



**THE SECOND  
MACHINE AGE**

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

**ERIK BRYNJOLFSSON  
ANDREW McAFEE**

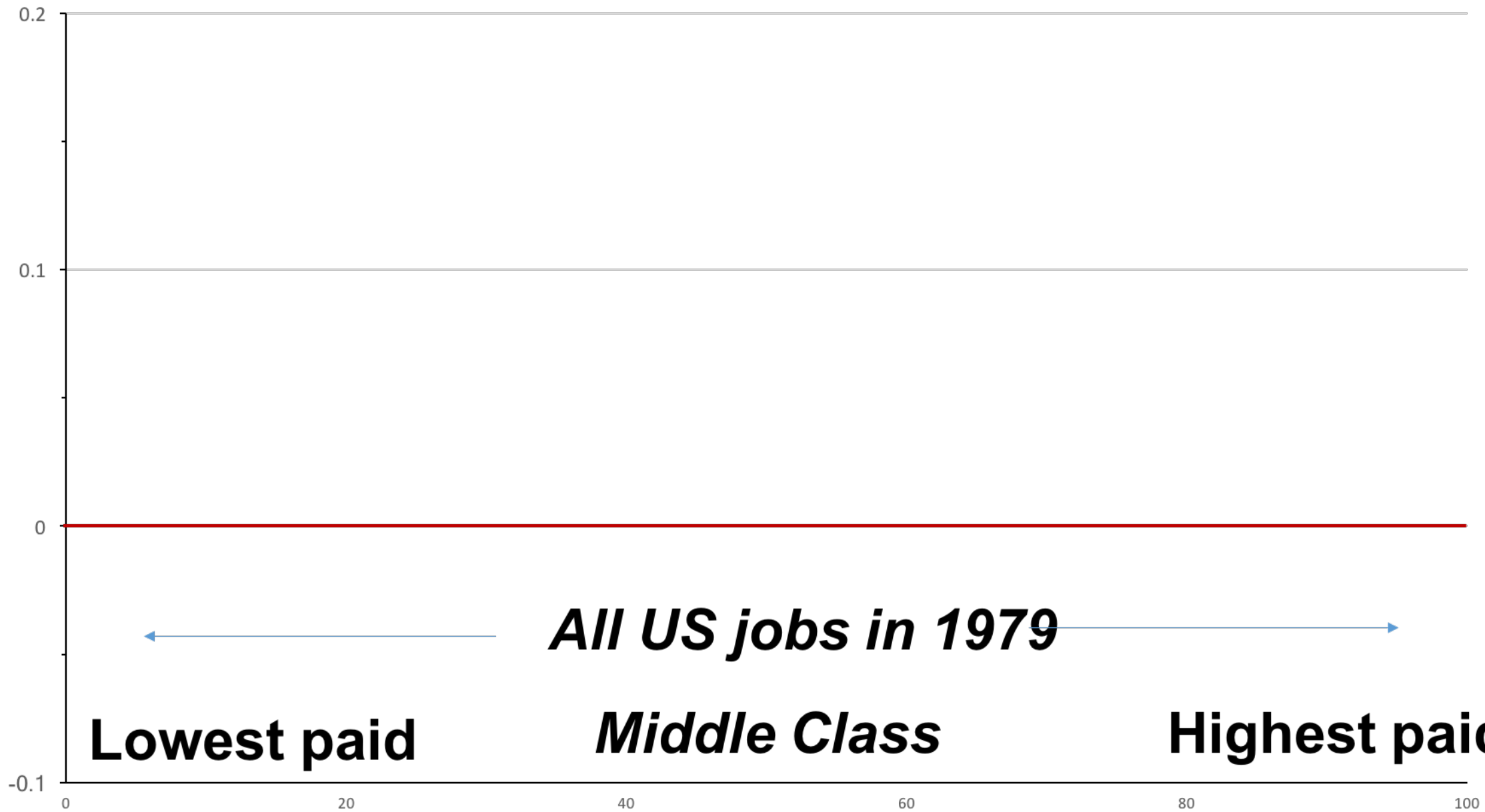
# A FAQ on tech, jobs, and wages

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What's going on?

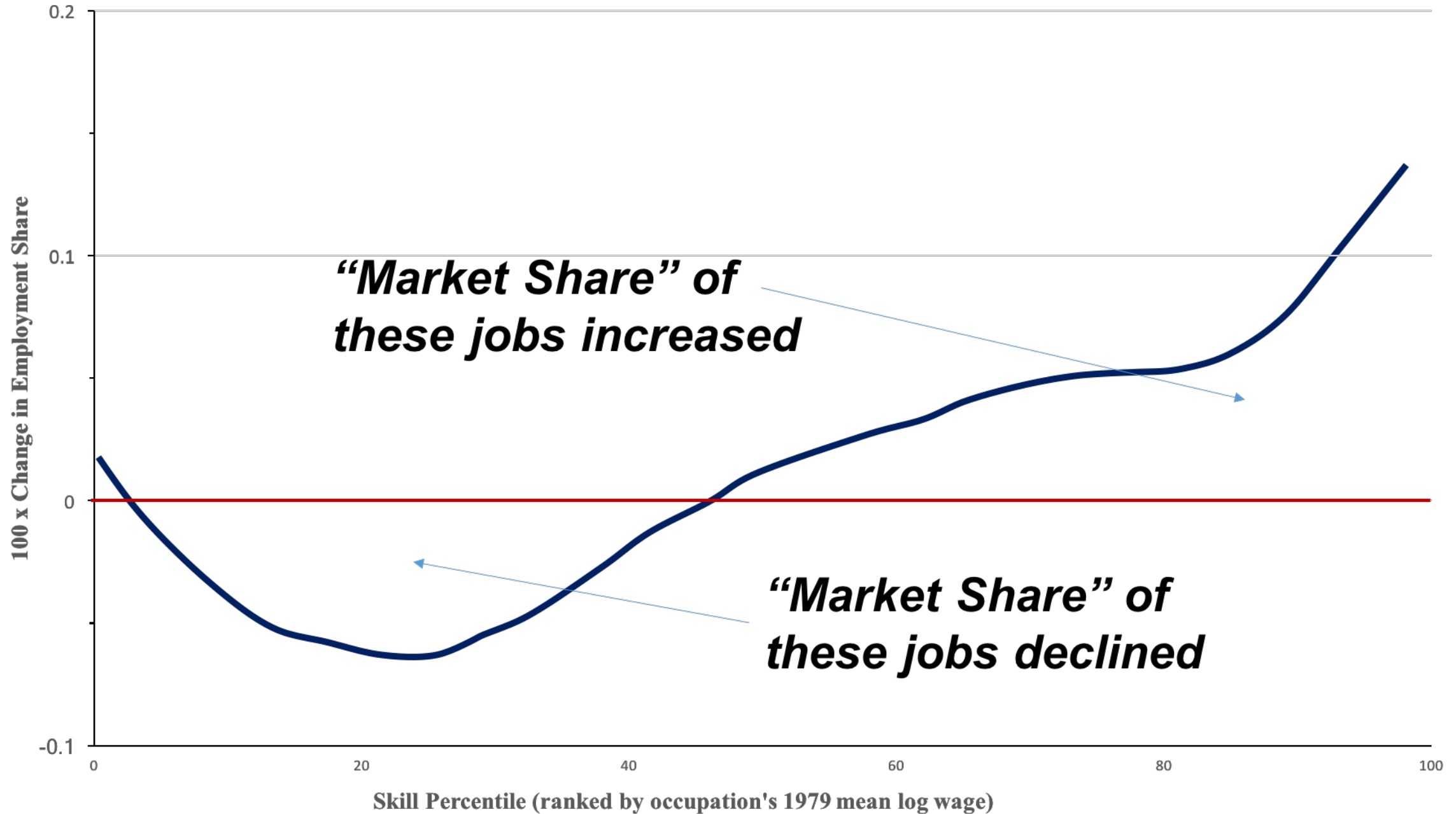
What's going on?

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



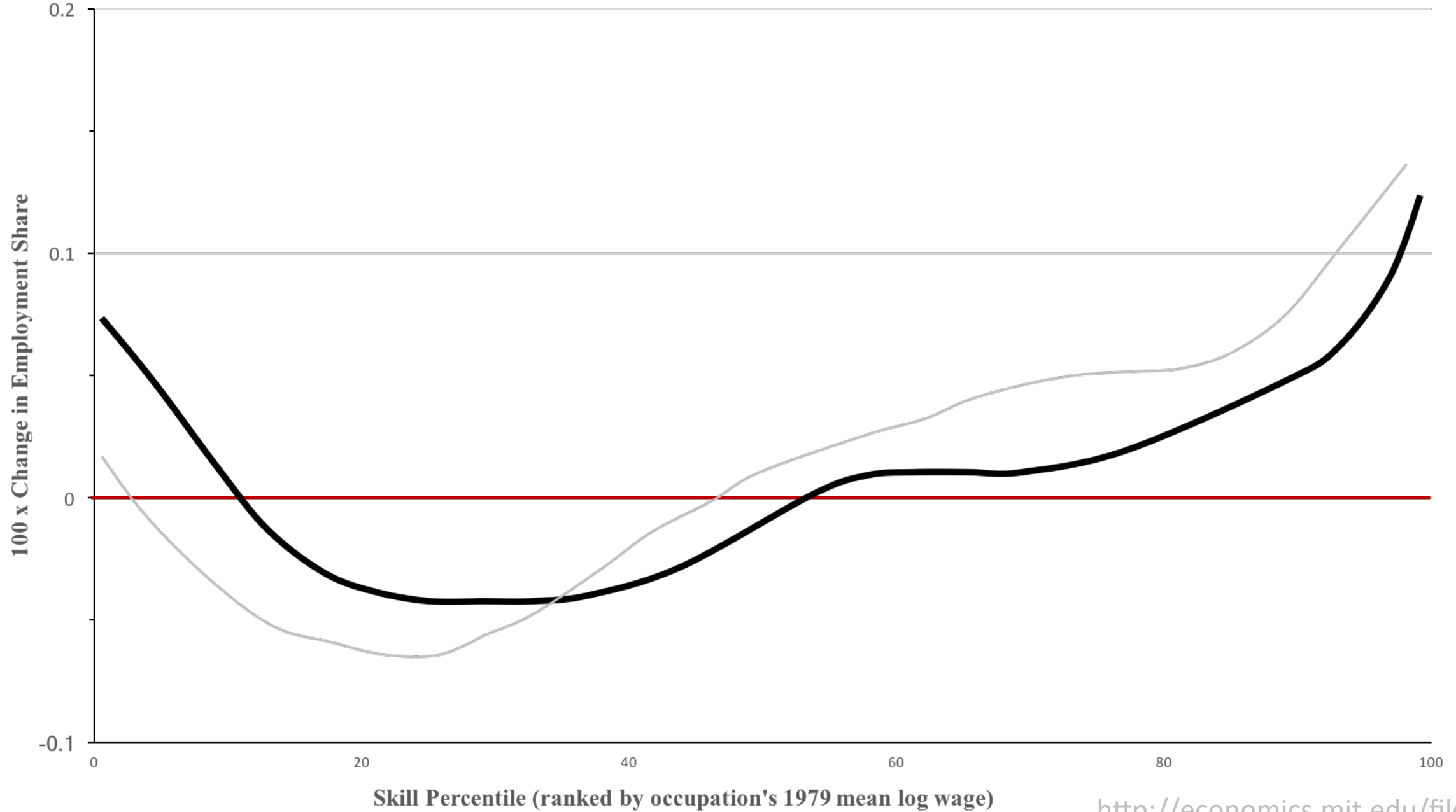
Skill Percentile (ranked by occupation's 1979 mean log wage)

# Smoothed Employment Changes, 1979-1989



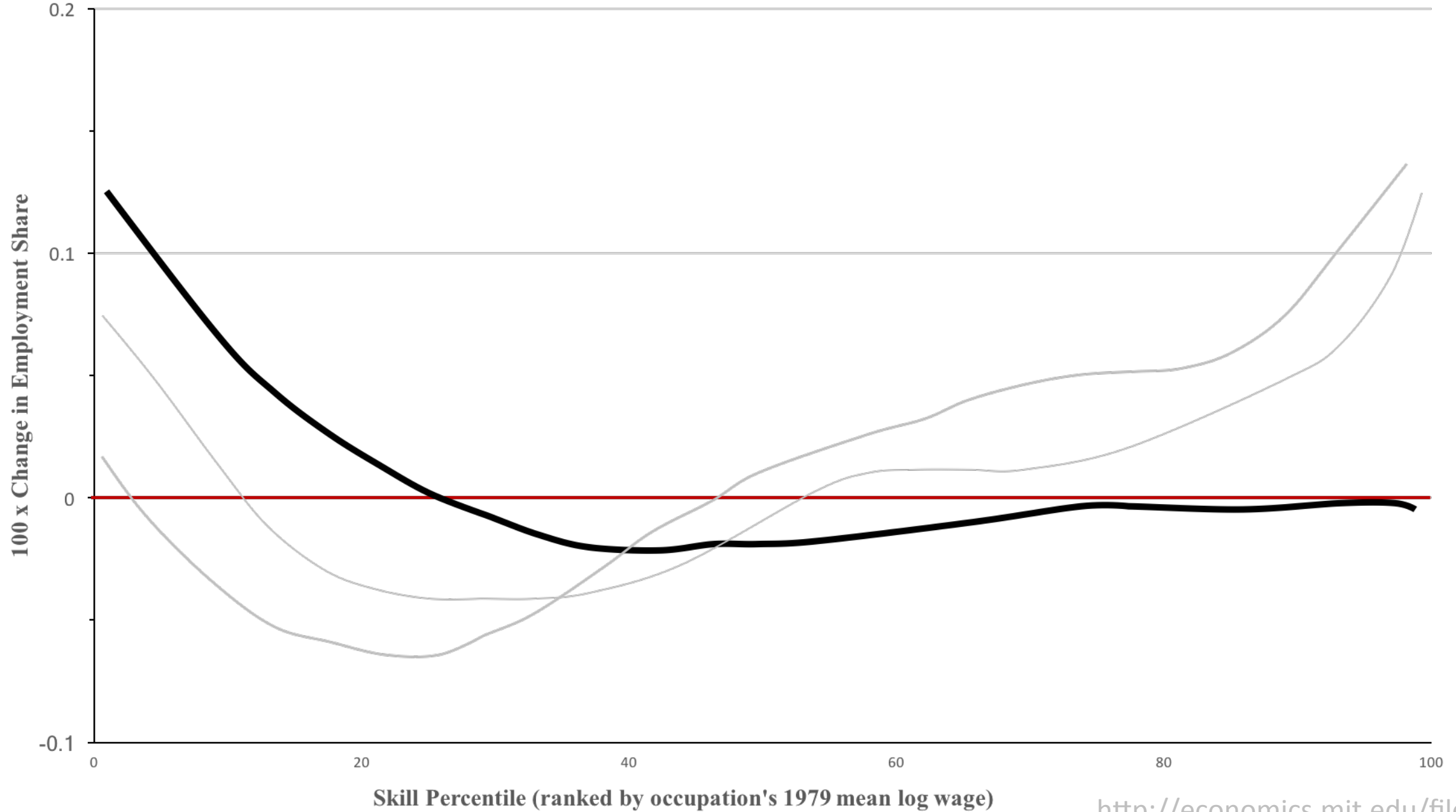
# Smoothed Employment Changes, 1989-1999

Autor, 2016



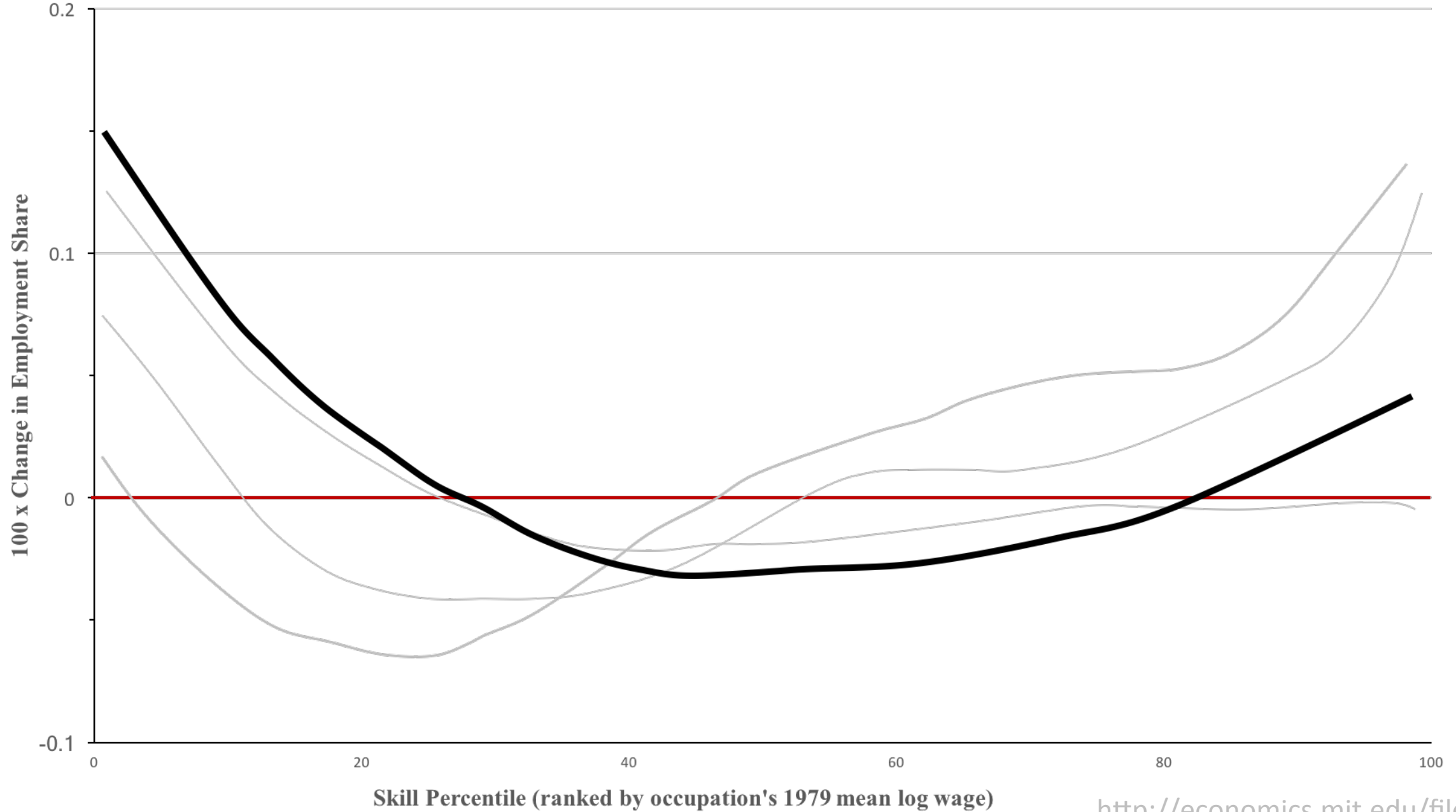
# Smoothed Employment Changes, 1999-2007

Autor, 2016



# Smoothed Employment Changes, 2007-2012

Autor, 2016



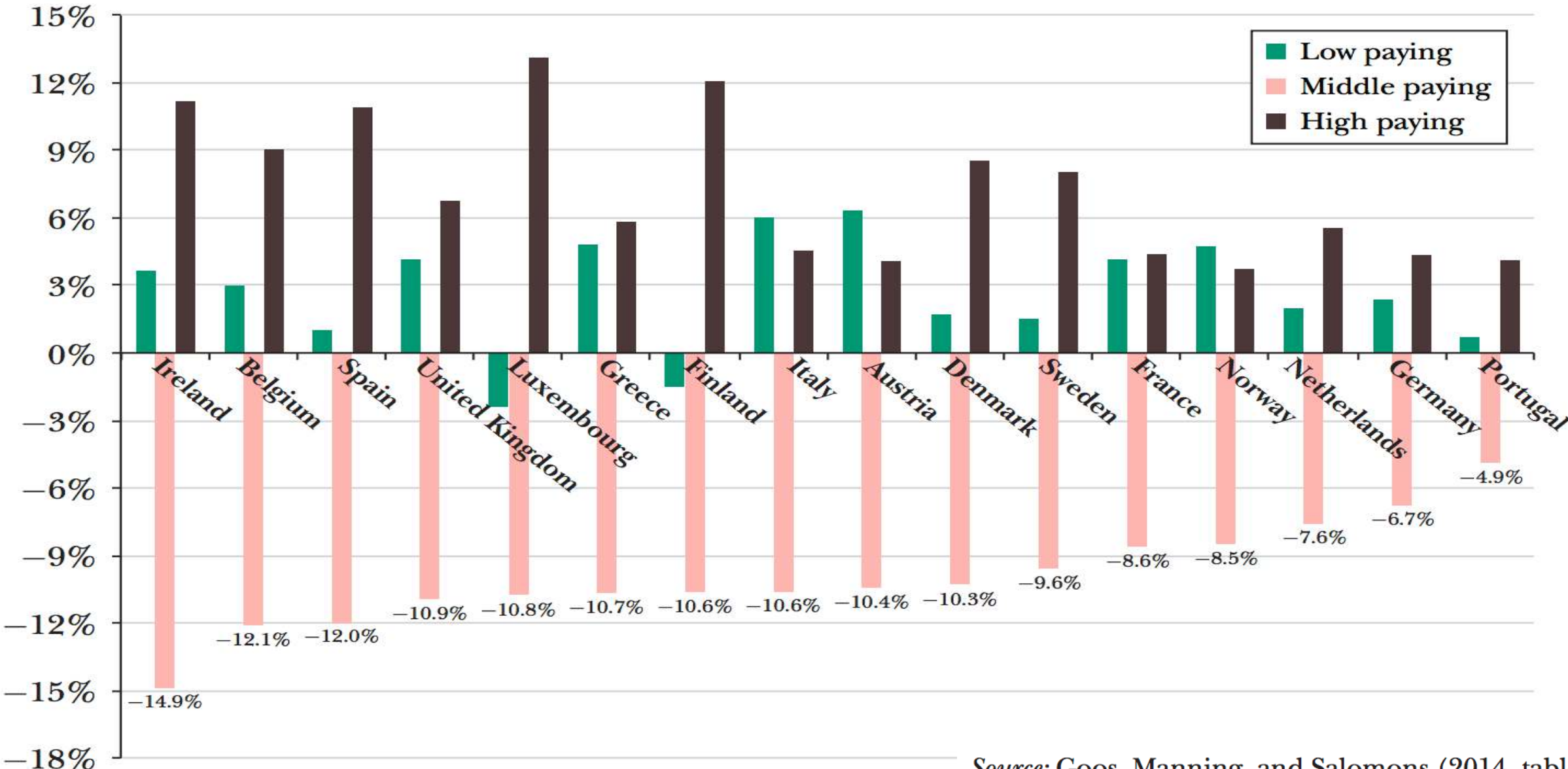


Is this a US-only  
phenomenon?

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



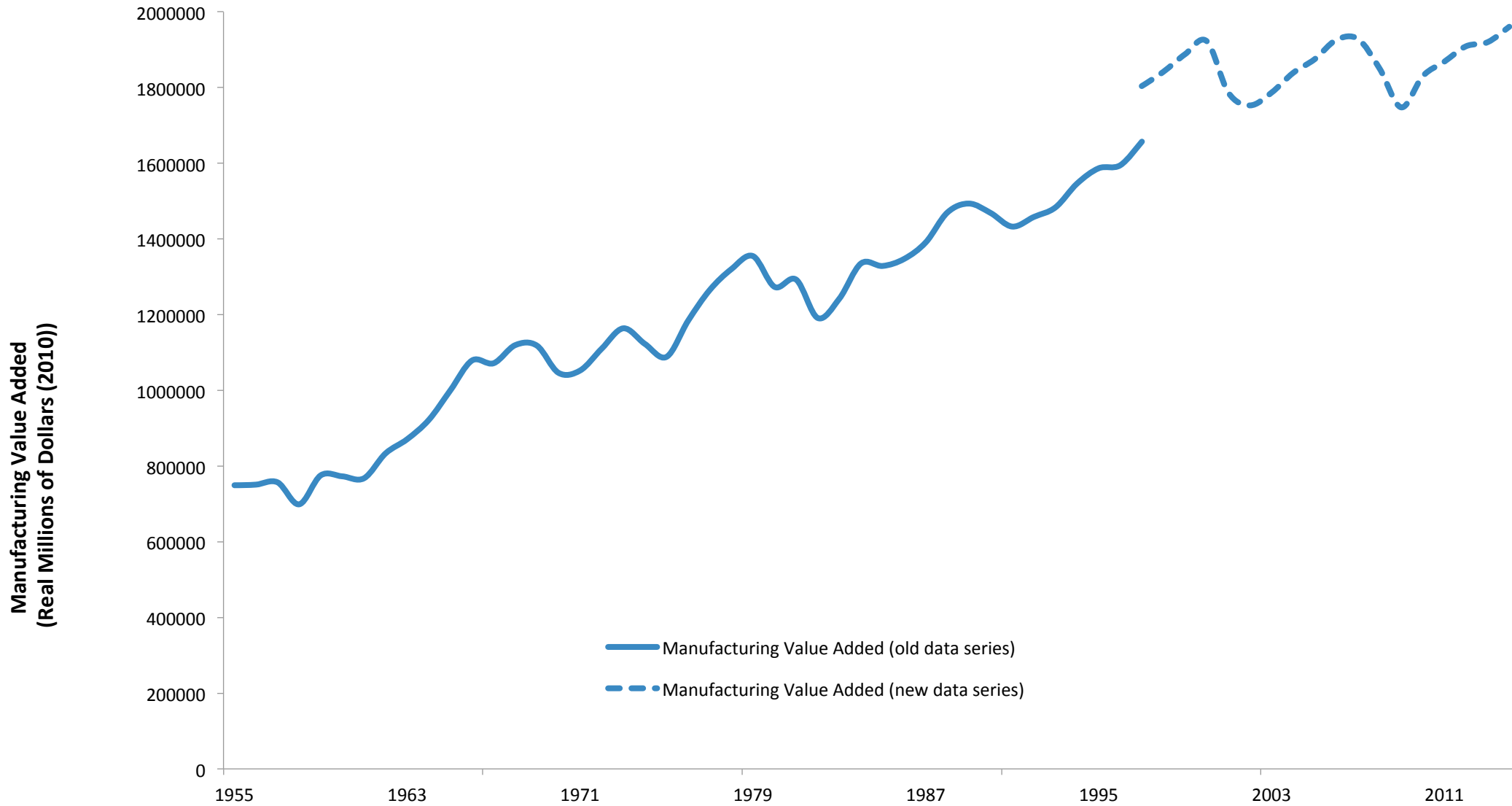
Source: Goos, Manning, and Salomons (2014, table 2).

Isn't this mainly because of  
globalization / China?

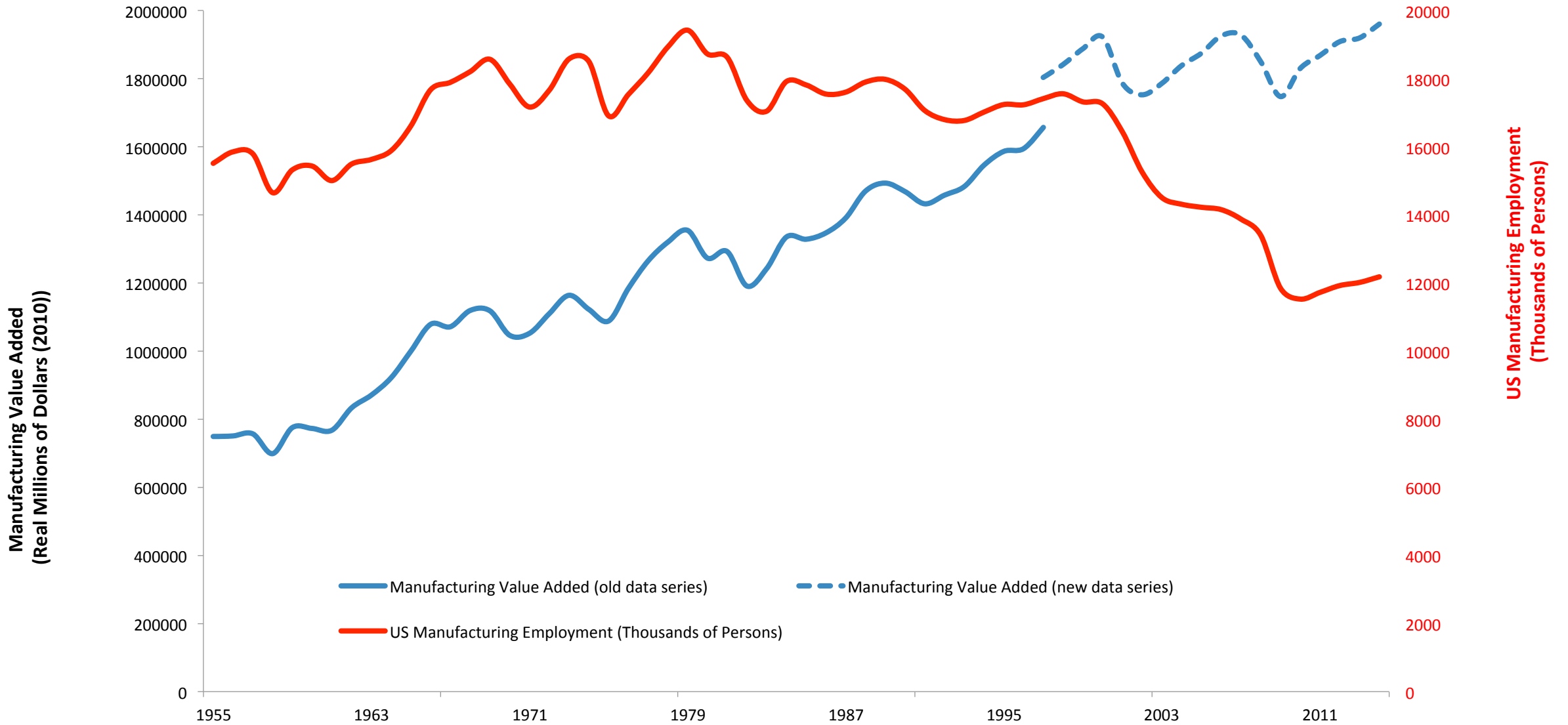
Isn't this mainly because of globalization / China?

*No*

# US Manufacturing Value Added, 1955-2015



# US Manufacturing Employment vs. Value Added, 1955-2015



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.”**

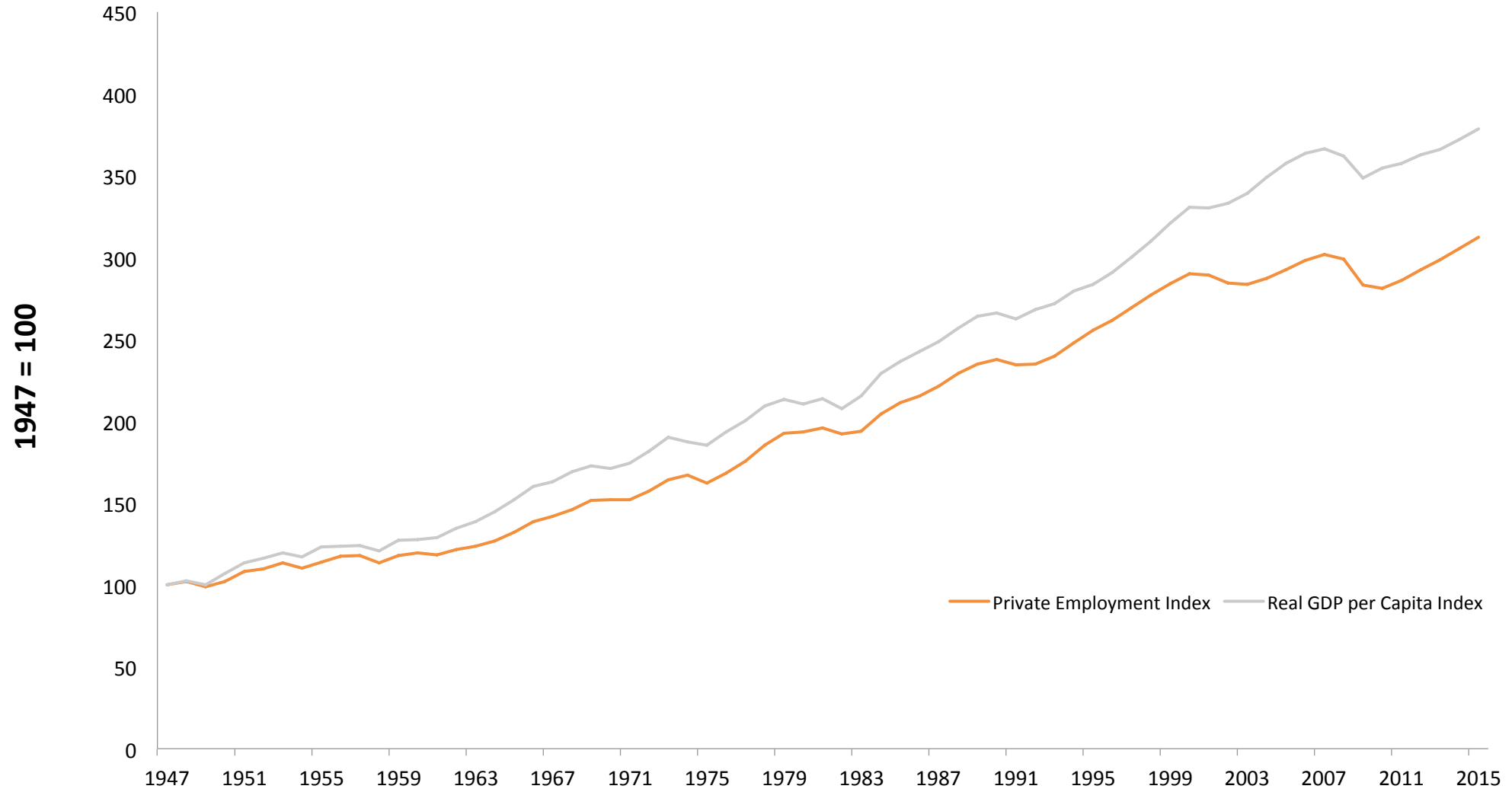
- Autor and Dorn, 2013

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.

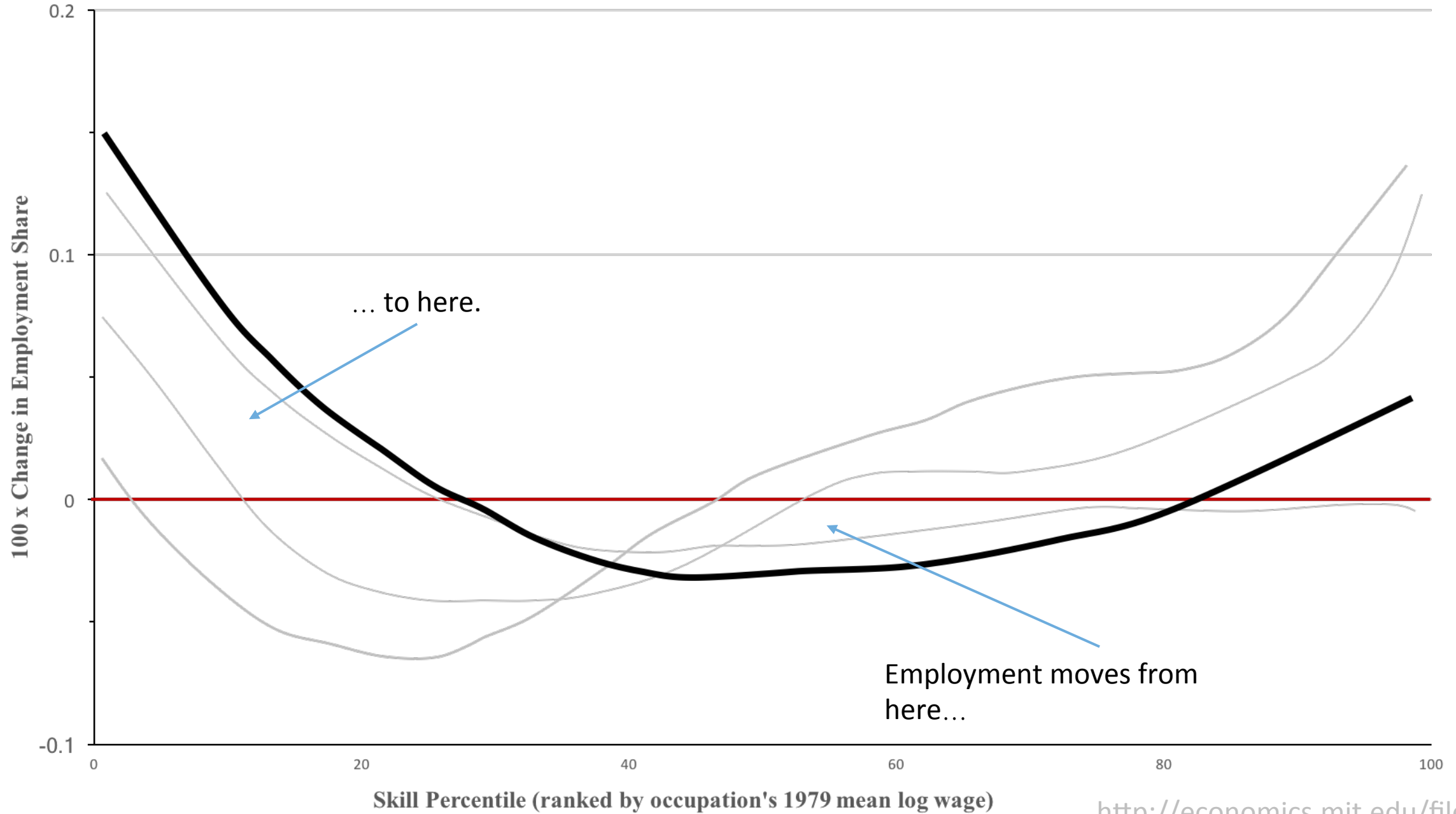
**Table 3: Labor Market Flexibility**

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

Source: OECD 2015; CEA calculations.

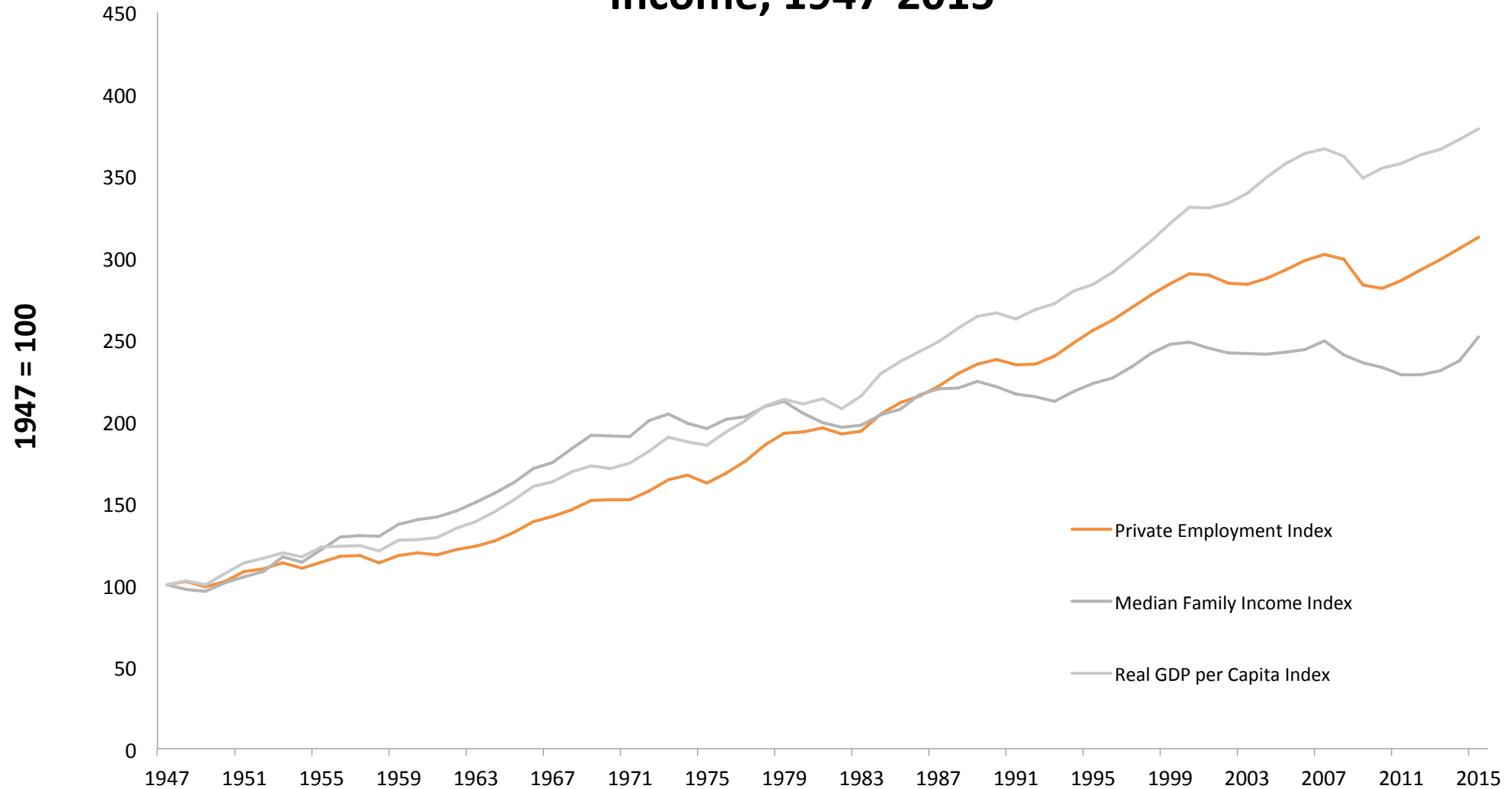
# Smoothed Employment Changes, 2007-2012

Autor, 2016





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

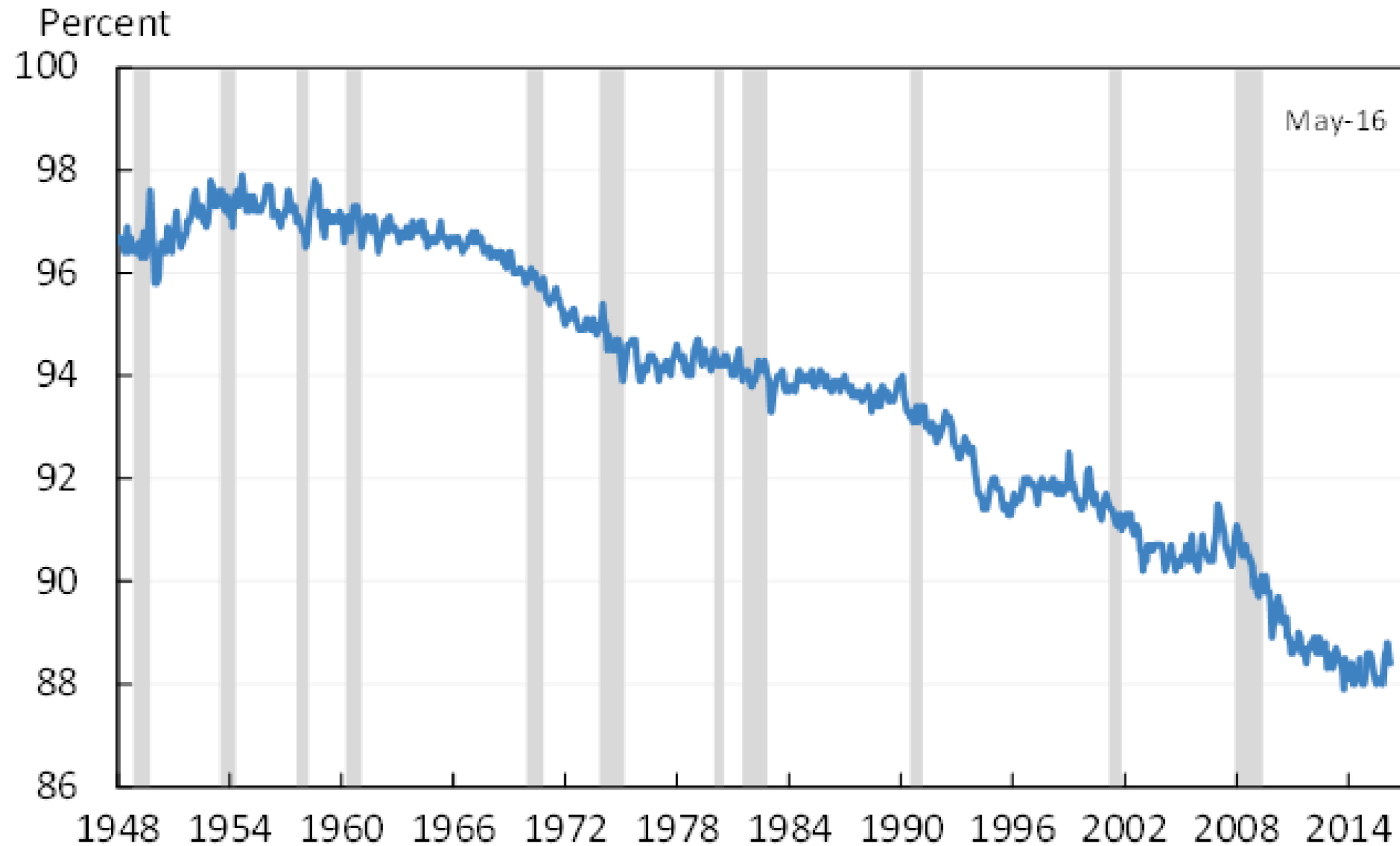


Sources: US Census Bureau, Bureau of Labor Statistics, Federal Reserve Bank of St. Louis.

Then why isn't there mass unemployment?

*Also, there is concentrated high unemployment*

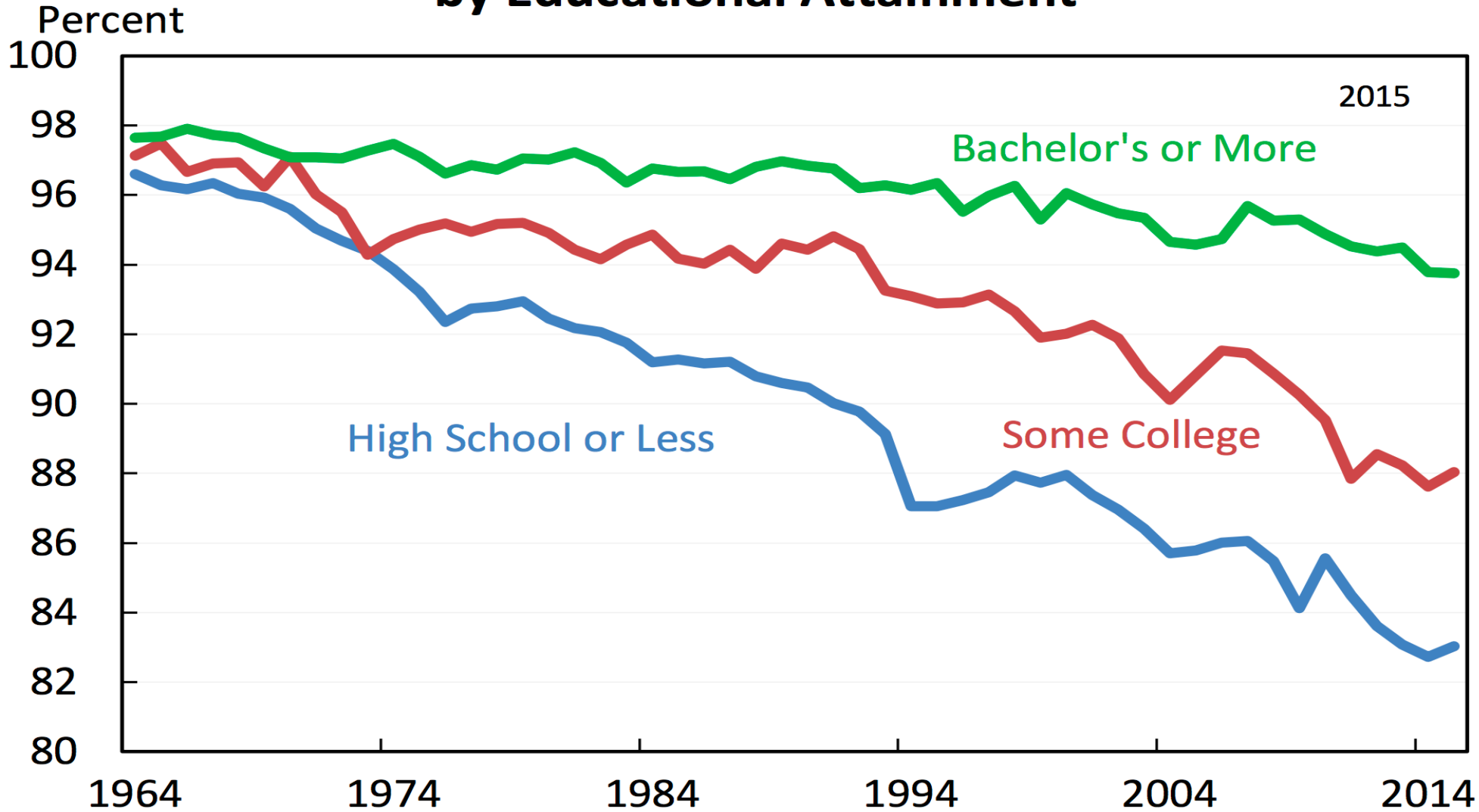
# Figure 1: Prime-Age Male Labor Force Participation Rate



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](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.

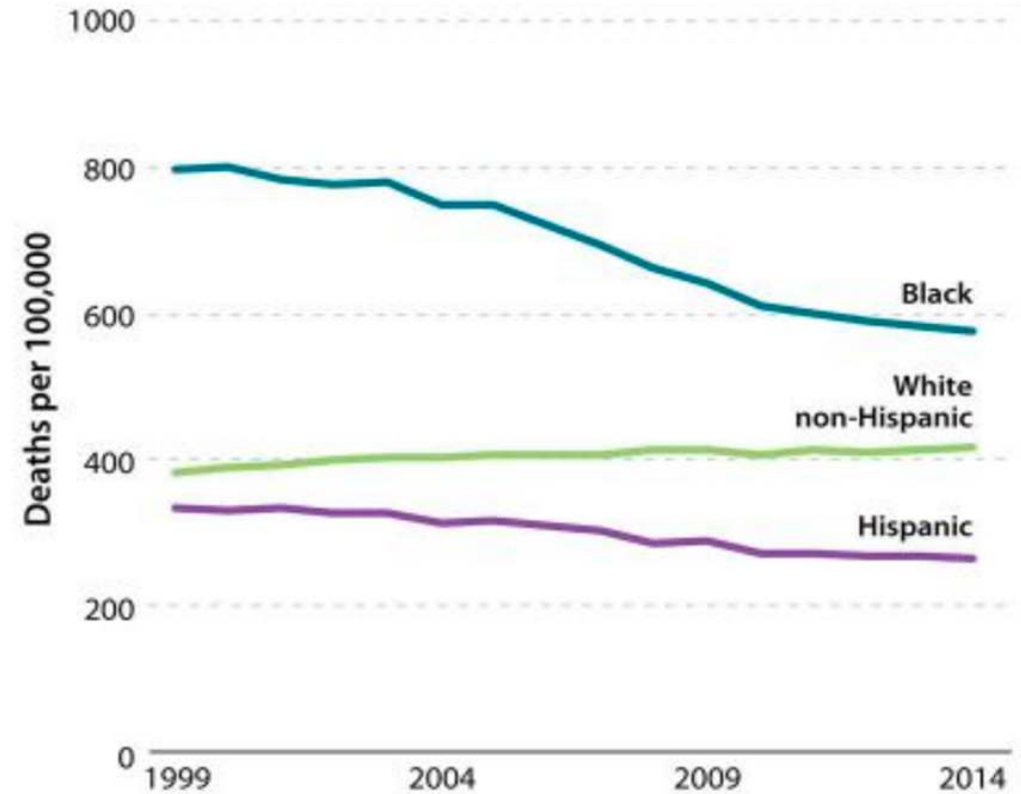
What are the consequences?

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.

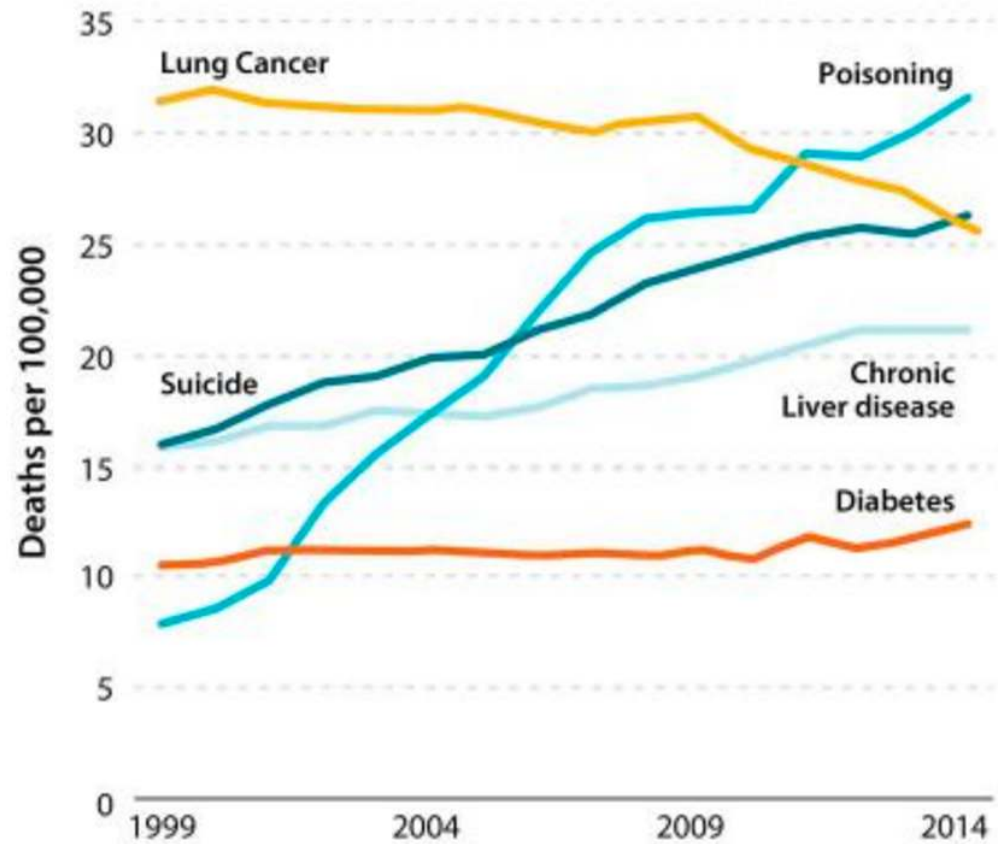
Note: Mortality data are for all-cause mortality. Figure is adapted from Case and Deaton (2015) figure 1.



# Mortality

FIGURE 5A.

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



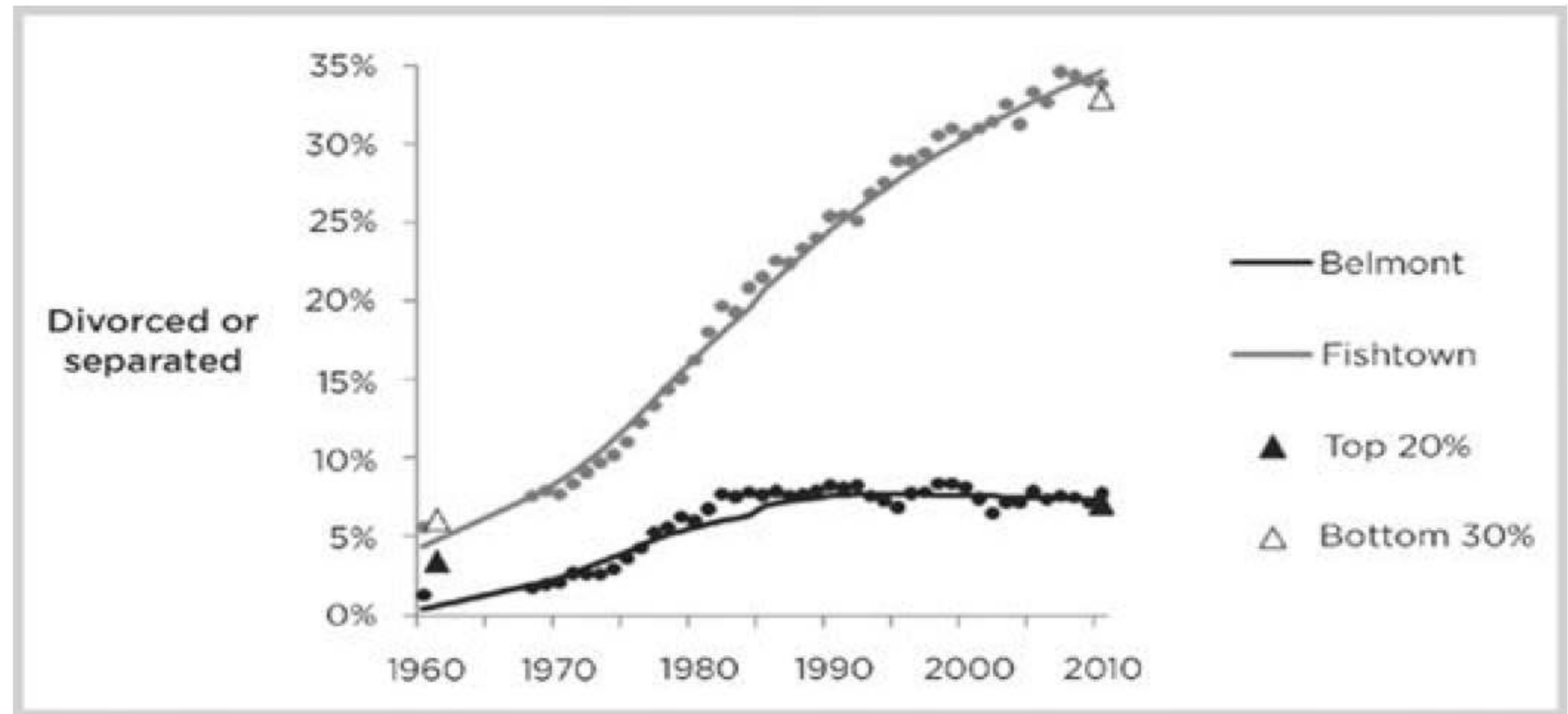
Source: CDC 1999–2014.

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.



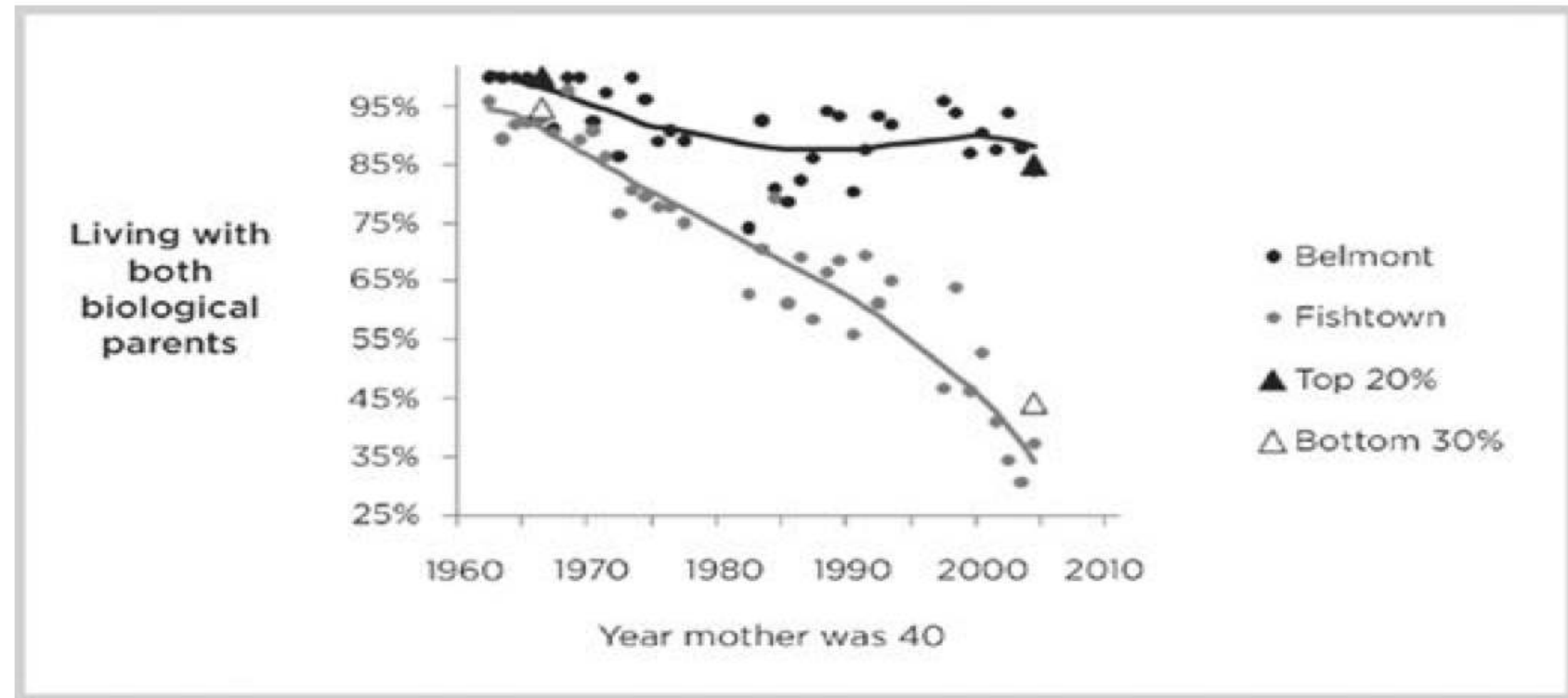
# Social Decay

FIGURE 8.5. DIVORCE



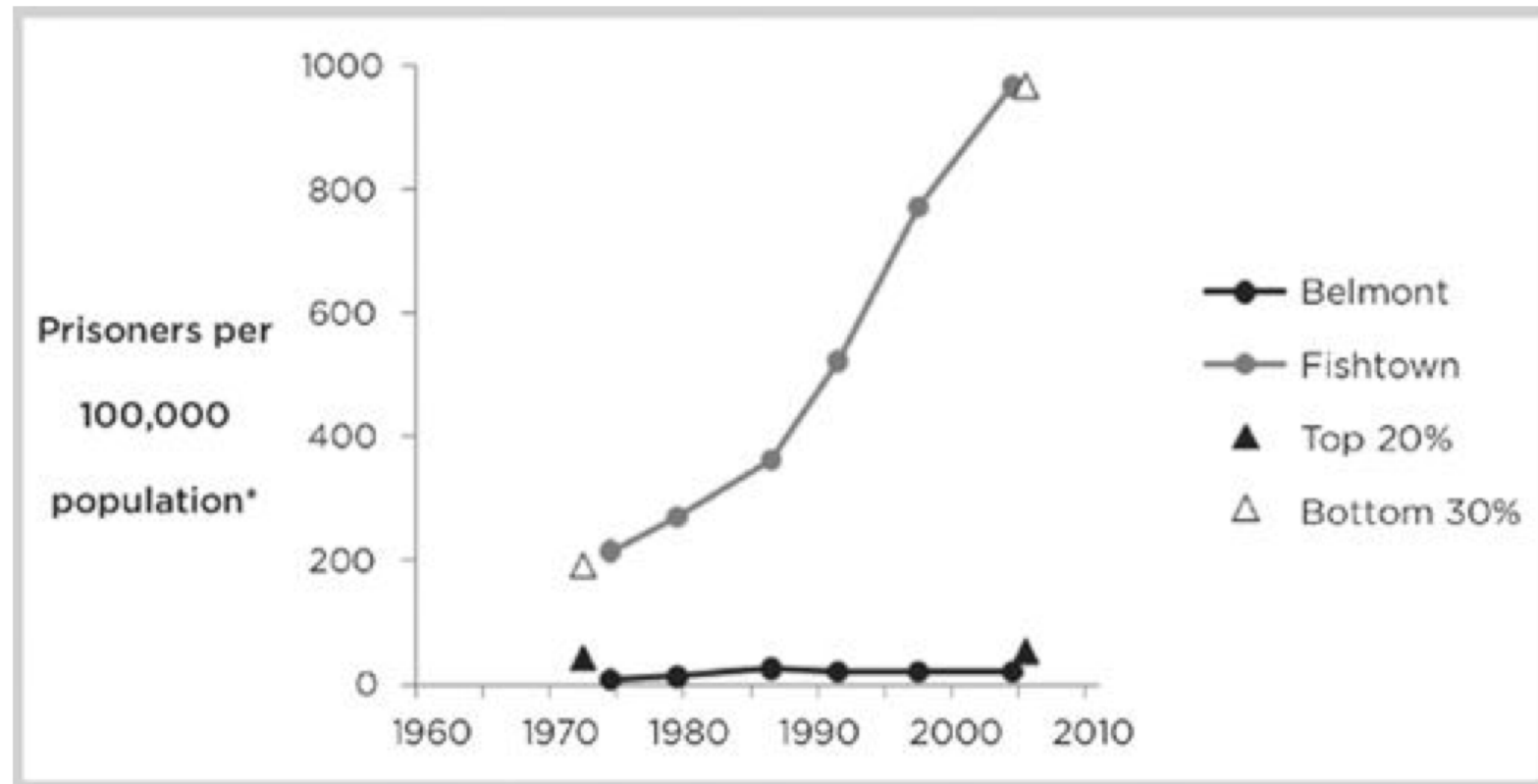
# Social Decay

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



# Social Decay

FIGURE 10.2. WHITE PRISONERS

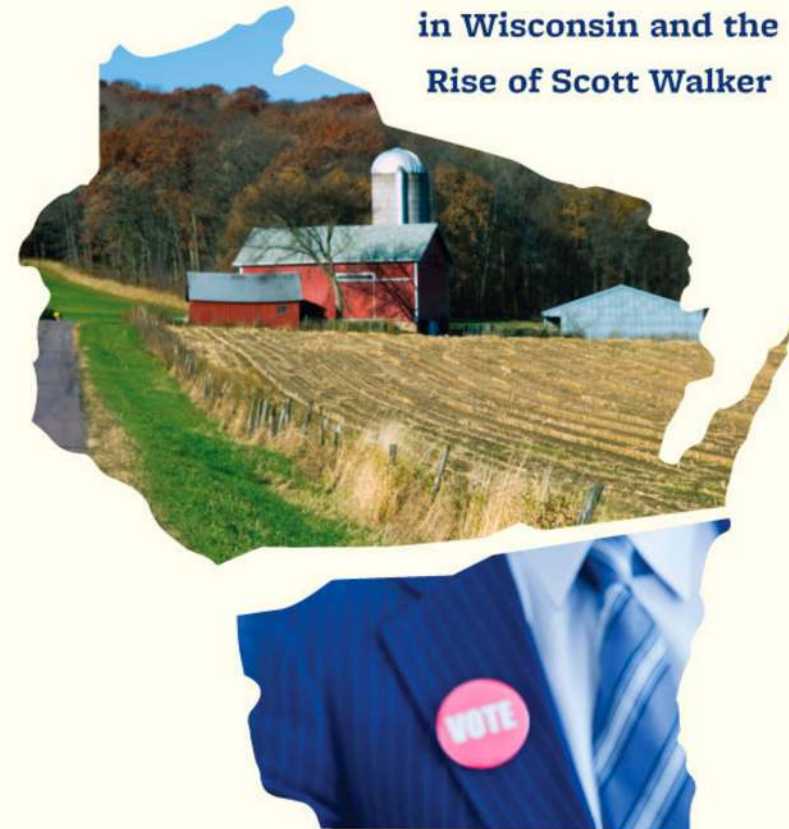


# “The Politics of Resentment”

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.*

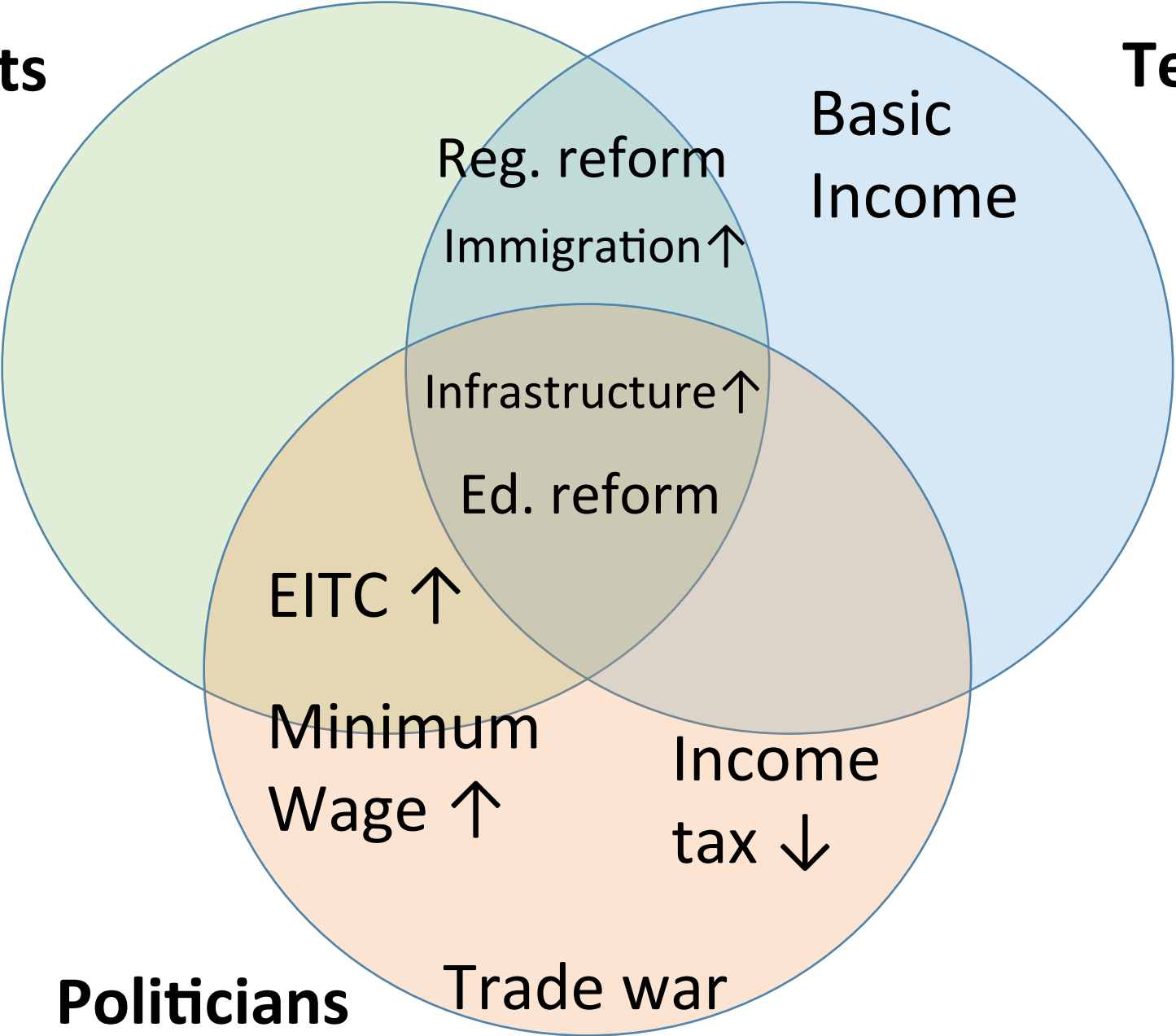
What should we do?

What should we do?

*Depends on who you talk to.*

**Economists**

**Technologists**



**Politicians**

Trade war



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Thank you!

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