

# How Globalization is Reshaping Labor Markets and How Education Can Respond

Fred and Judy Witney Lecture in Labor Economics  
April 2024

**David Hummels**

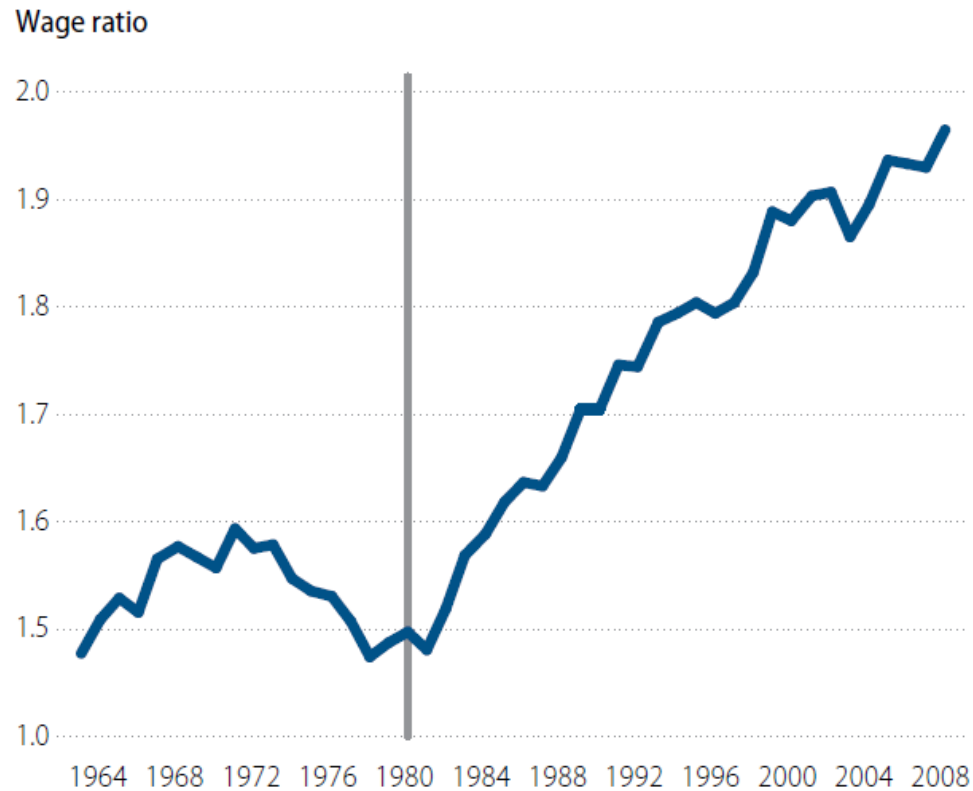
Distinguished Professor of Economics  
Dean Emeritus, Daniels School of Business  
Purdue University

# Outline: Findings, Implications, Provocations

- Findings
  - Globalization and the Rising Skill Premium
  - Firm level responses to offshoring and global demand shocks
  - Local labor markets and the China Shock
  - Business Dynamism and Labor Adjustment Costs
- Implications and Provocations
  - Why are globalization shocks so important and powerful?
  - Why are labor markets more sensitive to shocks?
  - What role can education play?

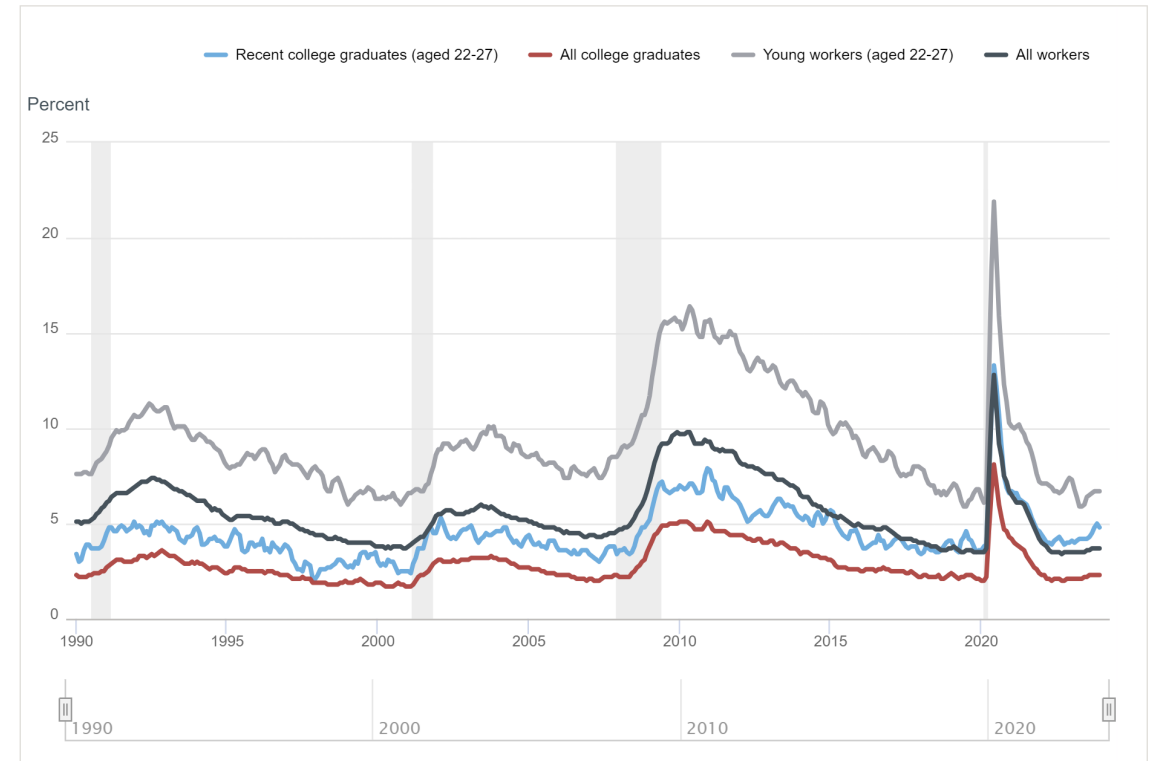
# The rising college-wage premium

College degree vs. high school diploma weekly wage ratio, 1963–2008



Latest Release: February 22, 2024, with 2023:Q4 data

Unemployment Rates for Recent College Graduates versus Other Groups



Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics, Current Population Survey (IPUMS).

Relative wages severely understate the labor market advantages of college grads

# Is this globalization?

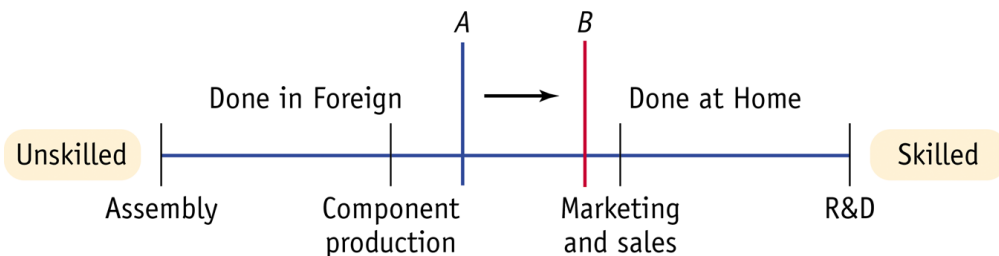
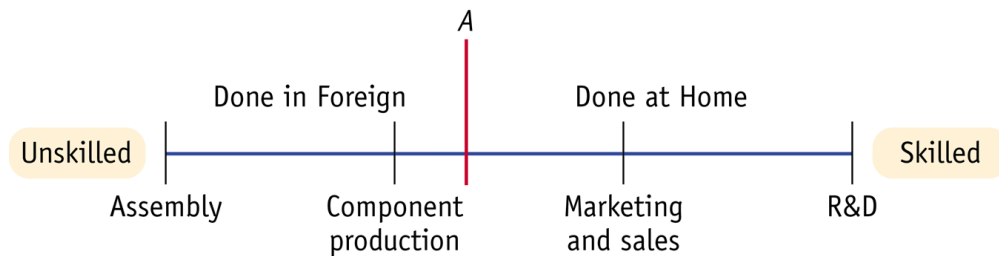
- Stolper Samuelson theorem
  - Goods produced with relatively abundant factors are relatively cheap.
    - US has 4X the ratio of college-educated workers as rest of world
    - Airplanes, pharmaceuticals, software, universities
  - US exports these goods, price rises (and reverse for other goods).
  - Trade raises the returns to college labor (and reverse for other factors)
- But evidence:
  - College wage premium is rising everywhere
  - Prices of college-intensive goods aren't rising
  - Changes in use of college-labor are happening within industries, not through change in industry mix
- Seems to point to skill-biased technical change as the responsible factor

# Offshoring and the changing composition of tasks

(a) Activities Ranked by Order in Production



(b) Activities Ranked by Skilled/Unskilled Labor



- Much of trade (75%...) is exchange of inputs, and involves a significant amount of offshoring.
- Specialization in tasks based on skill intensity... falling trade costs can increase this specialization
- If a US firm shifts the least skill intensive set of tasks to Mexico, it raises the skill intensity of production in both places.
  - Feenstra-Hanson (1997) show this happening at the industry level after NAFTA
- This can reconcile all the facts that were thought to implicate technology and not global competition

# Offshoring and Labor Markets: firm level evidence

- The industry level evidence is weak: very difficult to separate technological change from offshoring shocks.
  - Can we look to firm level behavior?
- Firm level offshoring: two confounding effects on labor demand
  - Offshoring substitutes for labor and raises productivity
  - Better firms do more of everything: import, export, sell, use more modern technology, take advantage of scale economies, have higher K/L and H/L

# “The wage effects of offshoring...”

Hummels-Jorgensen-Munch, Xiang 2014 AER

- Danish firm level data matched to workers and detailed trade flows
- Isolate **exogenous** shocks to offshoring, exports at the firm level to measure within job-spell wage change at the worker level
  - Large changes in world supply of inputs; world demand for outputs
  - Because firms are highly specialized, these are ideal instruments
  - Also: look within job-spell, and controlling for time varying firm characteristics.
- Track workers across firms and unemployment
  - how does displacement due to offshoring differ from wage effects within job-spell; other mass layoff events.

# The identification challenge

Table 3: Firm-level Effects of Trade

Dependent Variables	OLS	Firm FE	Firm FE, Predicted Offshoring	Firm FE Predicted Offshoring & Exports
	Offshorer dummy	log(offshoring)	log(offshoring)	log(offshoring)    log(exports)
	(1)	(2)	(3)	(4)    (5)
log employment	0.681***	0.044***	-0.106**	-0.205***    0.374***
log gross output	0.958***	0.082***	0.394***	0.143**    0.511***
log accounting profits	0.953***	0.066***	0.506***	0.00    0.908***
log (capital per worker)	0.161*	0.005	0.245***	0.119***    0.243**
log(wage bill per worker)	0.040**	0.014***	0.224***	0.131***    0.113***
log material inputs	1.162***	0.083***	0.195**	-0.140*    0.725***
log domestic material inputs	0.668	0.037***	0.355***	-0.082    0.847***
Share of high-skilled workers	-0.007	0.002*	0.091***	0.053***    0.055**
Materials/output	0.093***	0.005**	-0.049*	-0.063**    0.057*
Domestic materials/output	-0.043**	-0.011***	0.012	-0.03    0.073**

Better firms do more things, do them better

Firms are being hit with both offshoring and exporting shocks... changes in available inputs and change in demand for their output



# Wage and Labor Income effects: within job-spell

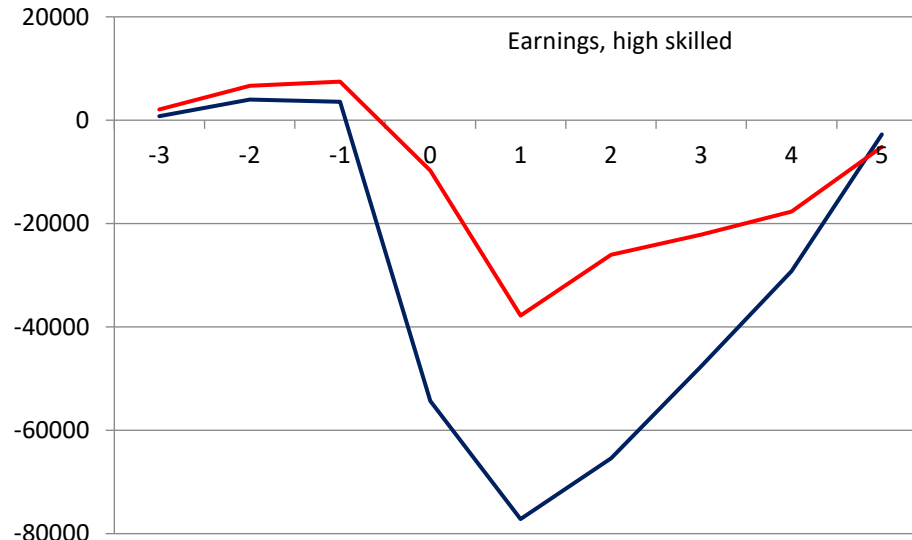
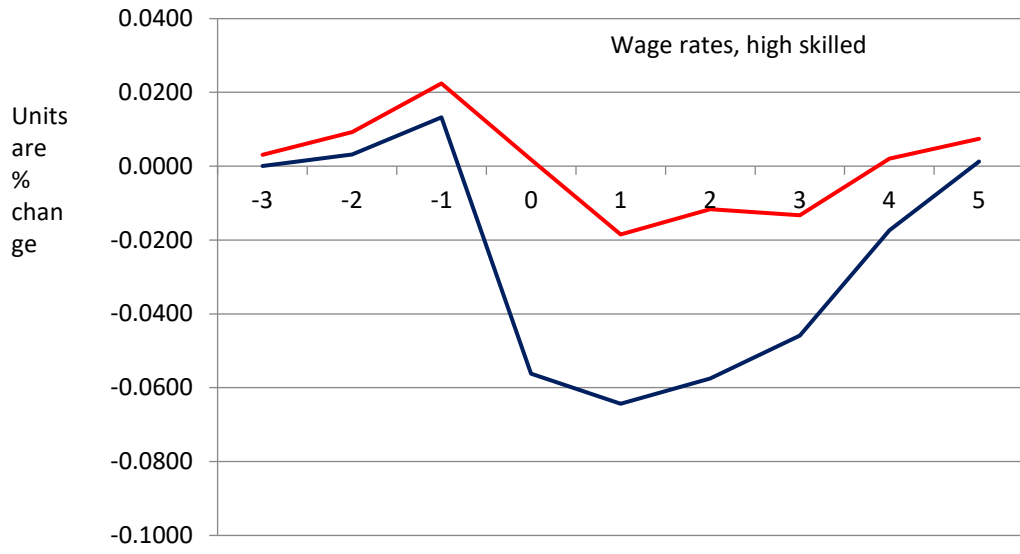
Table 5: Worker-Level Wage Regressions

Dependent variable:	Log hourly wage				Log labor income	
	FE		FE-IV		FE-IV	
	(1)	(2)	(3)	(4)	(5)	(6)
Log offshoring	-0.0025** [-2.43]	-0.0014 [-1.41]	-0.0222** [-2.56]	-0.0228*** [-3.70]	-0.0148** [-2.06]	-0.0100* [-1.94]
Log offshoring x high skilled	0.0060*** [5.59]	0.0061*** [5.57]	0.0510*** [7.71]	0.0523*** [7.78]	0.0220*** [3.59]	0.0239*** [3.84]
Log exports	0.0044** [2.02]	0.0060*** [2.82]	0.0493*** [4.48]	0.0531*** [7.63]	0.0391*** [3.44]	0.0538*** [6.47]
Log exports x high skilled	-0.0005 [-0.25]	0.0000 [0.02]	0.0008 [0.08]	0.0019 [0.18]	0.0364*** [3.62]	0.0398*** [3.83]

Offshoring raises the wage and labor income of “high skilled” (college educated) workers, and lowers the wage of others

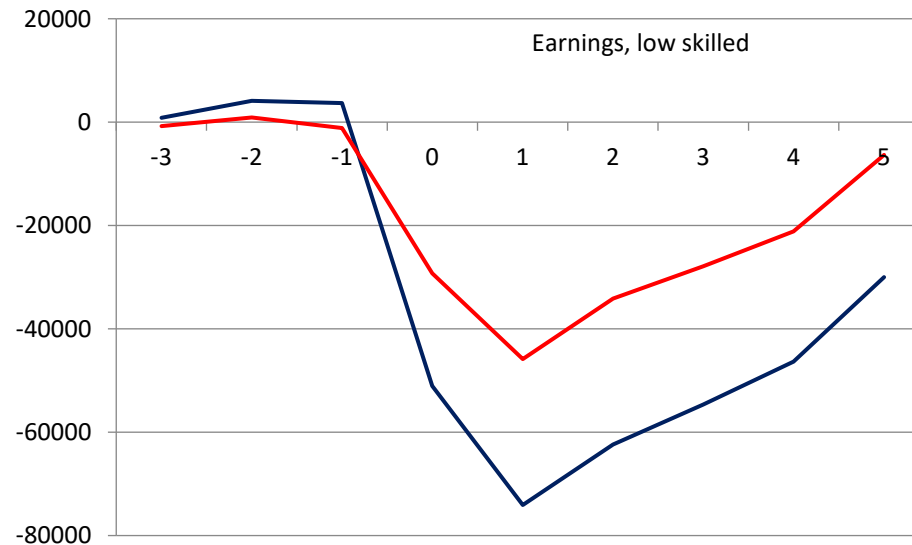
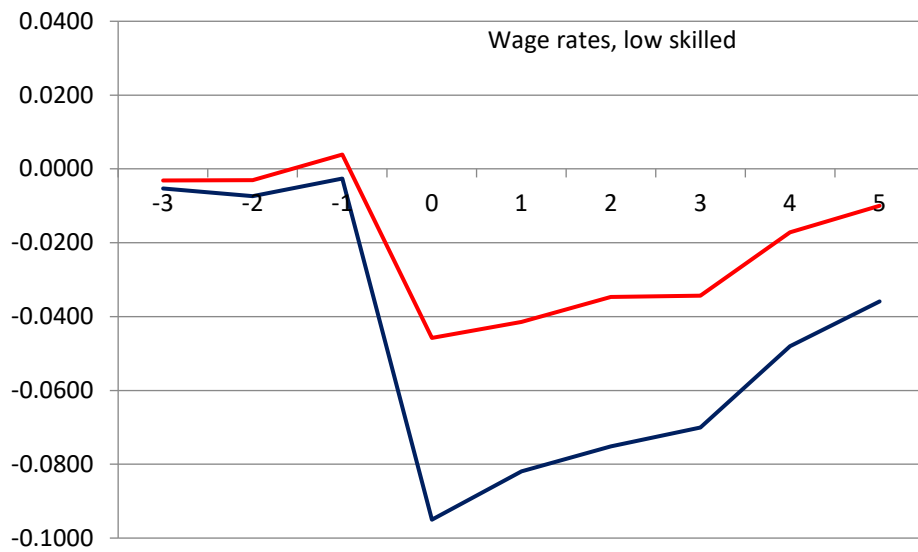
Exporting raises the wage of both groups. The net effect on wages depends on the type of firm you’re in

# Wages/earnings after displacement



Losses relative to average pre-displacement earnings

High skill  
 - Offshorers 19%  
 - Non-offshorers 9%



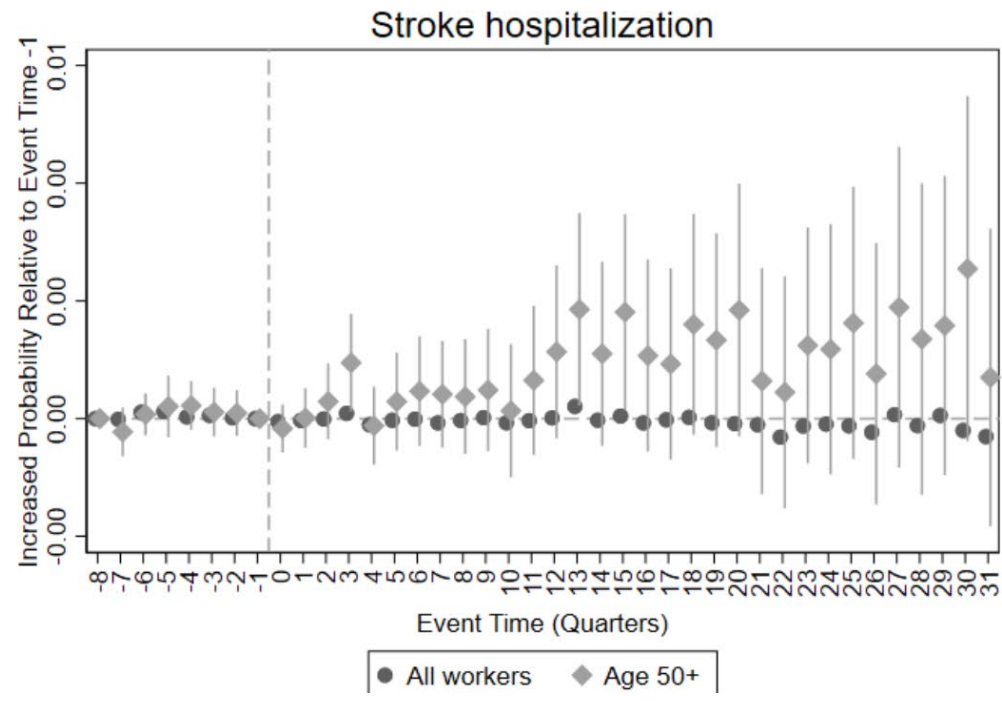
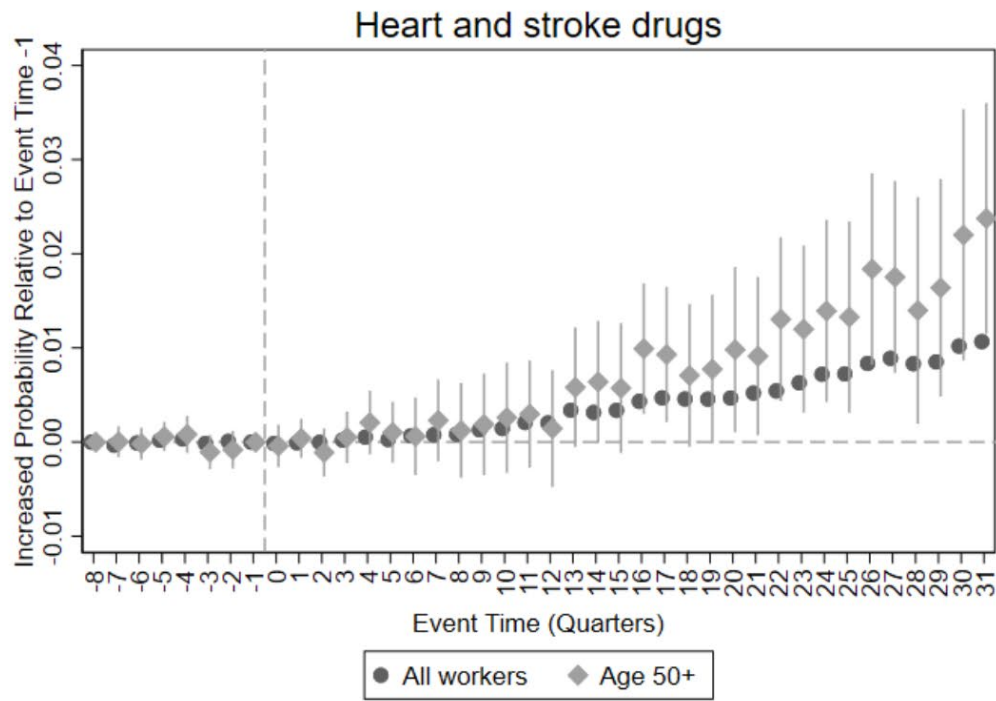
Low skill  
 - Offshorers 28%  
 - Non-offshorers 17%

Any mass layoff event

Offshoring induced mass layoff event

# Other consequences to large global shocks?

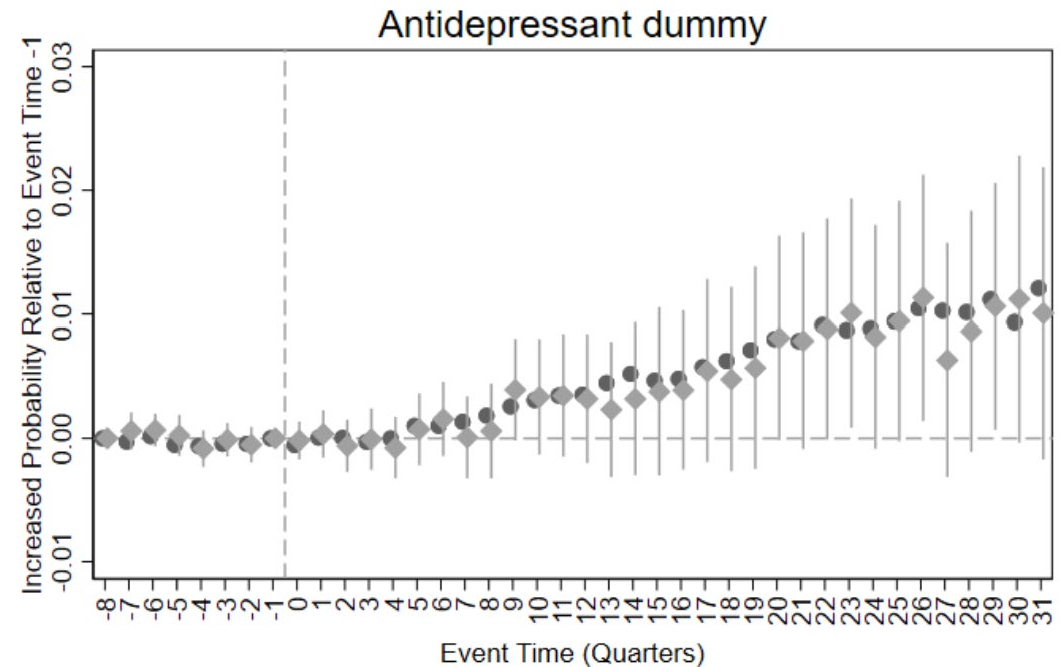
- “No Pain, No Gain: Work Demand, Work Effort, and Worker Health”, Hummels, Munch, Xiang ReStat (forthcoming)
- If global shocks to demand are large, and firms struggle to adjust workforce, wages will rise. But also...
  - Firms expect workers to put in longer hours, more intense work effort
  - Can see this in hours worked AND in sharp rise in materials/hours worked
- Are there health consequences to working longer hours?
  - Hard to pick up in observational data. More robust people work more. In US, health coverage depends on employment, income.
  - But we can use Danish data to see exogenous shocks to sales, work effort, health outcomes for a given worker over time.



Translated to elasticities: Doubling sales increases risks by about 10%

Much larger for

- Older workers
- Those already working long hours
- Those reporting little control over work environment

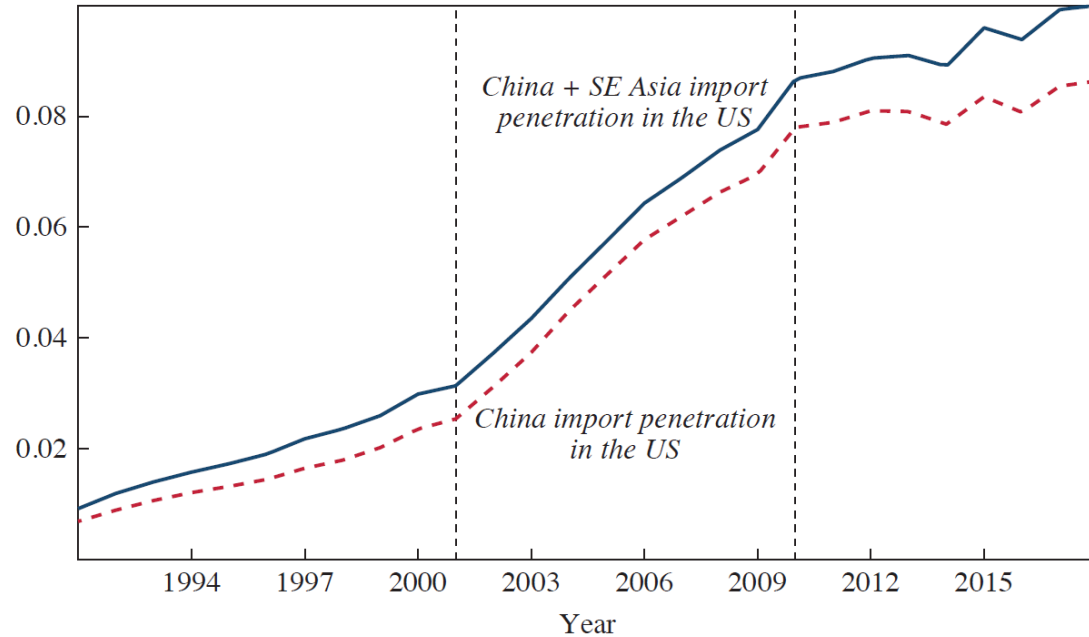


# Implications

- Why are these effects showing up in wages and health and not just employment, and why are displacement effects so large?
- Firms face upward sloping labor supply curves for particular types of labor.... Its hard to find people! Adjusting quantities means adjusting wages
- Workers have \*a lot\* of firm and/or occupation-specific human capital that they struggle to reuse after displacement
- Global shocks to supply and demand are large relative to the ability of a Danish firm to absorb them without sharply changing input costs

# Autor Dorn Hanson 2013 AER “China Syndrome...”

B. Import penetration in the US market

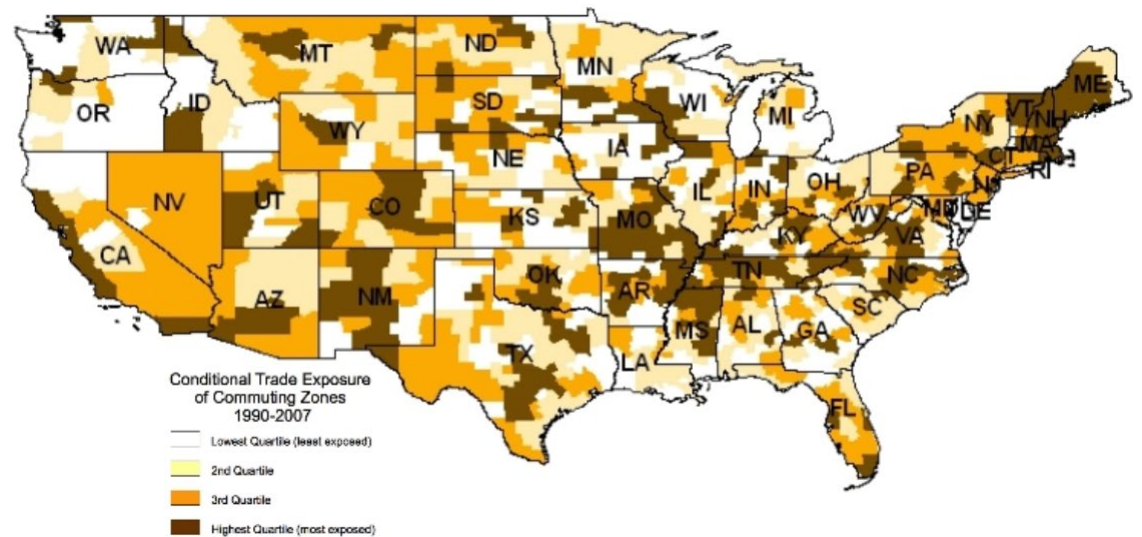


In 30 years, China goes from 5 to 28% of US imports

Imports penetration triples in 8 years.

Uses a combination of the huge increase in Chinese imports, and the geographic concentration of affected industries to study how the shock affects local labor.

B. Quartiles of Exposure Conditional on Manufacturing Employment Share



Even within manufacturing there are huge differences in exposure to Chinese imports due to industrial concentration

# Local wage and employment effects

Table 4: Import Competition and Outcomes in U.S. Local Labor Markets, 1990 - 2007

<u>A. <math>\Delta</math> Fraction of Working Age Population in Manufacturing, Unemployment, NILF</u>			
Employed in Manufacturing (1)	Employed in Non- Manufacturing (2)	Unemployed (3)	Not in Labor Force (4)
-0.60*** (0.10)	-0.18 (0.14)	0.22*** (0.06)	0.55*** (0.15)
<u>B. <math>\Delta</math> Log Population, Log Wages, Annual Wage and Transfer Income</u>			
$\Delta$ Log CZ Population (log pts) (5)	$\Delta$ Avg Log Weekly Wage (log pts) (6)	$\Delta$ Annual Wage/Salary Inc per Adult (US\$) (7)	$\Delta$ Transfers per Capita (US\$) (8)
-0.05 (0.75)	-0.76*** (0.25)	-549.3*** (169.4)	57.7*** (18.4)

Coefficient: What does a \$1000/worker increase in China import competition do to these variables?

# What else did the China shock hit?

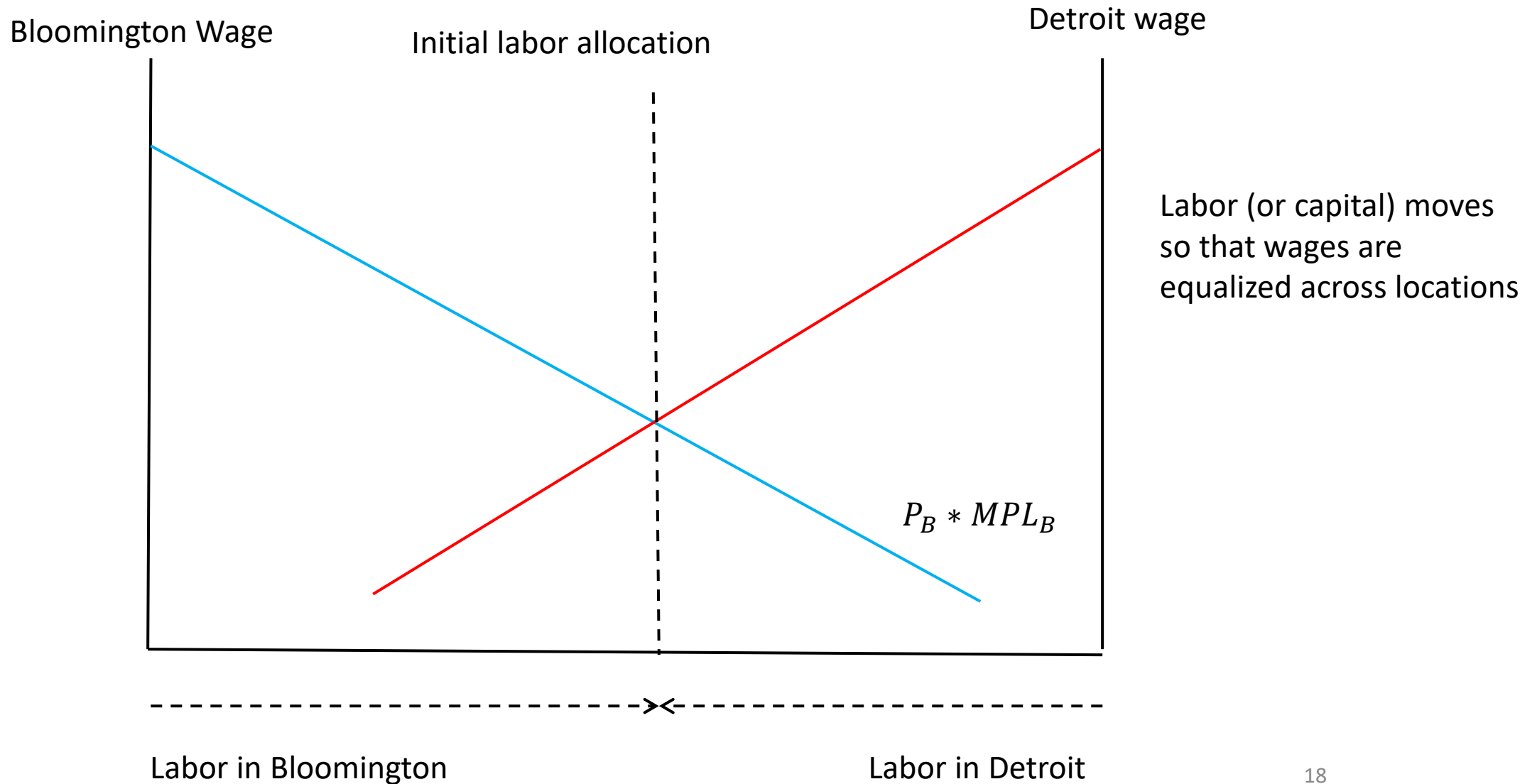
- Regional and industry employment, Plant closure, Innovation
- Labor earnings, Government transfers, Housing prices, tax revenues
- Marriage, fertility, mortality, health
- Schooling (only positive! Workers get more schooling)
- Out-migration (some debate here...pre-existing trends)
  
- Persistence of the shock.
  - Ten years out, explains 55% of the fall in manuf employment/population ratio
  - 86% of the manuf job loss absorbed into non-employment...
  - Individual worker effects post displacement: large and persistent losses
    - They either leave the workforce, or keep reattaching to new firms facing the same negative shocks as their original firm!



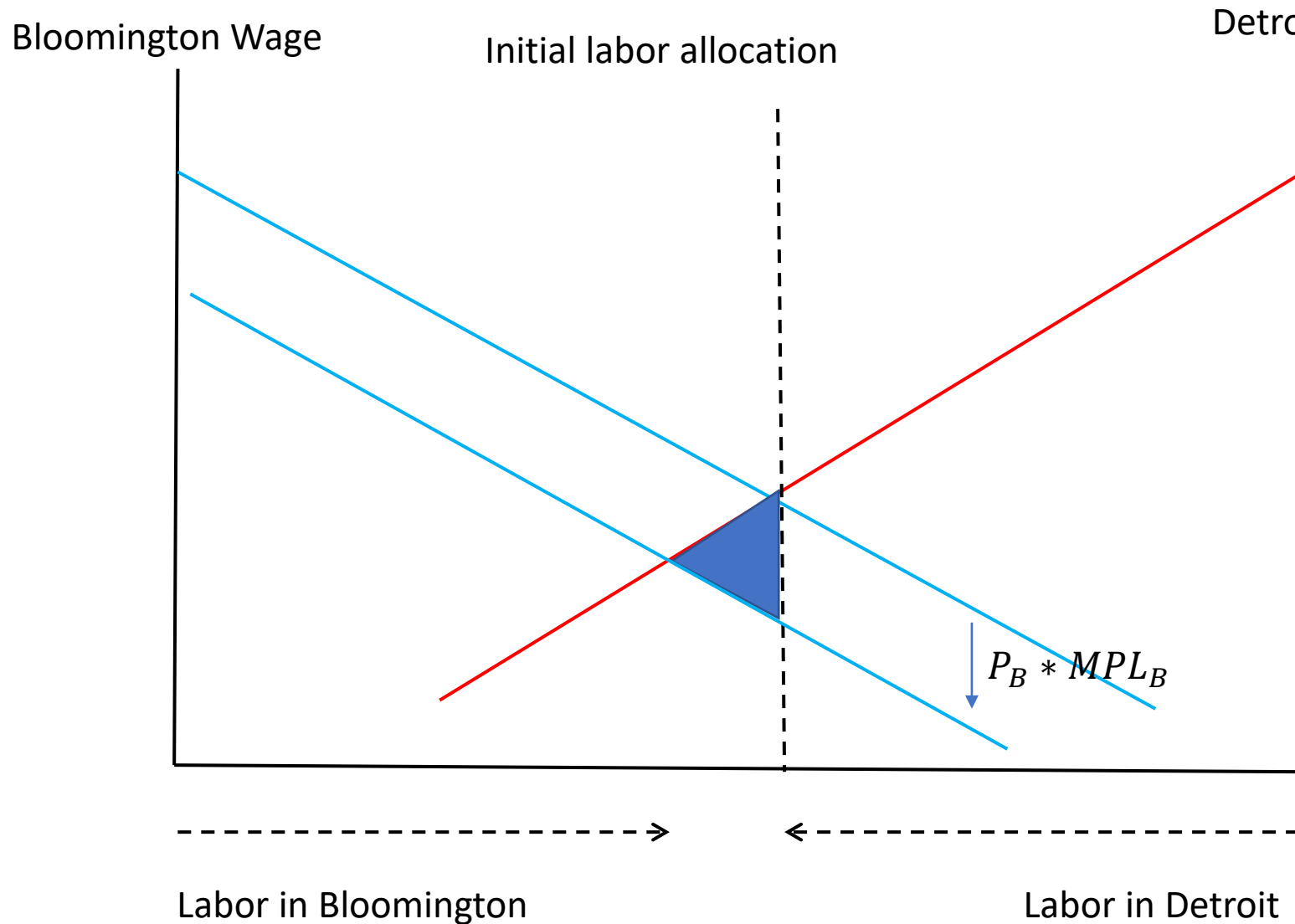
# Implications

- The ADH strategy wouldn't work if firms could easily shift what they make, OR workers could easily shift where they live, OR capital could flow in to take advantage of depressed working conditions
- Workers and firms face local, not national labor markets.
  - Global shocks might be modest relative to US, but they are very large relative to the Bloomington MSA.
- Because factors are specific to geography at short to medium horizons...
  - shocks have big effects on wages and employment, with knock-on effects for a host of other market outcomes
  - productivity differences are not arbitrated away.

# The allocation of labor across regions



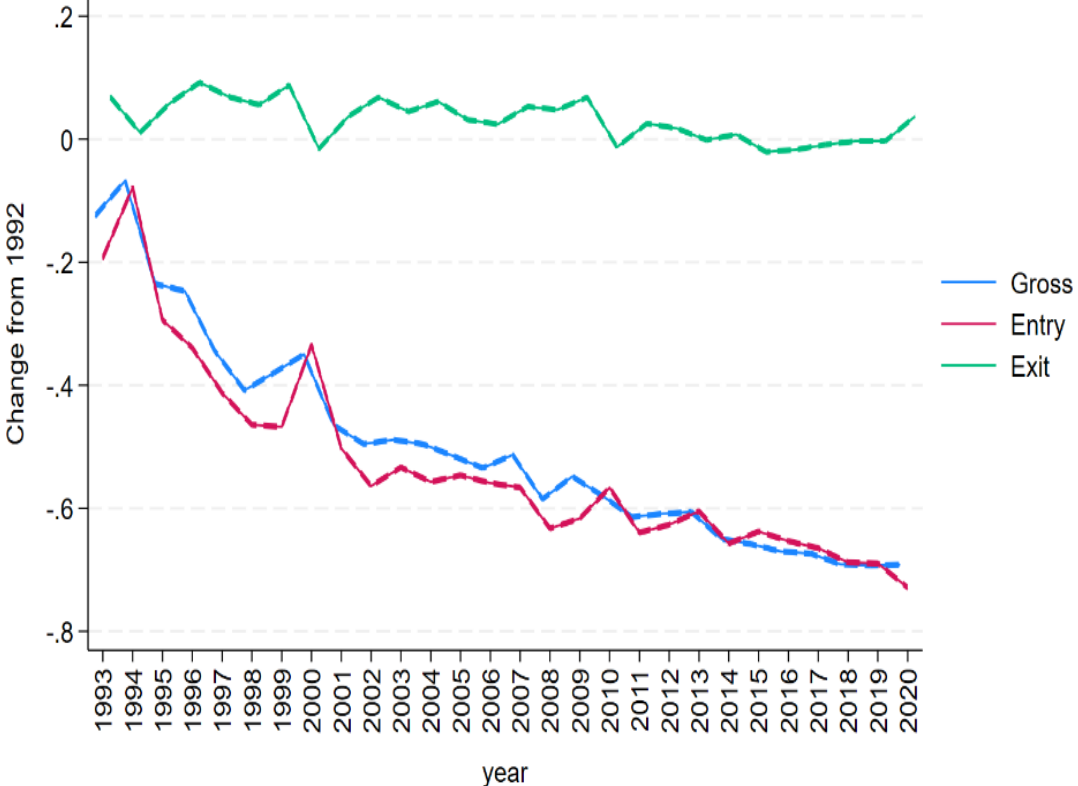
# Bloomington is hit with China shock



# Business dynamism and labor adjust costs

- Young firms are responsible for most job creation (and job destruction)....  
Historical tradeoff: some young firms grow rapidly, form new industries.
  - Think: Microsoft. Google. Or before that. Ford. Bell Labs.
- Some facts from US establishment data
  - The entry rate of new firms and the market share of young firms have dropped;
  - Reallocation of jobs between firms has slowed;
  - Sharp reduction in the skewness in young firm growth rates (no new superstars)
- Most evidence is US-based, but trade data reveal very similar patterns
  - Hummels-Yue, “Using Trade Data to Measure the Ubiquity of Declining Market Dynamism”

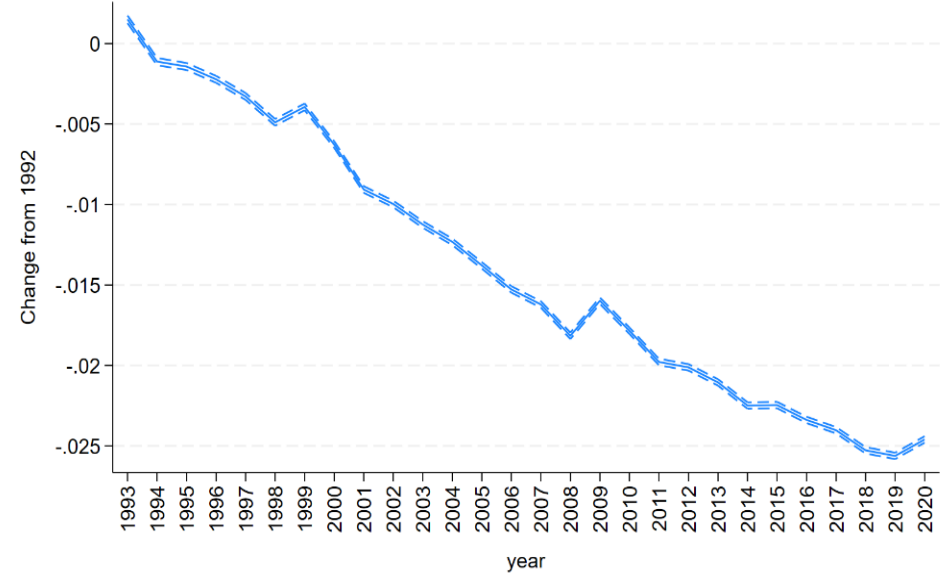
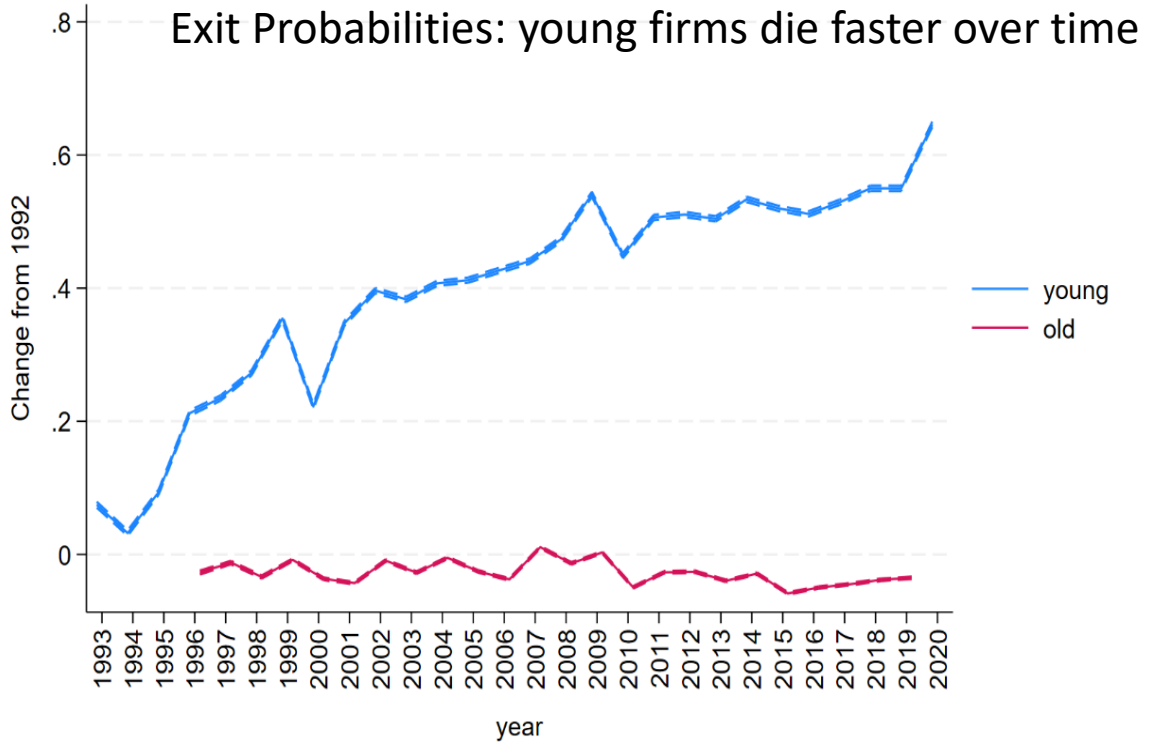
# Entry, exit, reallocation



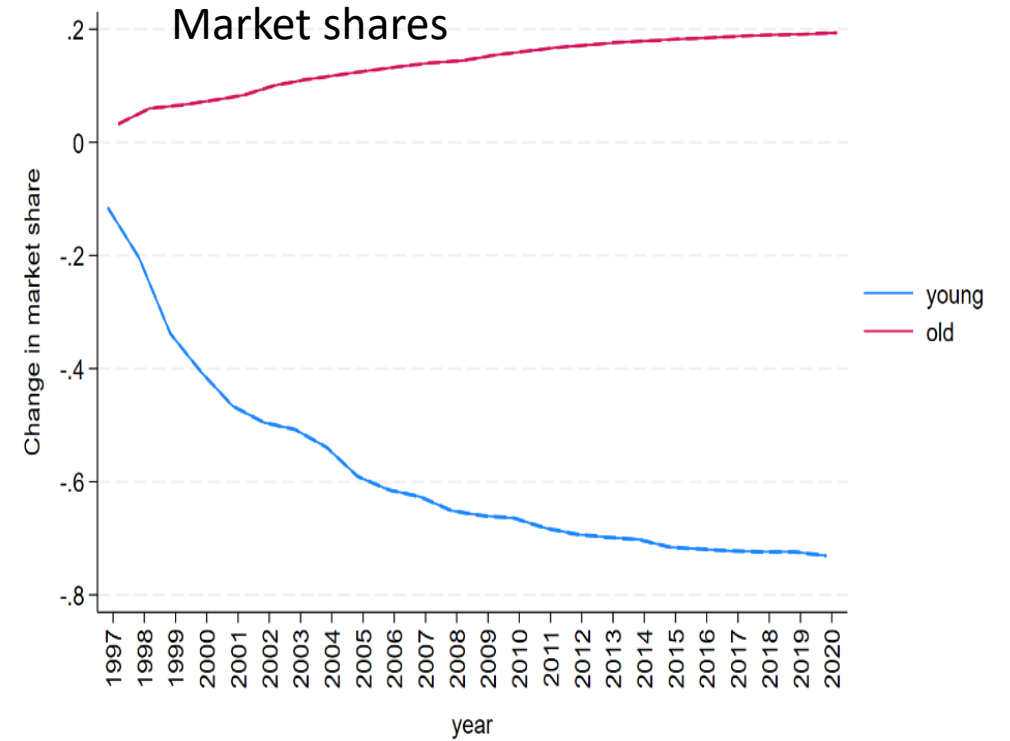
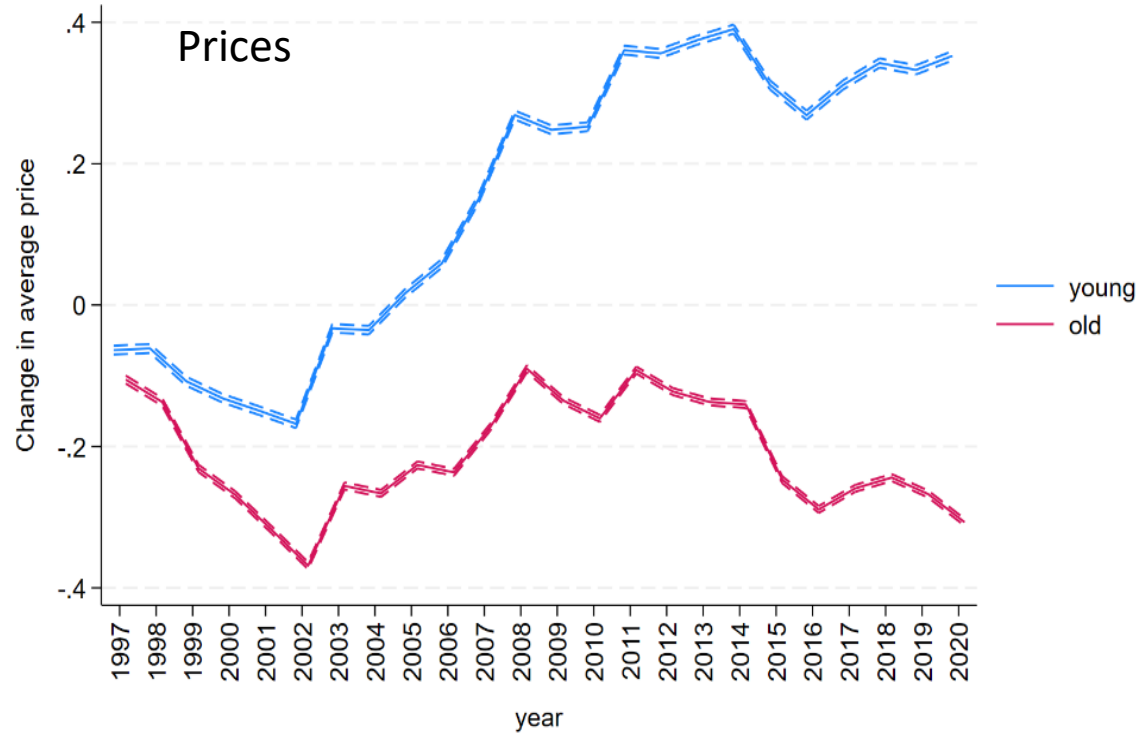
Entry rates are falling sharply

Hummels and Yue 2024

Market share reallocation has fallen 60%



# Young firms are getting worse relative to old firms



# What's driving loss in dynamism: shock v. response

- These patterns are strongly implicated in declining productivity growth, regional variation in employment growth rates.
  - So, what might be driving it?
- Market shares (or labor) reallocate when
  - a firm faces a shock to productivity
  - AND they are able to respond to expanding production and sales.
- The aggregate reduction in dynamism could be driven EITHER
  - by a reduction in the variance of productivity shocks
  - OR a decline in the ability/willingness of firms to respond.

# Variance of shocks to productivity and prices has risen

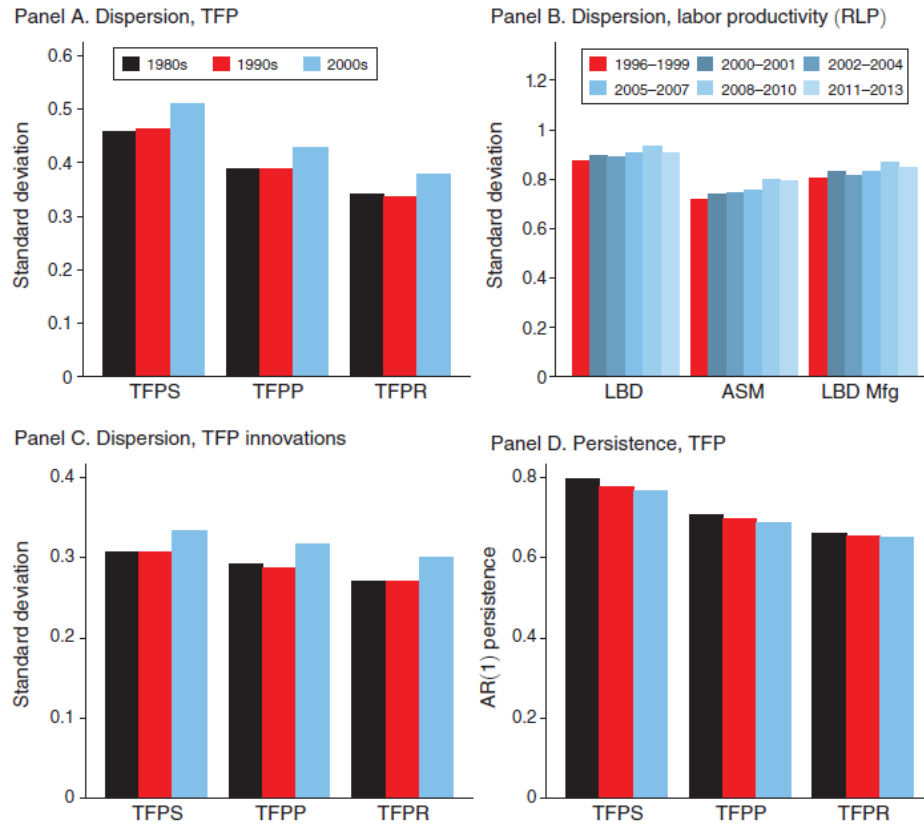
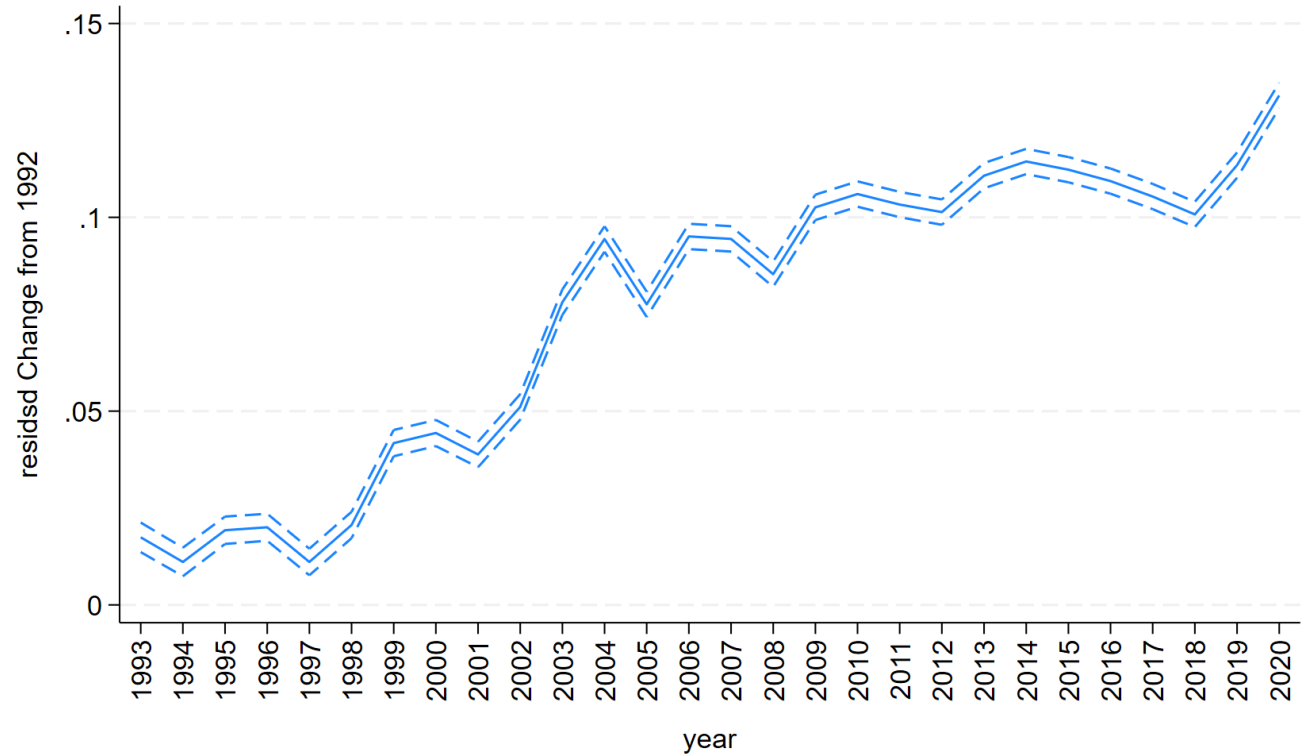


FIGURE 3. WITHIN-INDUSTRY PRODUCTIVITY DISPERSION HAS RISEN



Variance of price shocks in world trade data

From Hummels and Yue 2024

Productivity levels and Changes: US Establishments

From Decker et al 2020 AER



# Response to changing productivity/prices

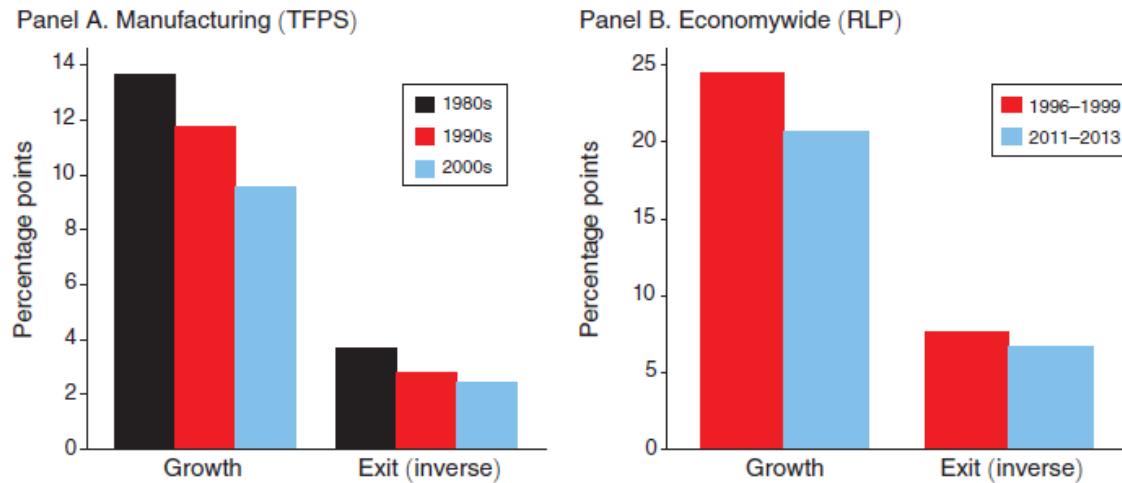
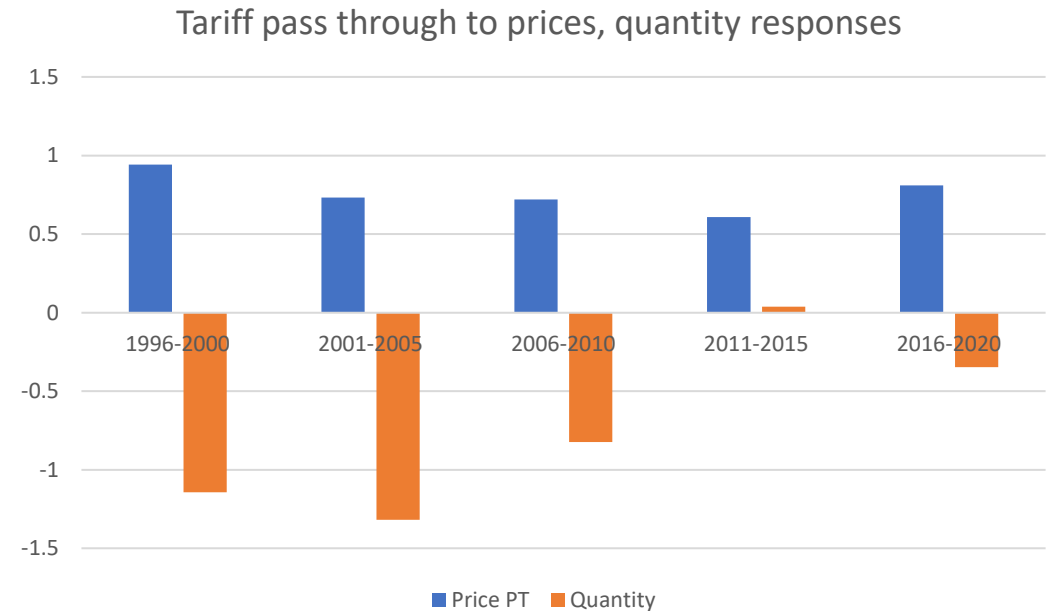


FIGURE 4. JOB GROWTH AND EXIT HAVE BECOME LESS RESPONSIVE TO PRODUCTIVITY

Elasticity of firm response (growth, exit) to changes in productivity

Decker et al 2020 AER



Elasticity of delivered price, quantities wrt tariffs

Hummels, Yue 2024.

# Implications

- Firms are experiencing a wider variance of productivity shocks, but they are not growing/exiting in response
- Leading explanation: labor adjustment costs have gotten much higher. Why?
  - Could be regulation and/or transfer payments that insulate workers
  - Or, it could be that firms are facing much steeper labor supply curves... increasingly difficult to expand labor at the margin due to labor specificity.
- Aside: geographic regions with low growth rates for young firms have much lower aggregate productivity growth... connection to local labor markets problem.

# Why global shocks to labor markets are so potent

- Factor based comparative advantage:
  - global competitors have very different factor mix and Stolper Samuelson logic => much larger changes in demand for labor / tasks of certain types
- Scale effects... the world is large relative to Denmark ... or... Bloomington
- Shocks are getting more variable and are highly concentrated on competing firms and locations.
  - Add factor specificity and shocks are entirely born by trapped factors
- Labor supply may be more inelastic, less responsive to changes.

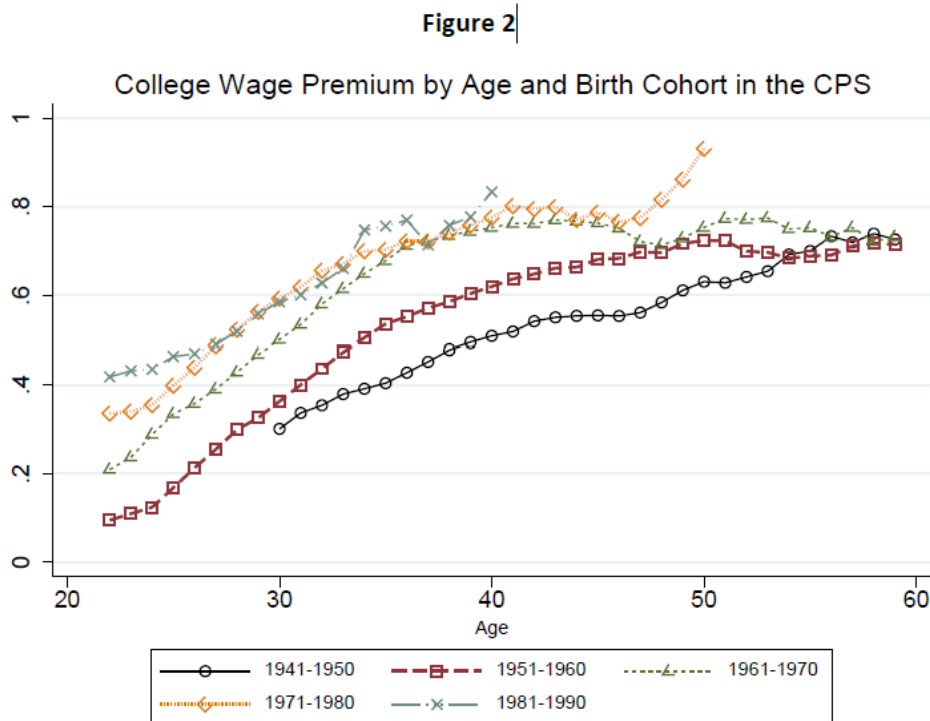


# Why might make labor supply less elastic?

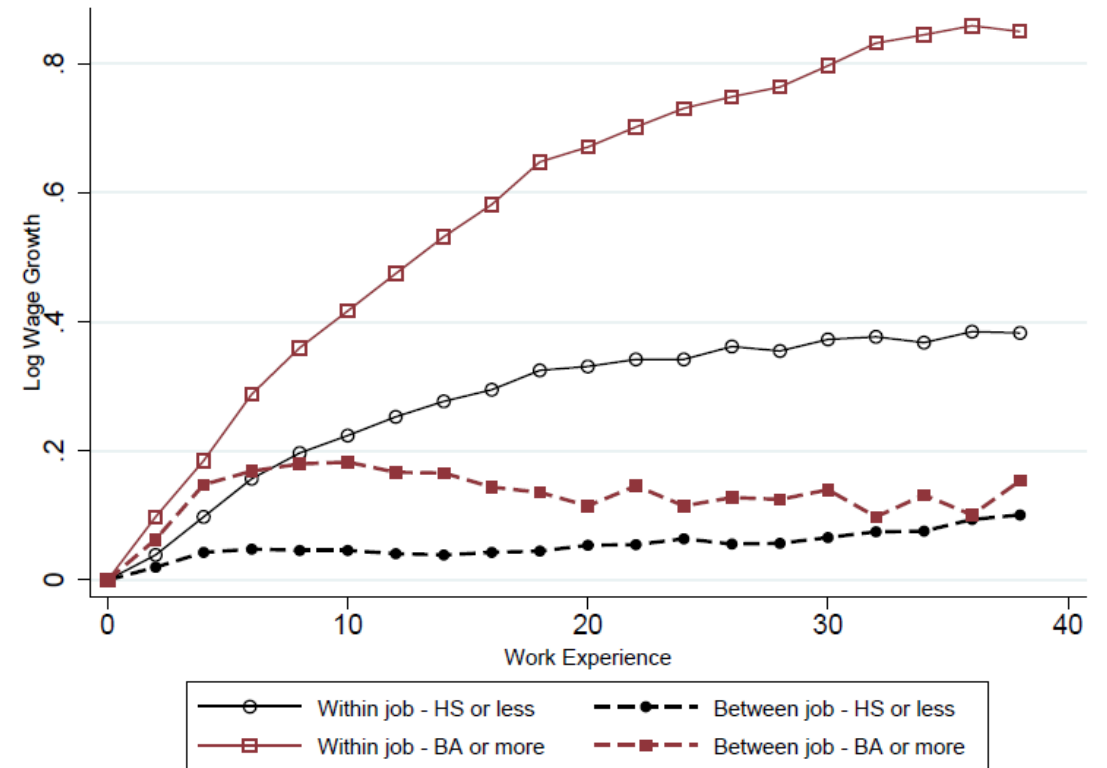
- Transfer payments that insulate workers from shocks
- Workers are increasingly specific to locations, firms, occupations
  - **Location:** new firm formation in new locations is slowing... so getting a new job means moving to new locations
  - **Firms:**
    - evidence on wage loss after separations
    - \*\*Offshoring => increasing task specialization, narrows the range of work done by firm and by workers, making it less likely that same set of tasks is found elsewhere.
  - **Occupations:**
    - Wage growth profiles suggest returns to continuous learning
    - \*\*Burden of knowledge in occupations

## Deming (2023)

- The return to a college education interacts with work experience
- Why: jobs are getting more complex and complexity and learning ability are complements...



## Panel B – Wage Growth by Years of Actual Work Experience



This growth profile is steeper than the ability-experience growth profile. Education matters

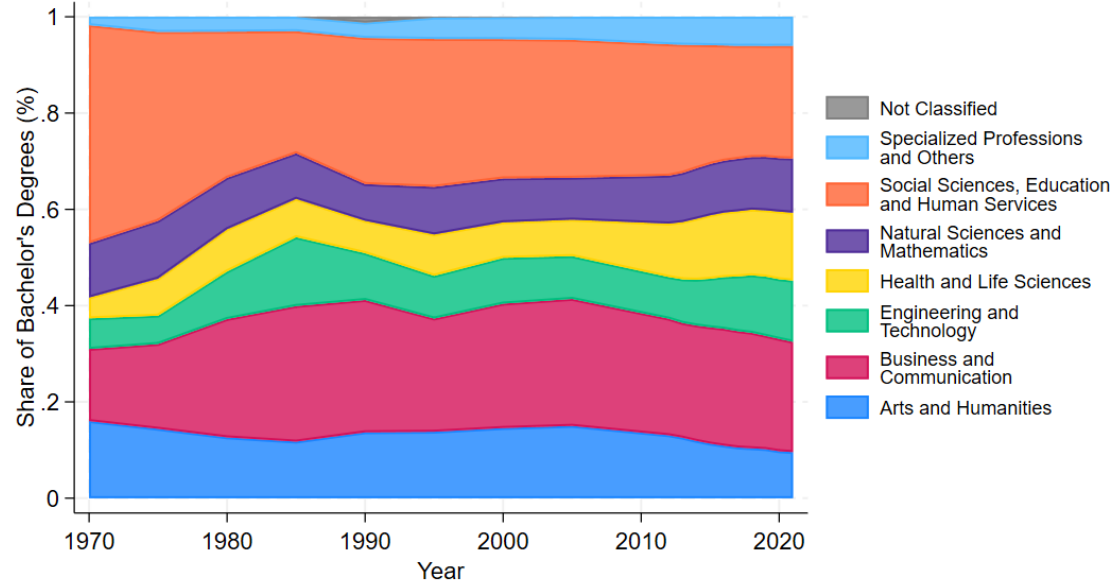
Each cohort has a higher/steeper wage growth gradient

# What role can universities play?

- What we do well: responding to market demand for degrees.
- Things we need to wrestle with?
  - Should we increase emphasis on skills-based learning?
  - Can we increase enrollment and improve completion rates?
  - Should we customize our product for individual learners?
  - Can we better understand how curricular improves market value?

# Flexibility and Responding to Market Demand

Change in Share of Bachelor's Degrees by Field Over Time

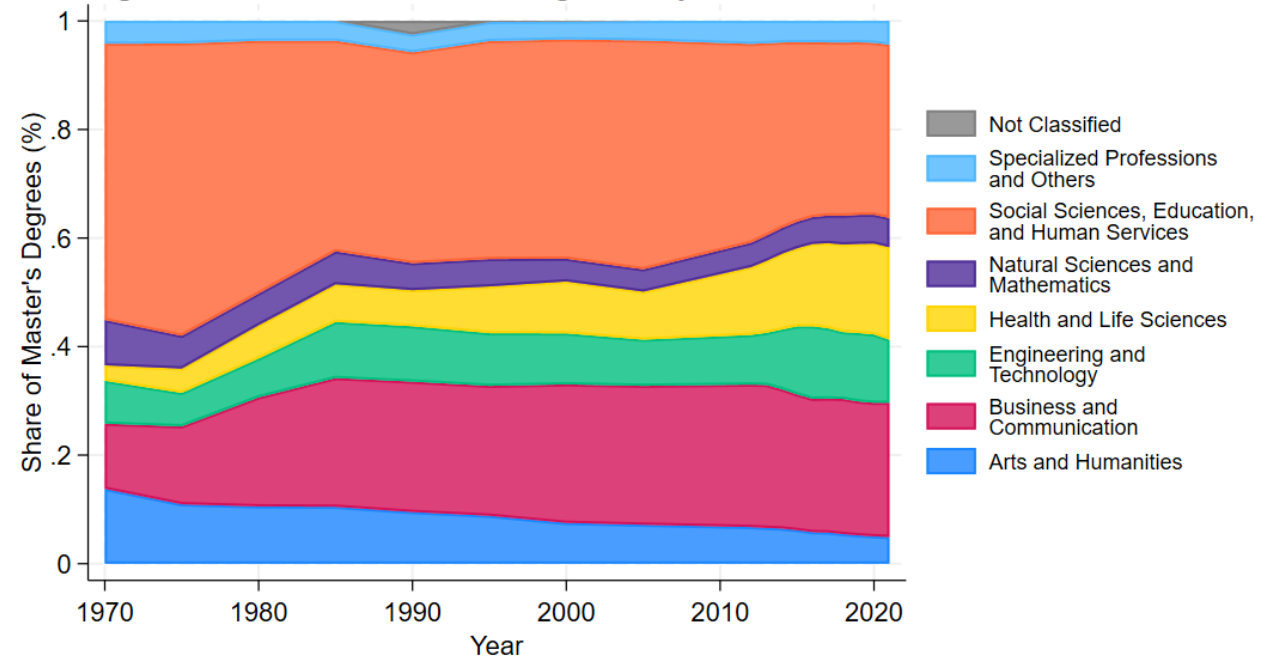


Between 1971-2021, number of bachelors degrees increased 2.4X, with big changes in shares

There are half as many English degrees (share shrank 5X), while business and engineering market shares grew 50%

Graphs courtesy of ChatGPT

Change in Share of Master's Degrees by Field Over Time



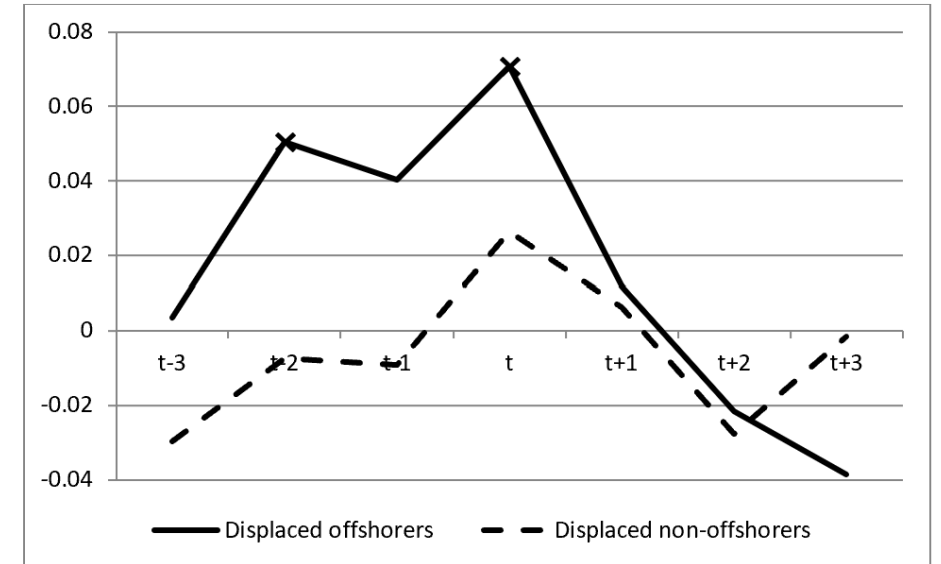
# Responding to market demand for degrees

- Conzelmann et al 2023 use the universe of online job ads + alumni network to create measure of labor demand that is major x institution.
- Majors production responds strongly to demand shocks: elasticity of majors wrt demand = 1.3.
  - Credit hours taken respond with similar magnitude
- Institutional investments also track this, but...
  - Marginal investments are in non-tenure track faculty, and
  - Course sections don't rise, class sizes rise.
- Where is response largest
  - Institutions that are less selective and less-research intensive
  - Majors that are in the bottom 2/3 of \$ per credit hour distribution
  - Points to capacity constraints.



# Focusing on skills based learning/retraining?

- With increasingly localized and concentrated shocks, the ability to switch/upgrade skillsets is critical
- Hummels-Munch-Skipper-Xiang 2013 AERPP: skills-based worker retraining program dramatically improve worker reattachment to the workforce, particularly after offshoring episode. 4X more successful than untrained.
- BUT... engaging in retraining is a LEADING indicator that your job will be offshored again.
- AND: firms like trapped factors! Should we collaborate in trapping our students?



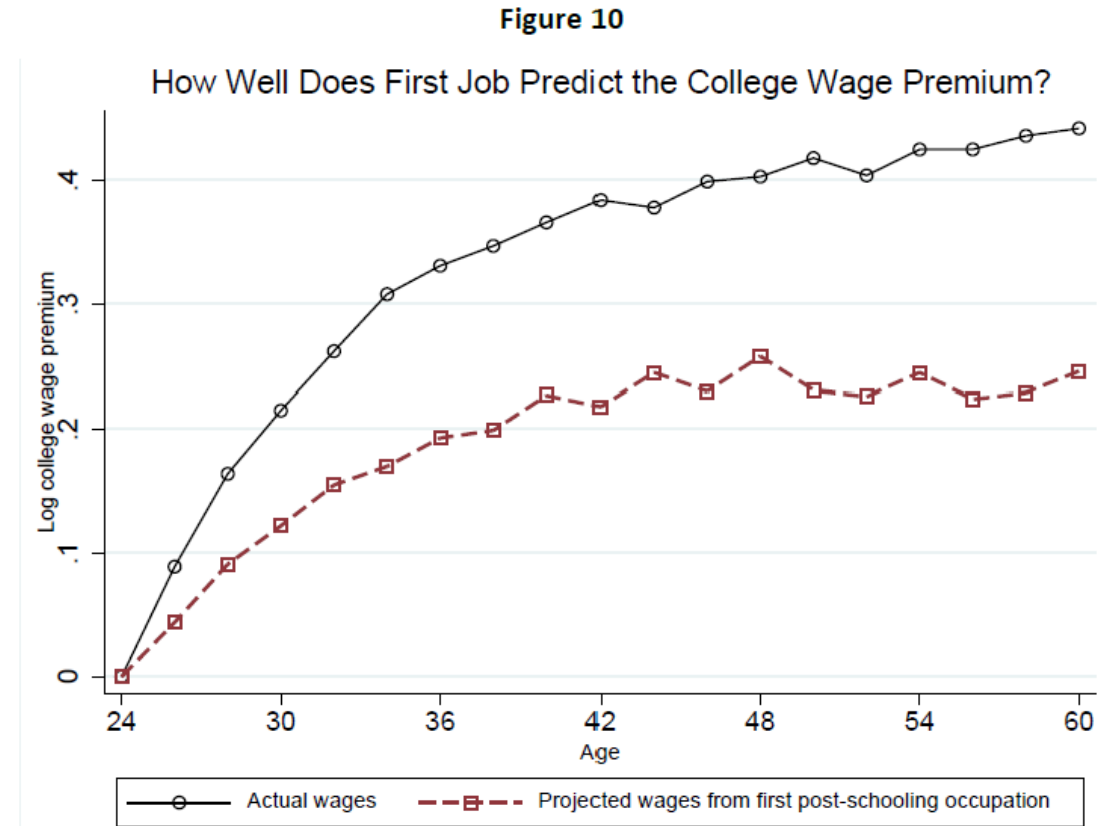
Training take-up rates in the years before and after a mass displacement event

# The explosion in credentials (Credential engine 2022)

- In 2022 there were a total of 1,076,358 credentials on offer in US
  - Post-secondary institutions offered 350,412 degrees and certificates
  - MOOCs: 13,014 certificates, micro-credentials, degrees from foreign univ
  - Non-academic providers: 656,505 badges course completion certificates, licenses, certifications, apprenticeships.
- In Indiana alone: 10,946 credentials
- In Management occupations: 292,060
  
- If students and employers don't know what a credential means, the credential doesn't have any value.

# On the other hand...

- The first job out of college really matters. Explains about half of the college-experience wage premium
- And employers don't hire 22 year olds to engage in grand strategy. They want skills.
- Surveying returning interns... what did you need to be more successful and increase your chances of landing a full time job?
  - Answer: excel skills.



Deming 2023

# Improve completion rates

	Four Year Institutions					
	All	Public	Private	For Profit	Two year	< Two year
Completion Rate	61.0%	59.0%	68.0%	42.0%	35.0%	65.0%
<u>Change in debt relative to original loan</u>						
Completer	-8.0%	-8.0%	-12.0%	12.0%	1.0%	7.0%
Noncompleter	6.0%	5.0%	2.0%	15.0%	7.0%	7.0%
Noncompleter % of debt.	20.6%	26.4%	18.0%	22.8%	39.5%	32.5%

Noncompleters can't pay off their loans

Neither can students at 2 yr and for-profit institutions

Source

Completion rate: IPEDS 2021

Debt: HEA Group, "The College Completion Crisis Fuels the Student Debt Crisis"

Good news: These are INCREASES in completion rates relative to 1970-1990

Bad news: the improvement is not explained by rising student ability, increased institutional resources, or shifting to higher completion rate institutions. **IT'S ALL GRADE INFLATION** (Denning et al 2022)

# Customizing our product for individual learners

- Students come to us with widely varying ability, preparation
- We address this in a few ways
  - Students sort into universities, majors by difficulty level
  - We have some limited summer prep
  - We “lowest common denominator” our classes and grade-inflate
- These are badly insufficient
  - High ability students aren’t pushed.
  - Low ability students never overcome poor preparation and drop out
- What if we: made use of AI-tools to vary pace and depth of course coverage to accommodate variable capabilities.

# How does curriculum map into market value

- We have no idea.
  - No careful studies linking how/what we teach to student success
  - Way too satisfied with rising starting salaries, increasing placement rate.
  - How do we decide what to teach?
- “We’re not really teaching them models, we’re teaching them to think.” Are we? And how do we know if we’re succeeding?
- What if we made an effort to ask: after this class, what can a student do that they couldn’t do before? And does that thing matter in the workforce? And then we studied whether we were right.

Thank you.

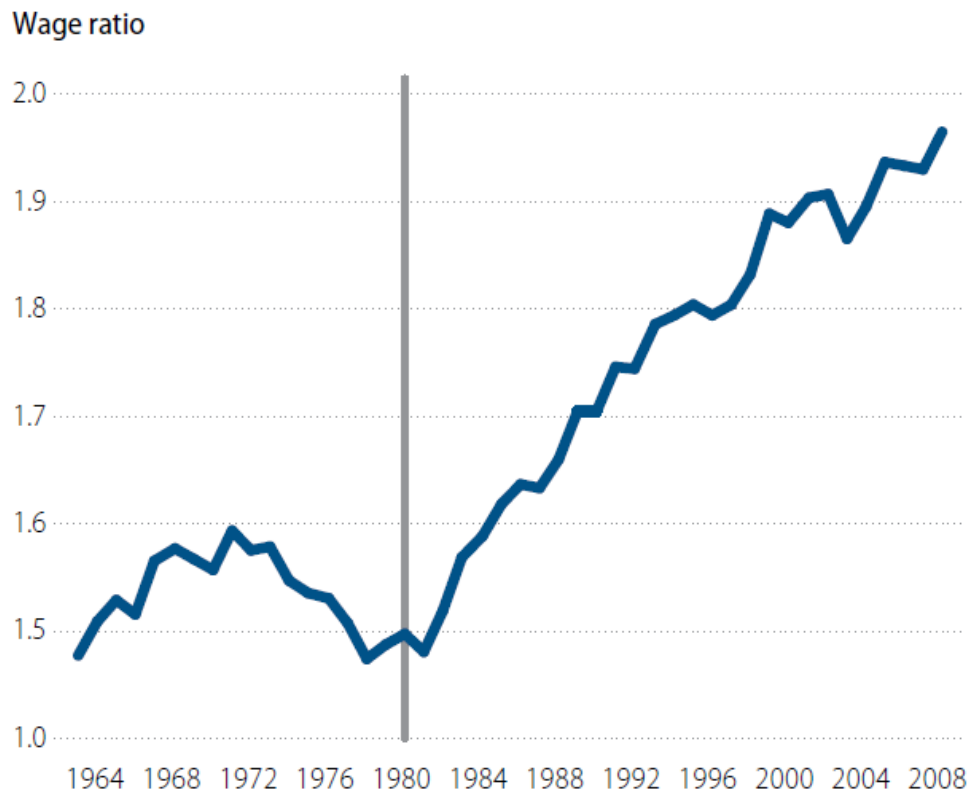
Other slides





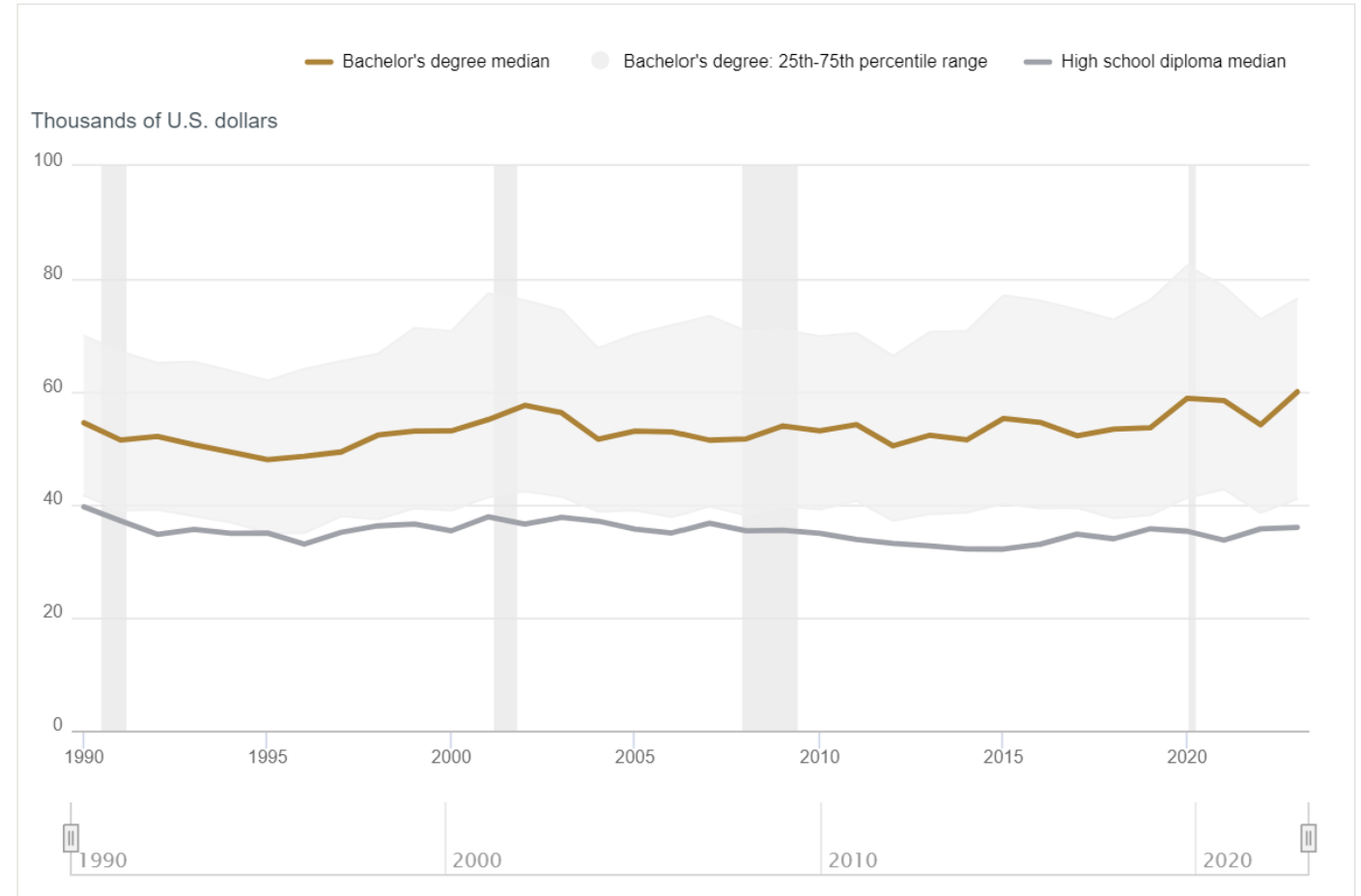
# The rising college-wage premium

## College degree vs. high school diploma weekly wage ratio, 1963–2008



Latest Release: February 22, 2024

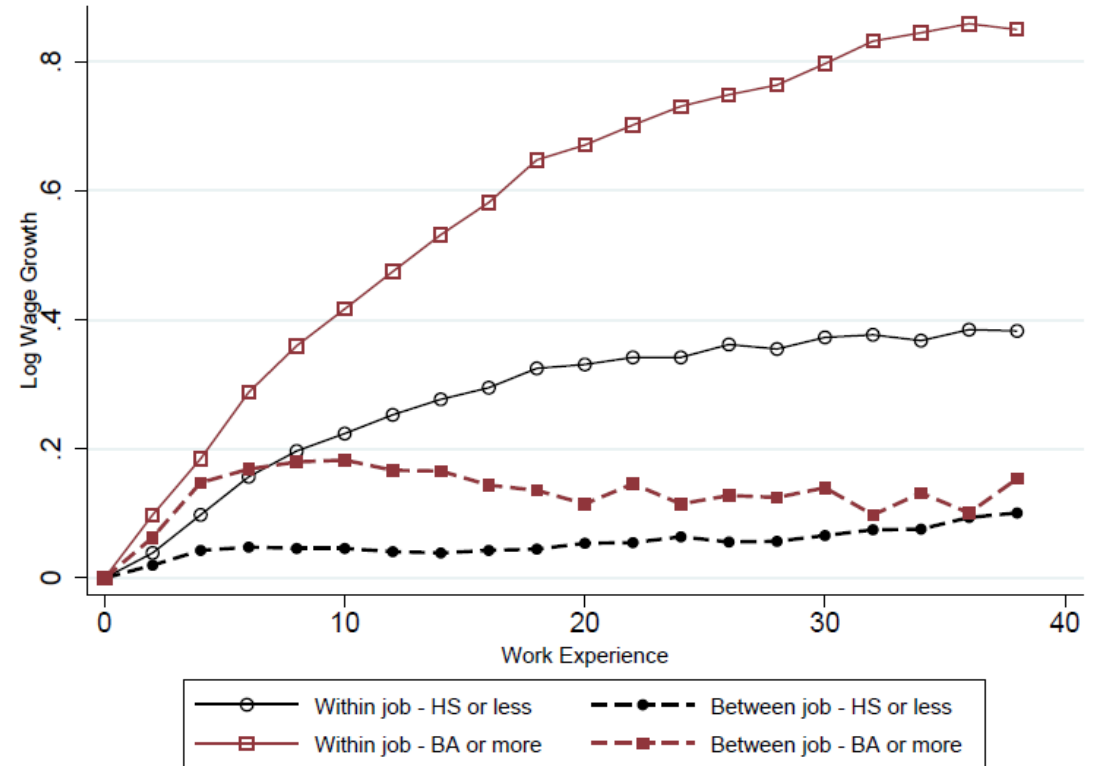
## Distribution of Annual Wages for Recent College Graduates



Sources: U.S. Census Bureau and U.S. Bureau of Labor Statistics, Current Population Survey, March Supplement (IPUMS); U.S. Bureau of Labor Statistics,

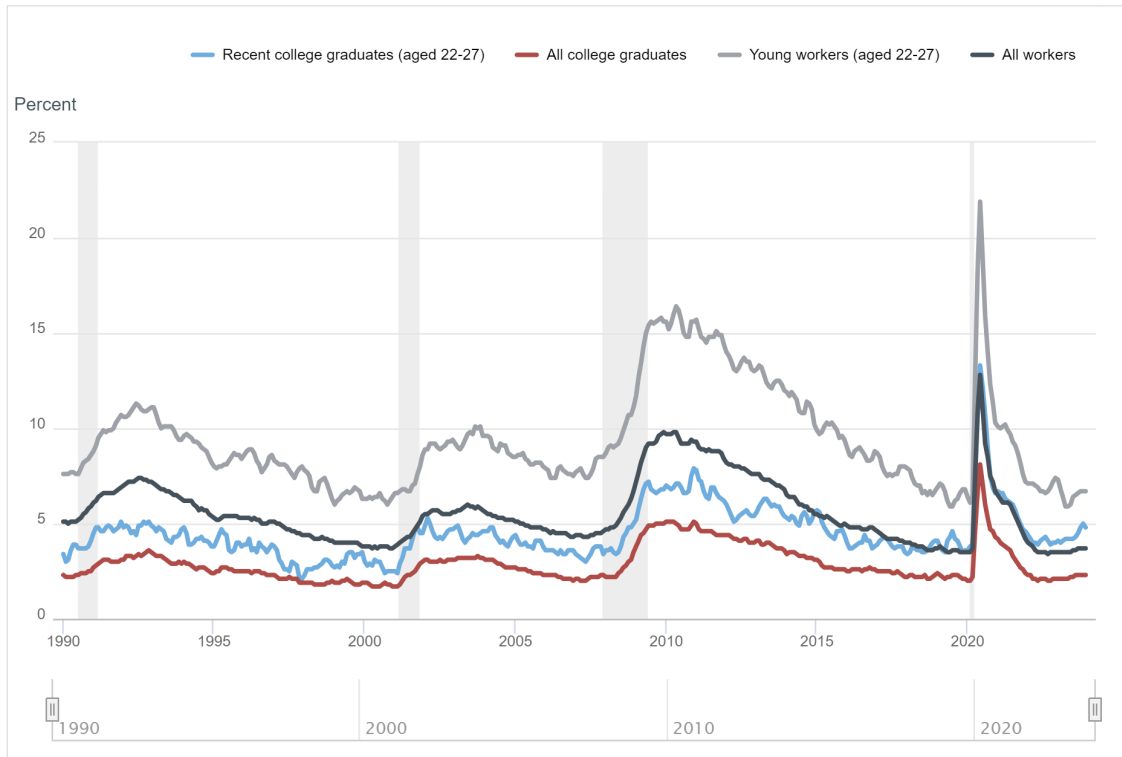
# Relative wages severely understate the labor market advantages of college grads

Panel B – Wage Growth by Years of Actual Work Experience



Latest Release: February 22, 2024, with 2023:Q4 data

Unemployment Rates for Recent College Graduates versus Other Groups



Labor Force Participation Rates are even more dispersed

Even after big increase in demand for HS grads post-pandemic LFP is 15 percentage points higher for college grads (72%) compared to high school grads (57%)

Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics, Current Population Survey (IPUMS).

# What occupational types are at risk?

Table 8: Wage Effects by Task Characteristics and Industry Experience

Interaction term (Z):	Routine	Non-Routine	Non-Routine (Other than Math)	Social Sciences	Natural Sciences	Communication	Industry-specific experience
Log(offshoring)	0.0075 [0.83]	-0.0034 [-0.40]	-0.0055 [-0.66]	-0.0049 [-0.54]	-0.0155* [-1.70]	0.0030 [0.34]	-0.0248*** [-2.85]
Log(offshoring) x high-skilled	-0.0081 [-1.20]	-0.0264*** [-3.89]	-0.0227*** [-3.37]	0.0151** [2.40]	0.0465*** [6.88]	-0.0081 [-1.28]	0.0512*** [8.53]
Log(offshoring) x Z	-0.0422*** [-17.36]	0.0497*** [14.10]	-0.0443*** [-13.56]	0.0377*** [16.09]	-0.0008 [-0.44]	0.0446*** [17.23]	-0.0002 [-1.12]

Labor economists like to separate occupations based on “routine-ness” .... The adverse effects of offshoring are particularly strong for routine tasks and the difference between high/low education goes away for non-routine tasks.

But... this is mostly math! Also, three cheers for social scientists and communication