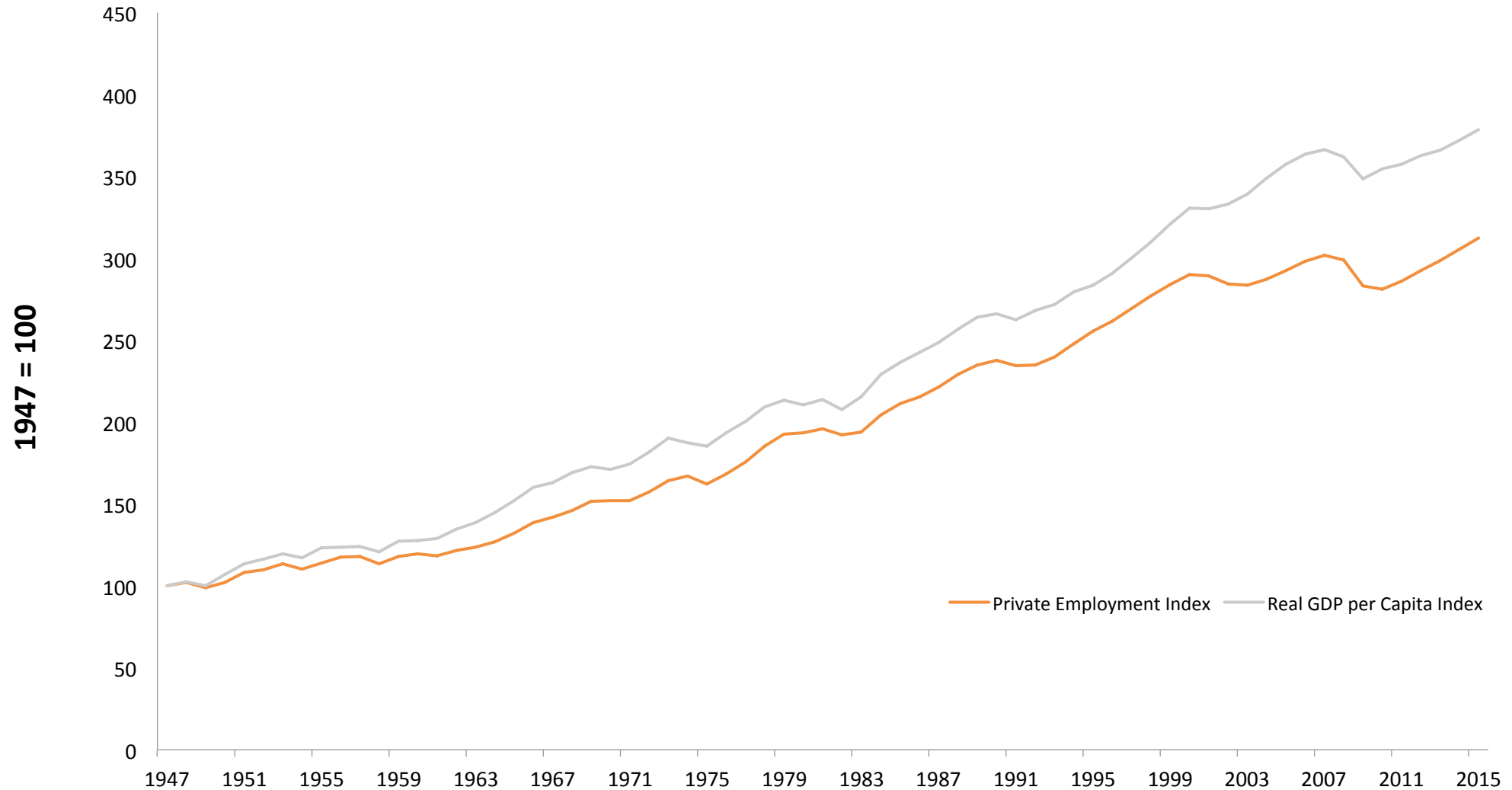
- Autor and Dorn, 2013

Then why isn't there mass unemployment?

Then why isn't there mass unemployment?

Economic growth + Labor force flexibility + + “downward mobility”

US Real GDP per Capita and Employment, 1947-2015



Sources: US Census Bureau, Bureau of Labor Statistics, Federal Reserve Bank of St. Louis.

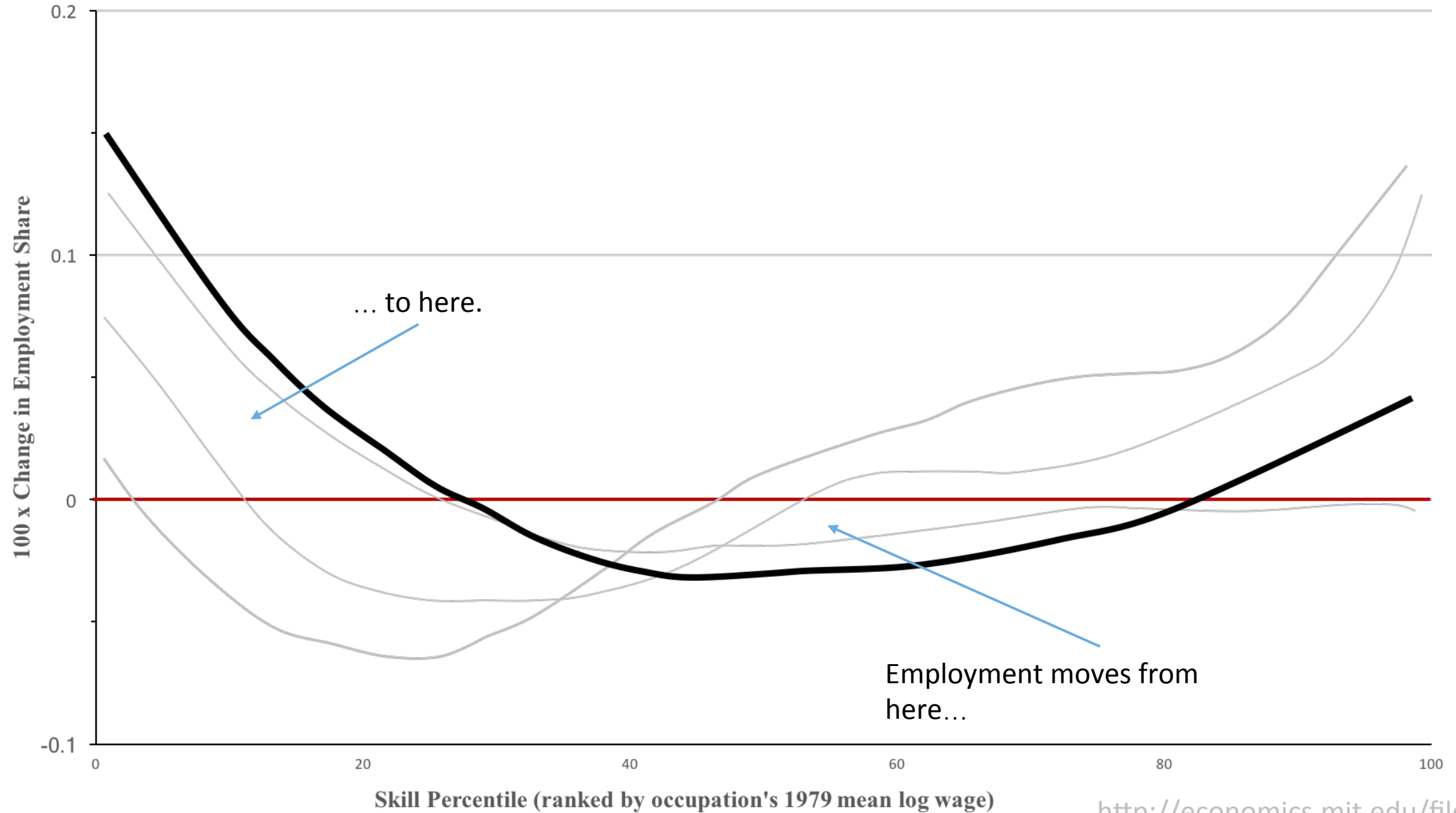
Table 3: Labor Market Flexibility

OECD Measures of Labor Market Flexibility	U.S. Percentile Rank (100 = Most Flexible)
Barriers to Entrepreneurship	62
Labor Taxation	71
Coverage of Collective Bargaining Agreements	90
Minimum Cost of Labor	92
Scope of State Intervention	94
Employment Protection for Regular Employment	100
Overall Labor Market Regulation	100

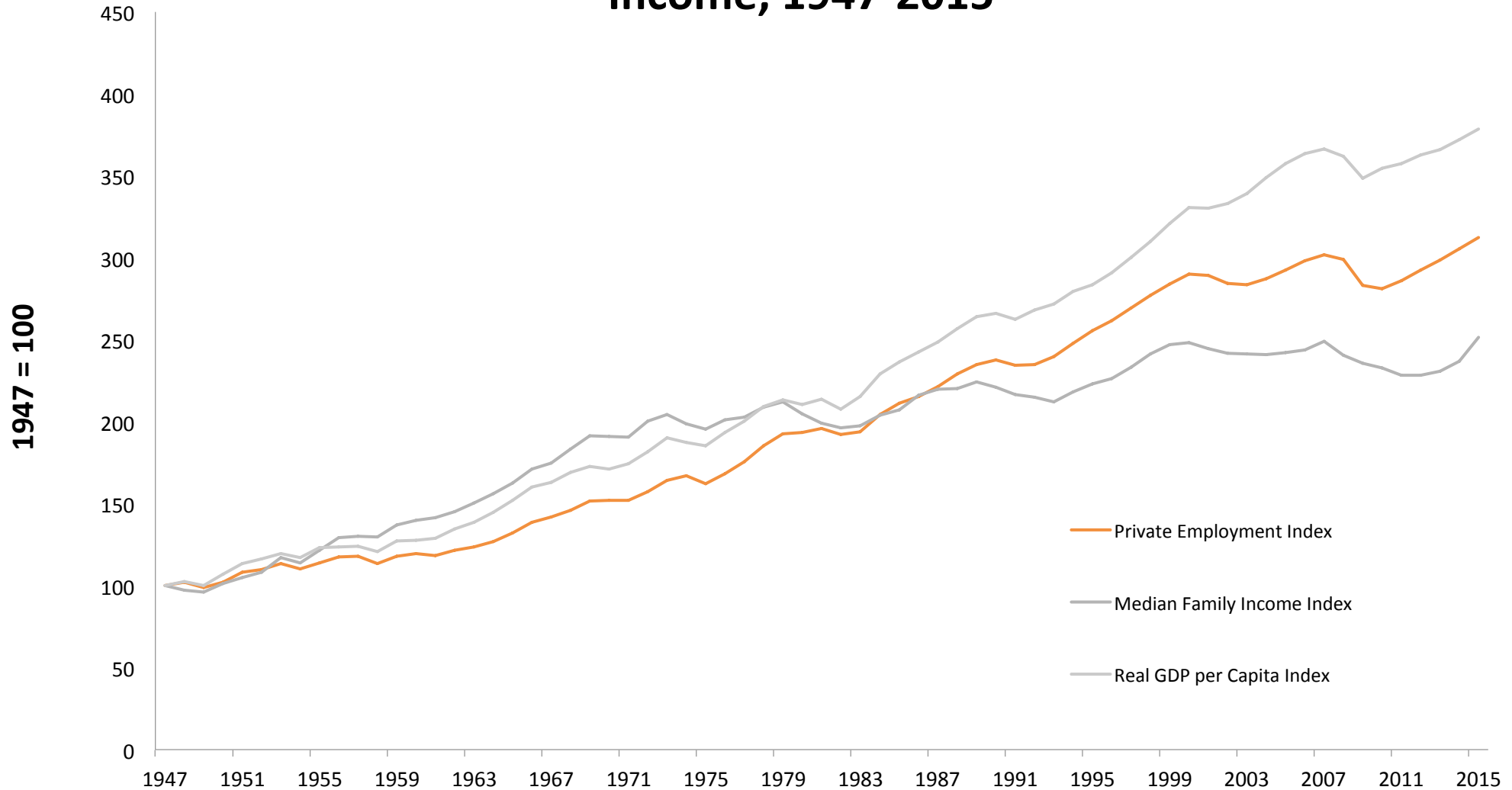
Source: OECD 2015; CEA calculations.

Smoothed Employment Changes, 2007-2012

Autor, 2016



US Real GDP per Capita, Employment and Median Family Income, 1947-2015

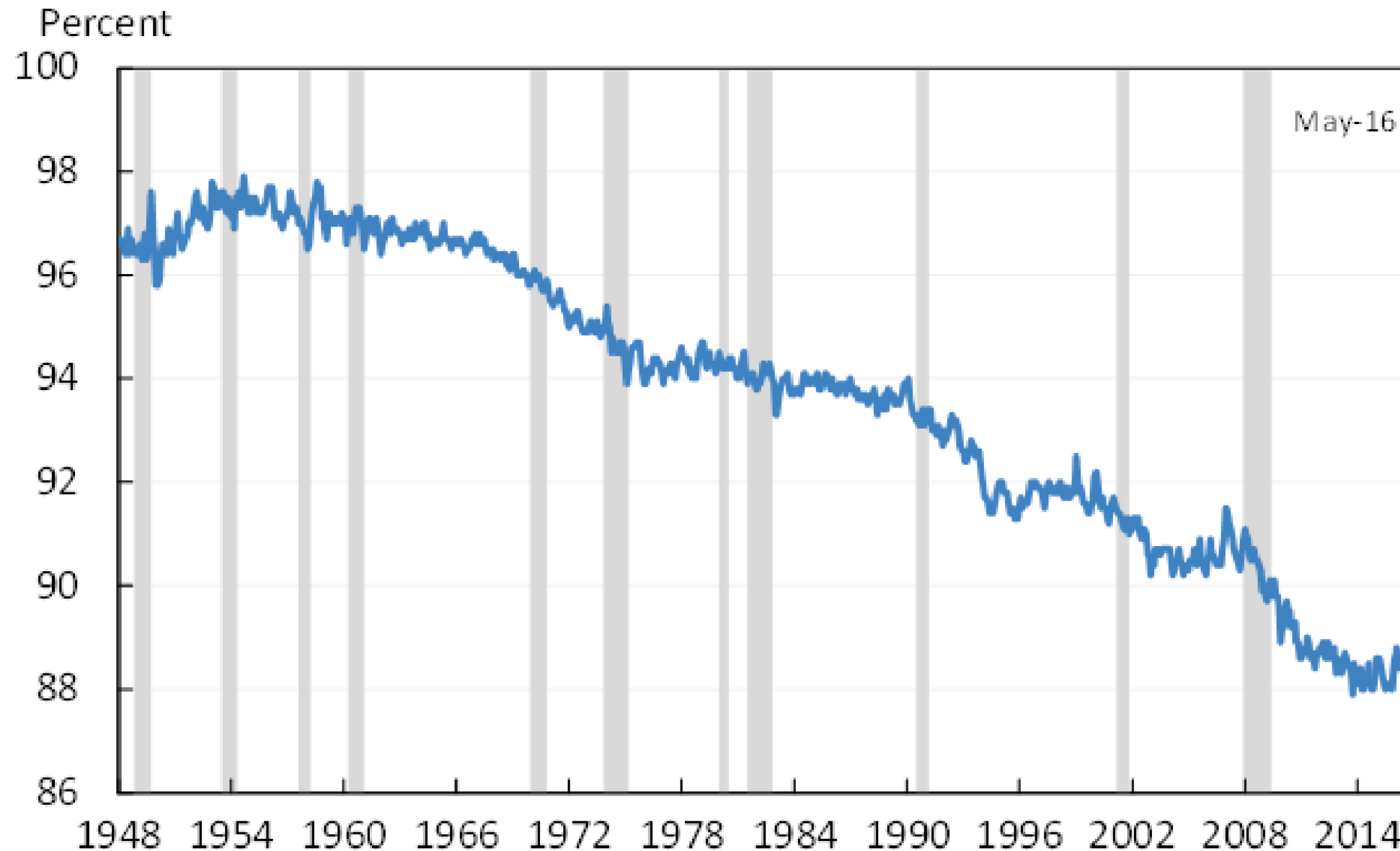


Sources: US Census Bureau, Bureau of Labor Statistics, Federal Reserve Bank of St. Louis.

Then why isn't there mass unemployment?

Also, there is concentrated high unemployment

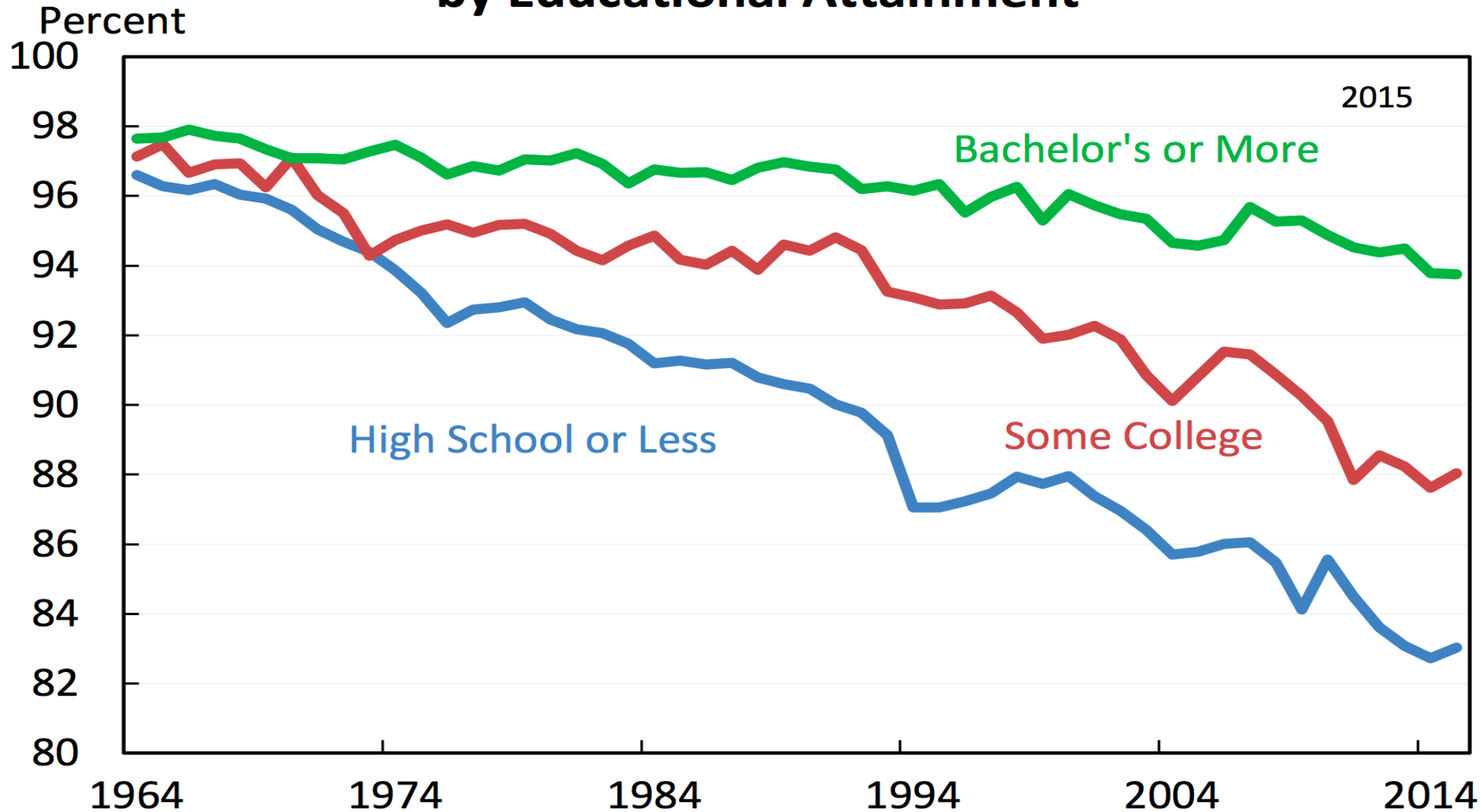
Figure 1: Prime-Age Male Labor Force Participation Rate



Source: Bureau of Labor Statistics, Current Population Survey; CEA calculations.

https://www.whitehouse.gov/sites/default/files/page/files/20160620_cea_primeage_male_lfp.pdf

**Figure 9: Prime-Age Male Labor Force Participation
by Educational Attainment**



Source: Bureau of Labor Statistics, Current Population Survey (Annual Social and Economic Supplement); CEA calculations.

What are the consequences?

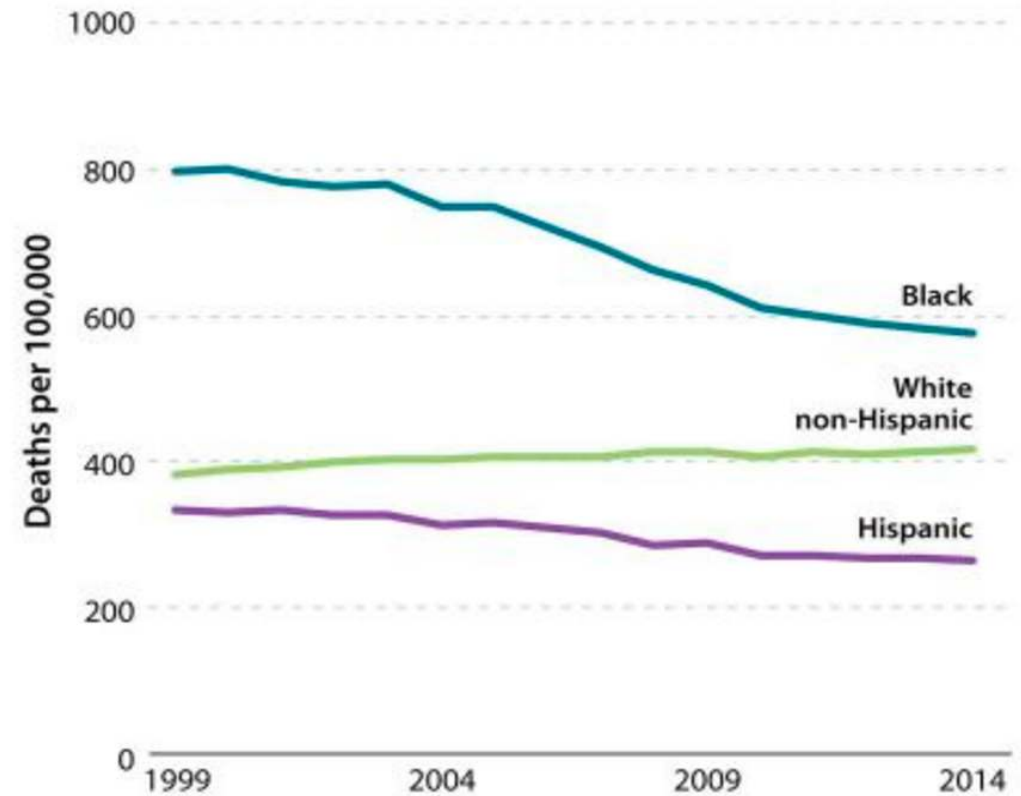
What are the consequences?

Hard to say, precisely. Here are a few other things that are going on...

Mortality

FIGURE 5B.

Mortality, Age 45–54



Source: Centers for Disease Control and Prevention 1999–2014.

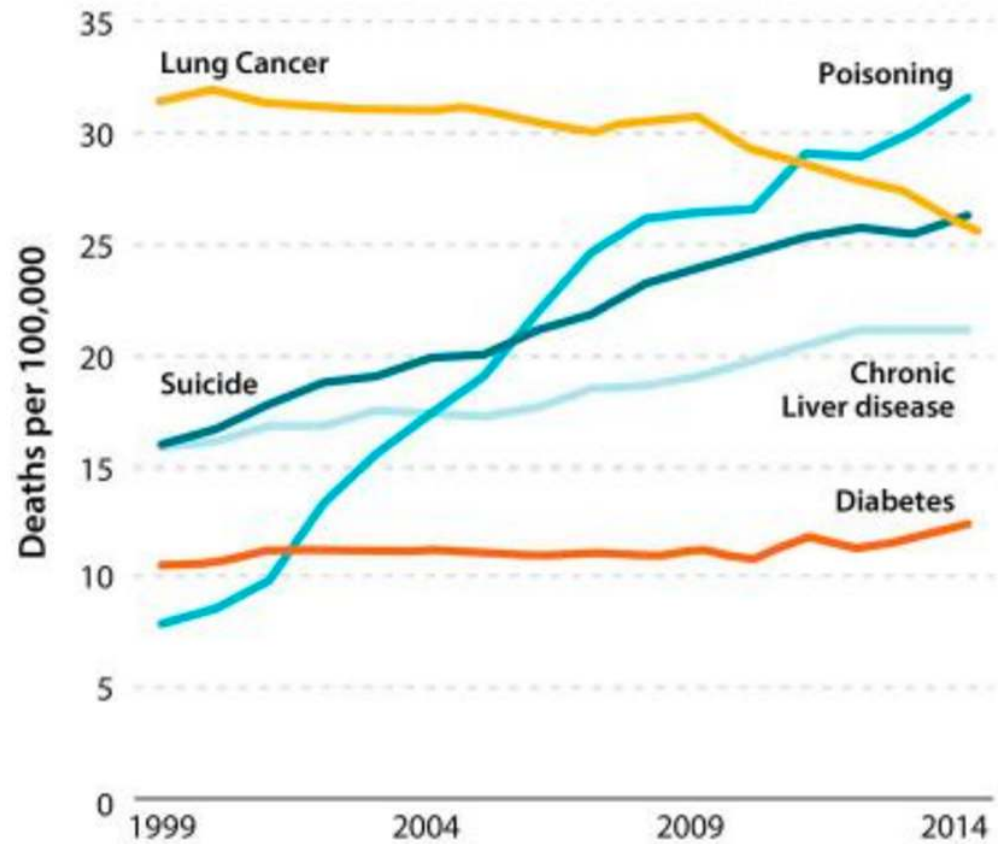
Note: Mortality data are for all-cause mortality. Figure is adapted from Case and Deaton (2015) figure 1.



Mortality

FIGURE 5A.

Mortality by Cause, White Non-Hispanics Age 45–54

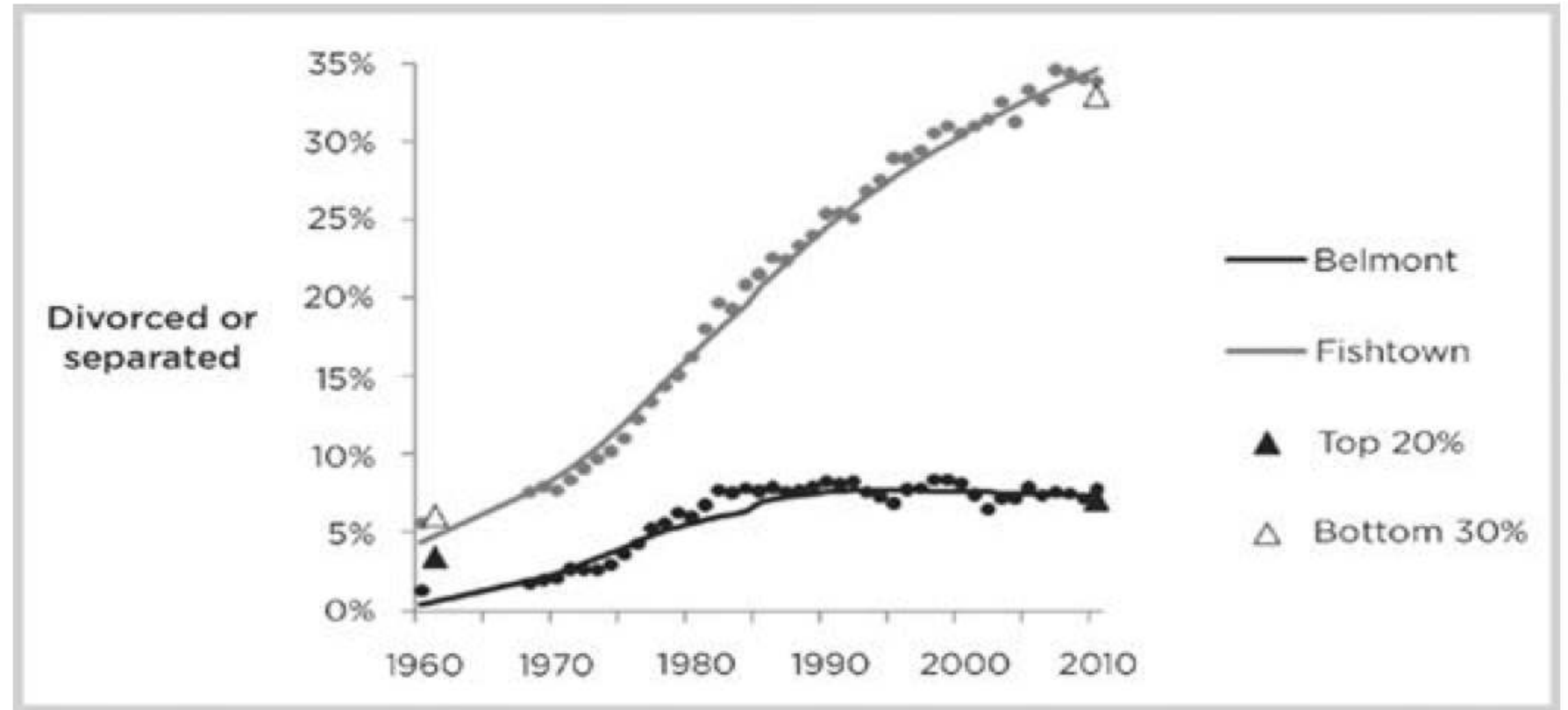


Source: CDC 1999–2014.

Note: Figure is adapted from Case and Deaton (2015) figure 2. Chronic liver diseases include alcoholic liver diseases and cirrhosis. Poisonings include drug and alcohol poisoning, both accidental and with undetermined intent.

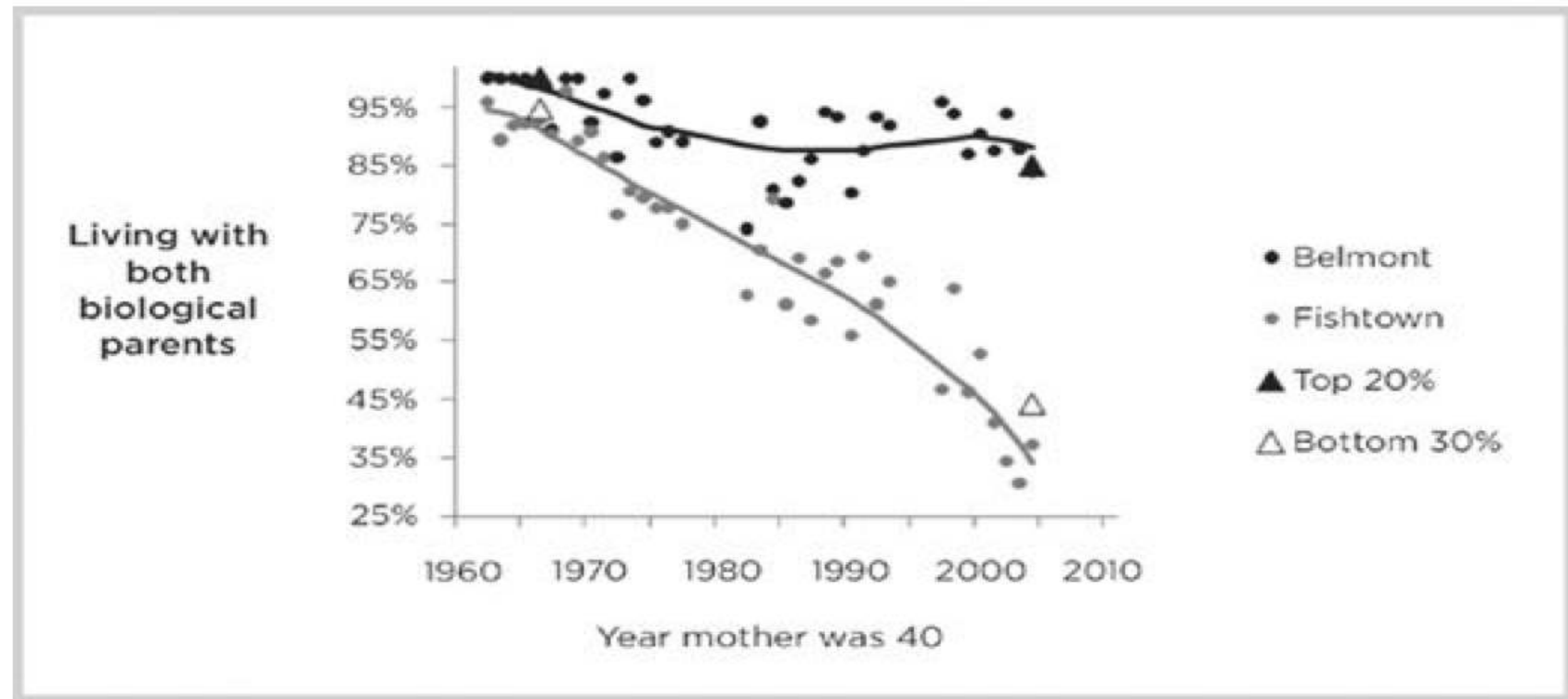
Social Decay

FIGURE 8.5. DIVORCE



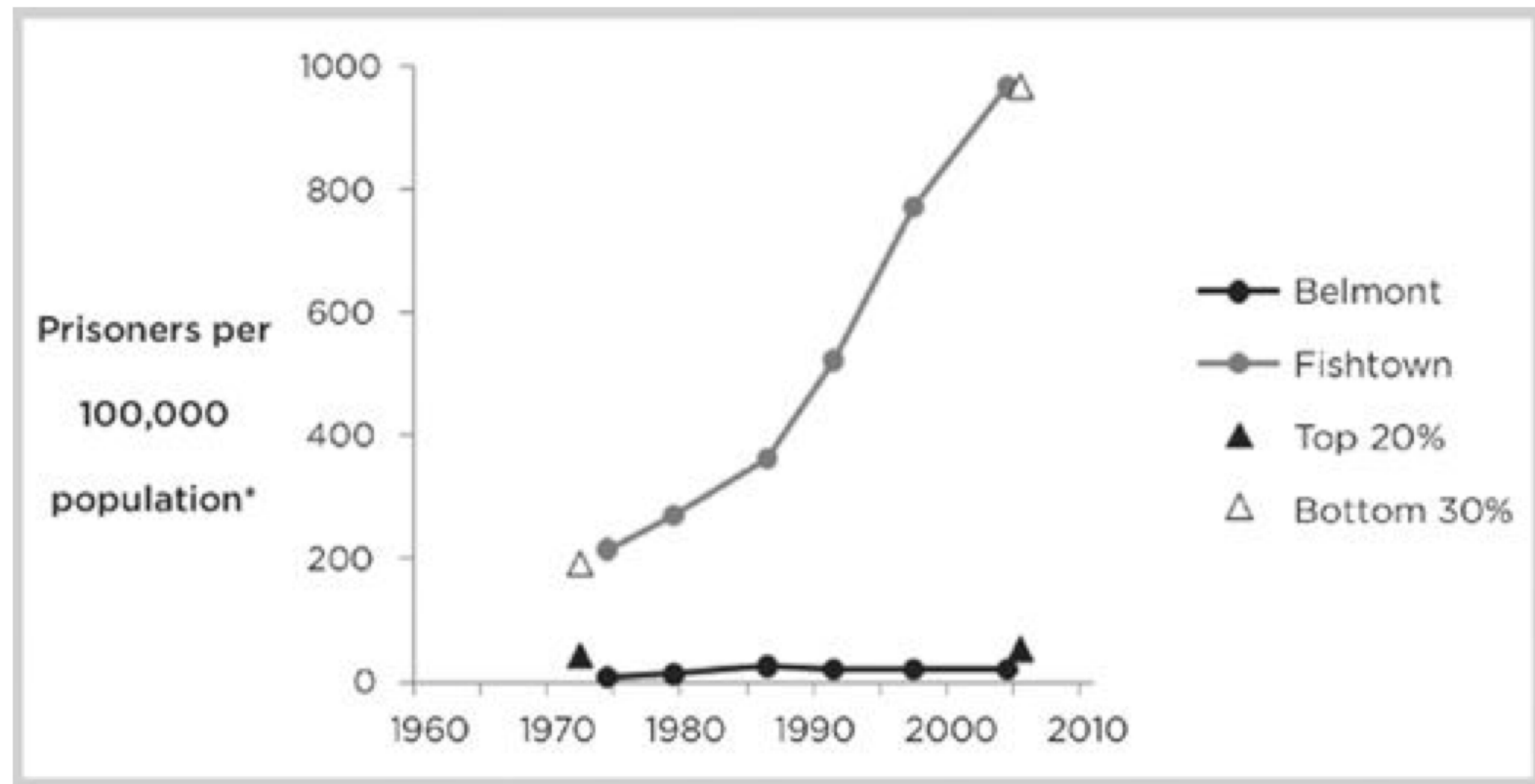
Social Decay

FIGURE 8.11. PERCENTAGE OF CHILDREN LIVING WITH BOTH BIOLOGICAL PARENTS WHEN THE MOTHER WAS AGE 40



Social Decay

FIGURE 10.2. WHITE PRISONERS

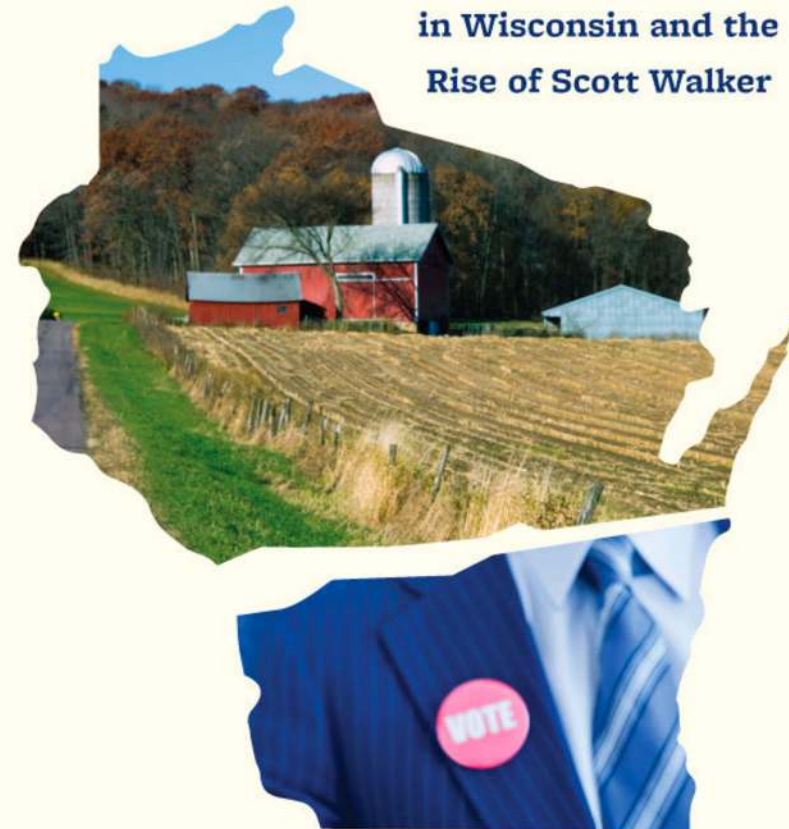


“The Politics of Resentment”

KATHERINE J. CRAMER

THE POLITICS OF **RESENTMENT**

Rural Consciousness
in Wisconsin and the
Rise of Scott Walker



McAfee's caution:

"If current trends continue, the people will rise up before the machines do."



Are things going to get better?

Are things going to get better?

Two views here:

1) YES. We're underestimating the power of capitalism. History will repeat itself.

Are things going to get better?

Two views here:

2) NO. We're underestimating the power of modern technology. This time is different.

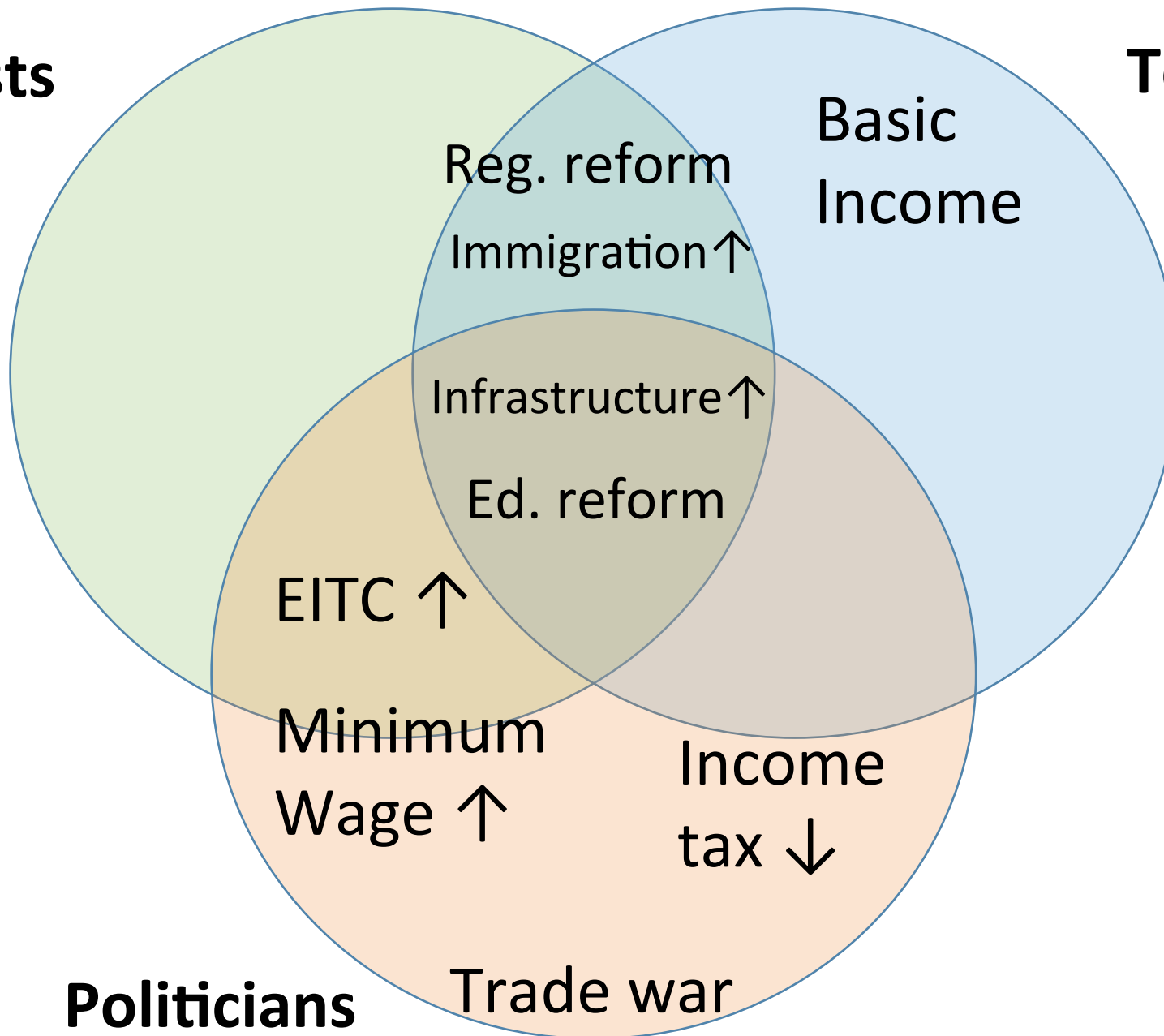
What should we do?

What should we do?

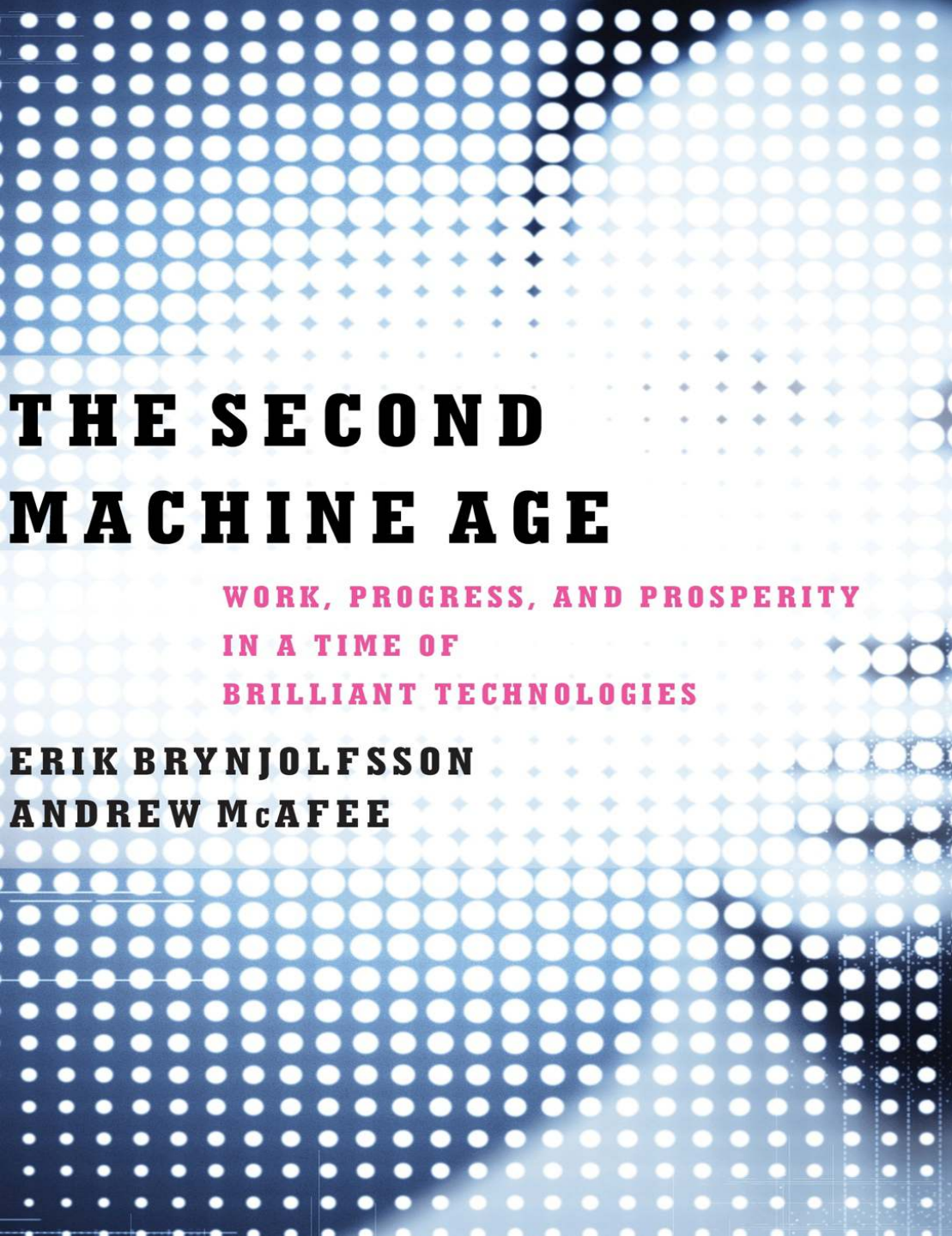
Depends on who you talk to.

Economists

Technologists



Politicians



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Thank you!

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