

Whither Technological Innovation, Business Dynamism and Productivity

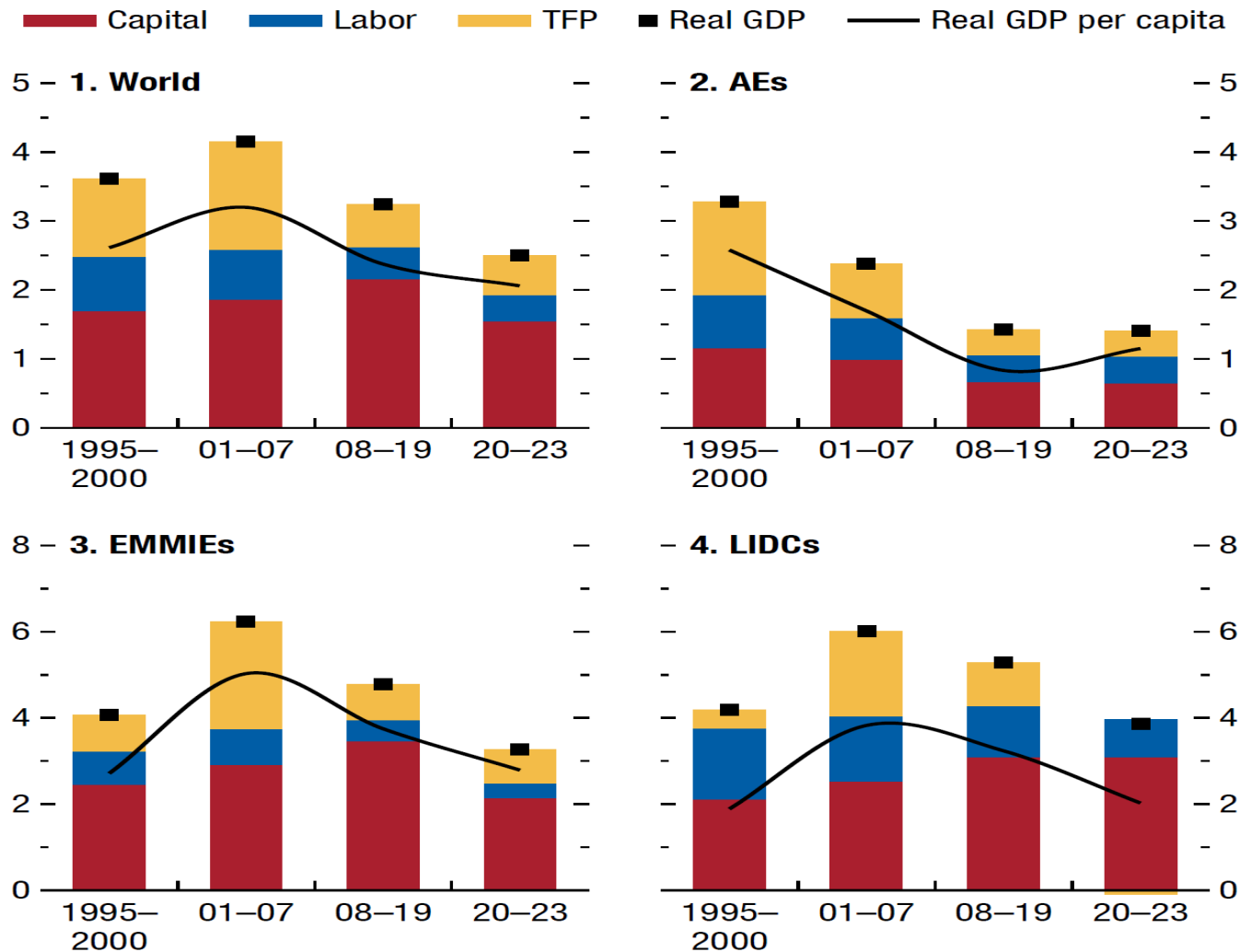
By

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*Without implication, this talk draws heavily on collaborative work with a large number of co-authors. Citations to the relevant papers are provided on the slides. Any opinions and conclusions expressed herein are my own.

Figure 3.4. Contribution of Components of GDP Growth, 1995–2023
(Percent)



Low productivity growth (TFP) in the post 2008 period is ubiquitous.

Many factors likely underlie this decline.

This talk will focus on the role of Business Dynamism as a potential driving factor.

Working Hypothesis:

Productivity growth involves innovation which inherently involves uncertainty, experimentation and idiosyncratic outcomes at the firm level.

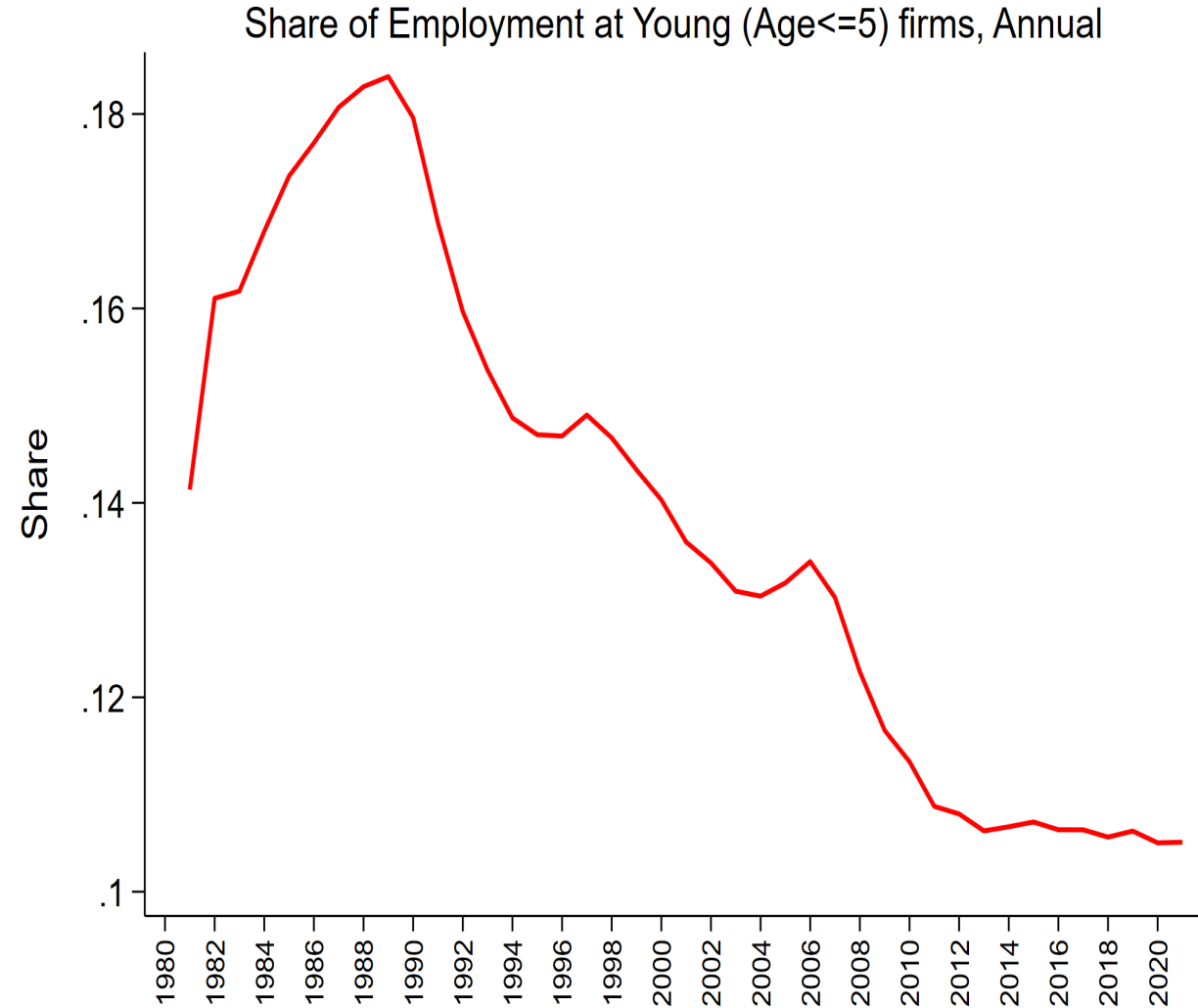
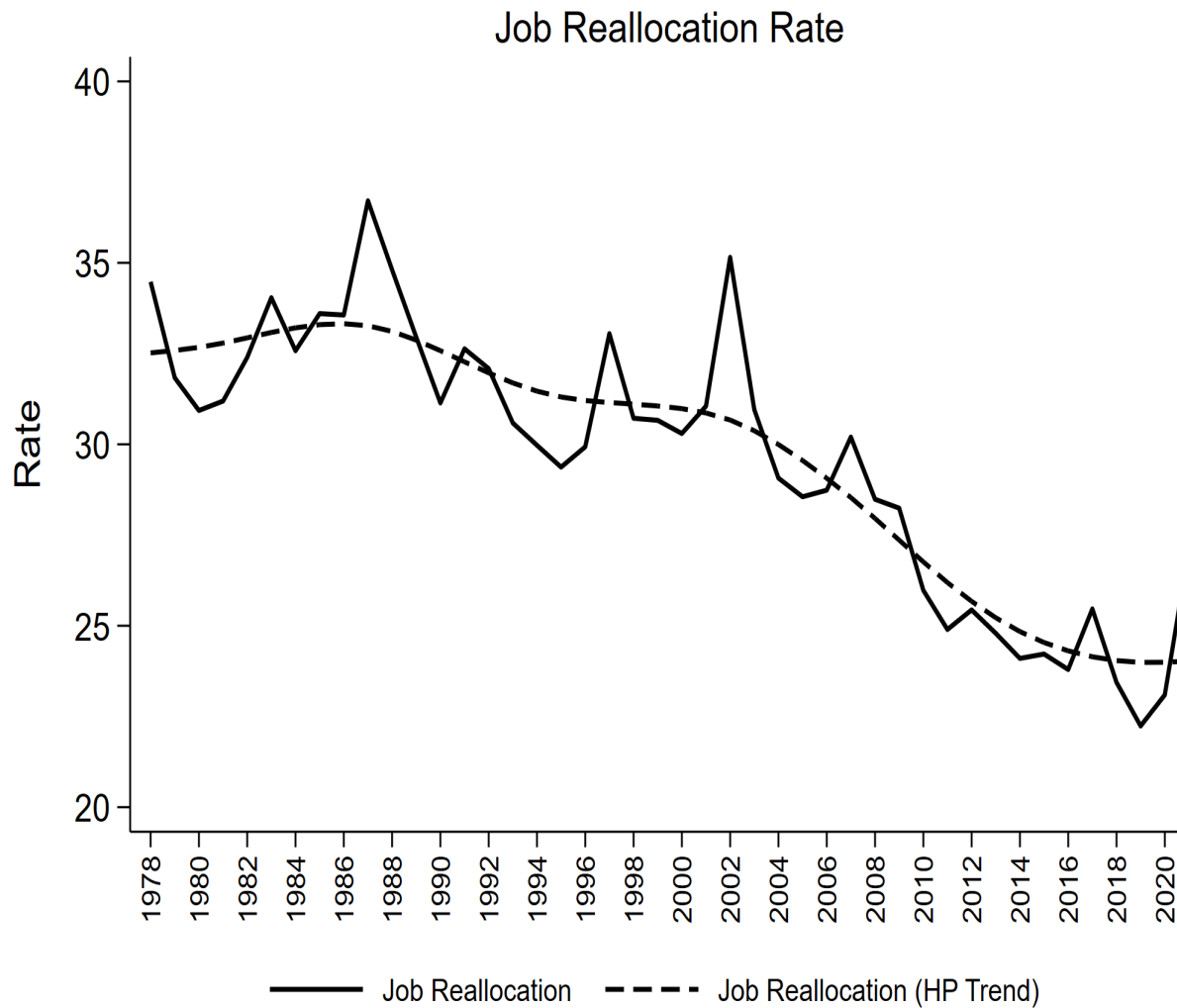
Young firms play a critical role in this experimentation. Have stronger incentives to make disruptive innovation.

Frictions that adversely impact entry, exit and reallocation can reduce innovation and growth

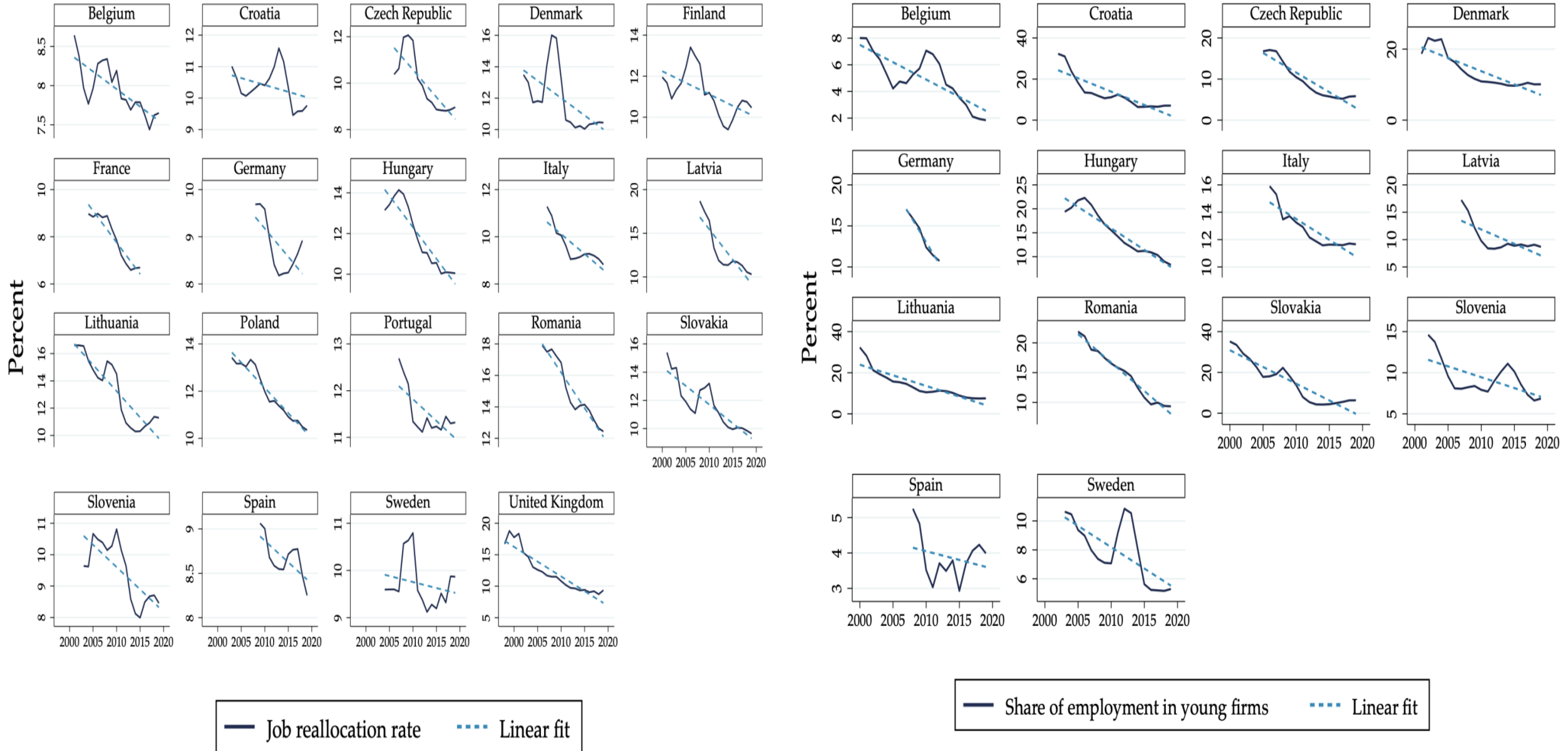
AE=Advanced Economies, EMMIEs=Emerging Market and Middle Income Economies, LIDCs=low-income developing economies

Source: IMF World Economic Outlook, Chapter 3.

Indicators of Declining Dynamism in the United States



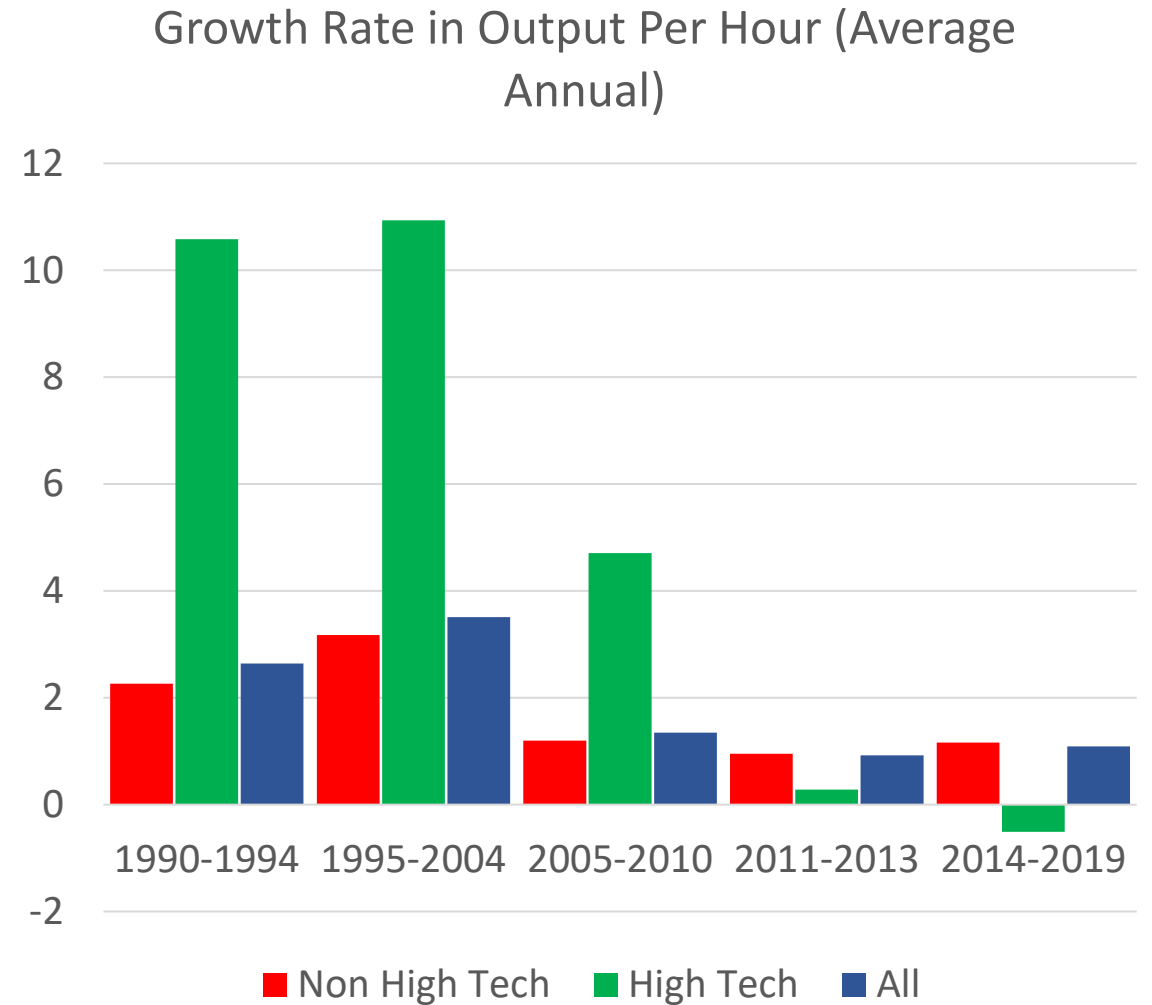
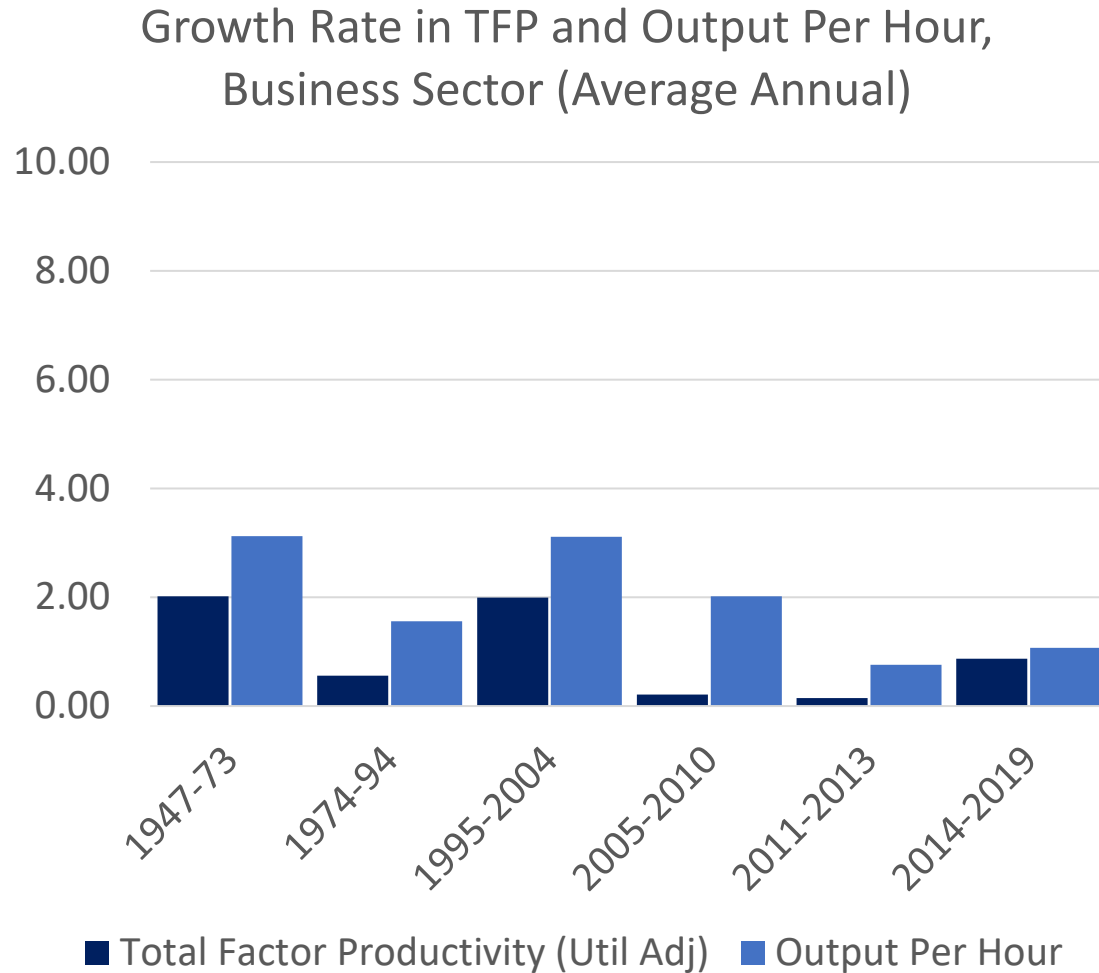
Evidence of declining business dynamism in Europe



Source: Biondi, Inferrera, Mertens, Miranda (2024)

This talk: Focus on US to Explore Working Hypothesis

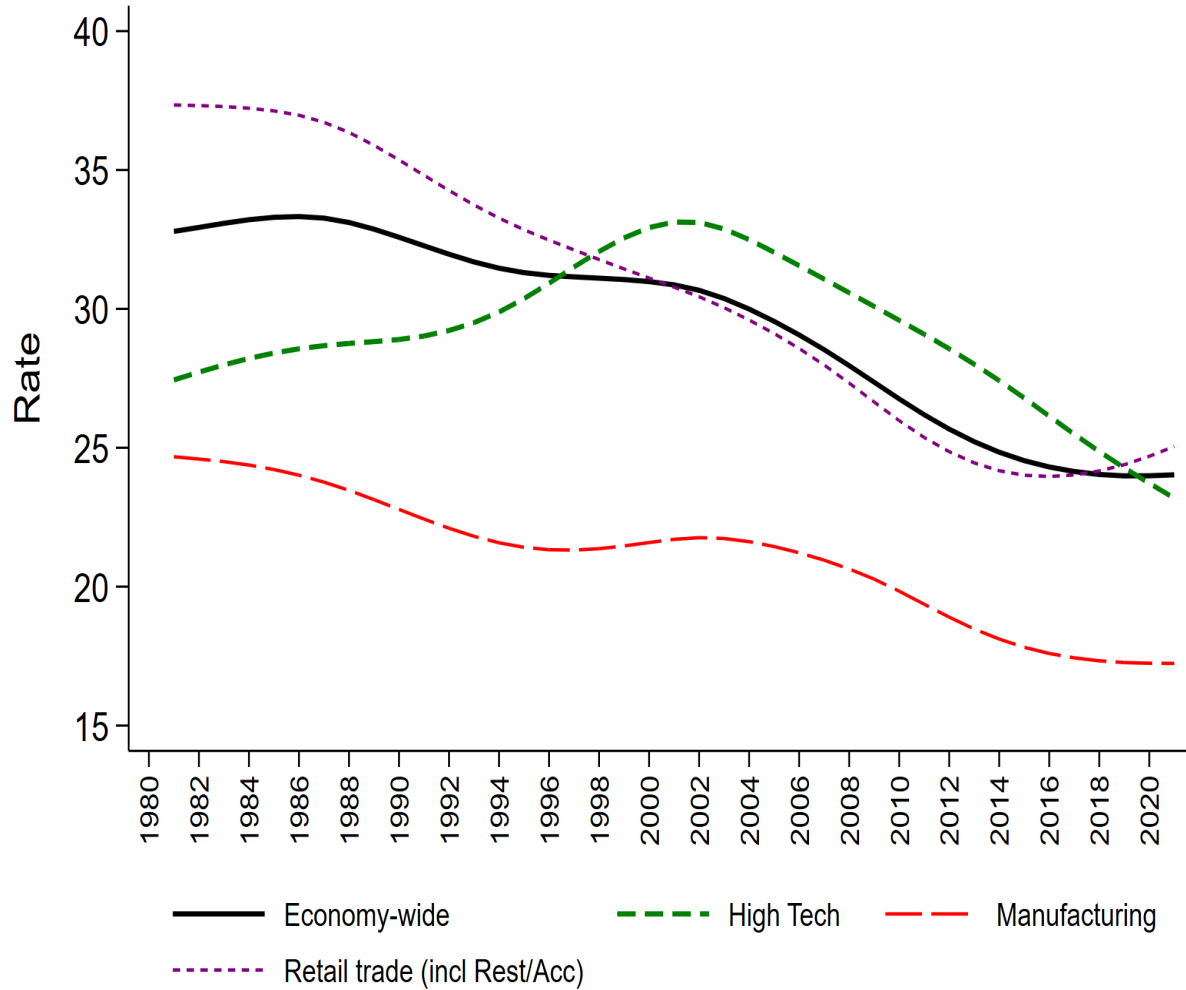
To start: Useful to highlight that surge in 1995-2004 and Slowdown from 2005-2019 dominated by High Tech (ICT).



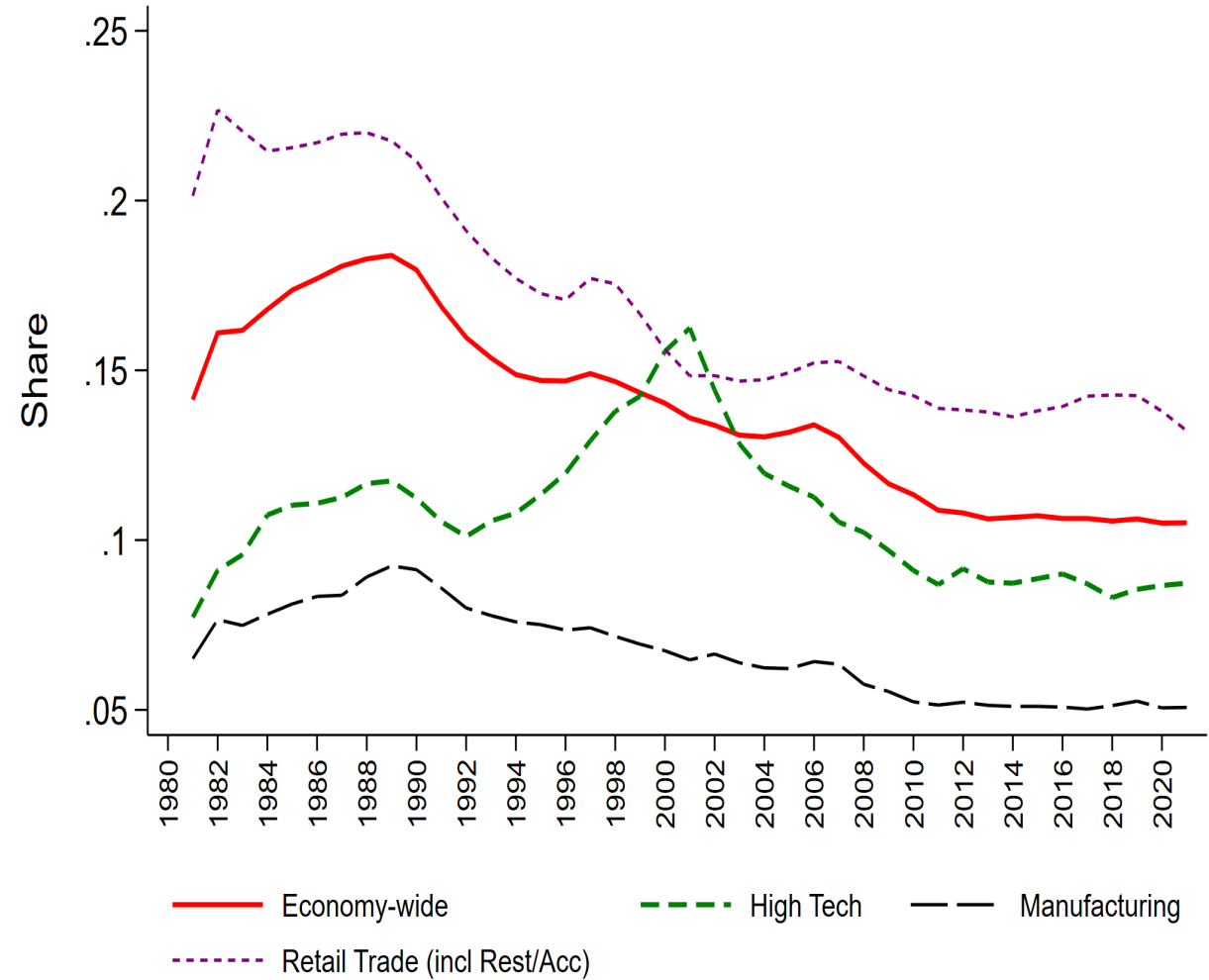
Source: Left Panel from Fernald, SF Fed. Right Panel from Aggregated 4-digit industries from BLS

Further Evidence for the U.S.: Selected Sectors

Trends in Job Reallocation Rates for Selected Sectors



Share of Employment at Young (Age<=5) firms



High Tech vs Retail: Cautionary Note About Role of Dynamism

- Surge in entry in early 1990s and subsequent high pace of reallocation in mid 1990s-mid 2000s consistent with experimentation by young firms and shakeout: More on this to come!
- But Retail Trade is a different story:
 - Decline of “mom and pop” businesses in favor of “big box” retailers in the 1980s-1990s was productivity enhancing. (Foster et al. 2006, 2016).
 - **Decline Business Dynamism \neq Decline in Productivity Growth**
 - Still might be downsides of this consolidation: More on this to come too!

Phases of Innovation – Critical Components: Entry and Experimentation

Each Phase
Can Take
Many Years

Experimentation
Accompanying
Complementary
Organizational
Investments

How businesses
organize
themselves and
interact with each
other

Nascent innovation



Few producers



Surge in Producer Entry



Many Producers
Most small



Experimentation



Productivity Dispersion
Across Producers Rises

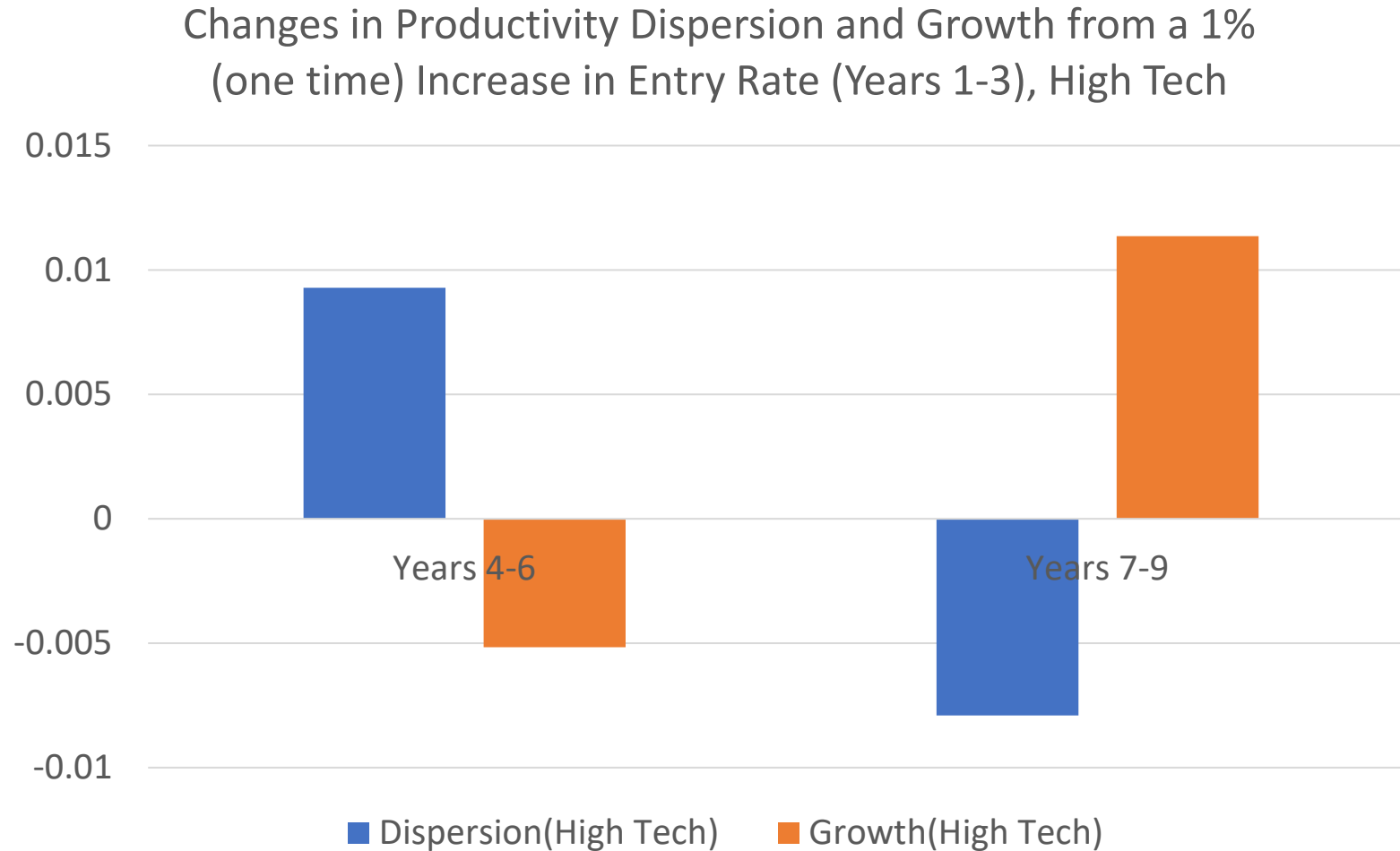


Shakeout
Productivity Growth



Few, large successful
producers

Dynamics of Entry, Productivity dispersion and Productivity growth (High Tech Detailed Sectors in the 1990s and early 2000s)



Timing of Productivity Surge:

1. Phase 1: Surge in Entry

2. Phase 2: Experimentation

a. Rise in Between-Firm Dispersion

b. Decline in Productivity Growth

3. Phase 3: Growth

a. Shakeout

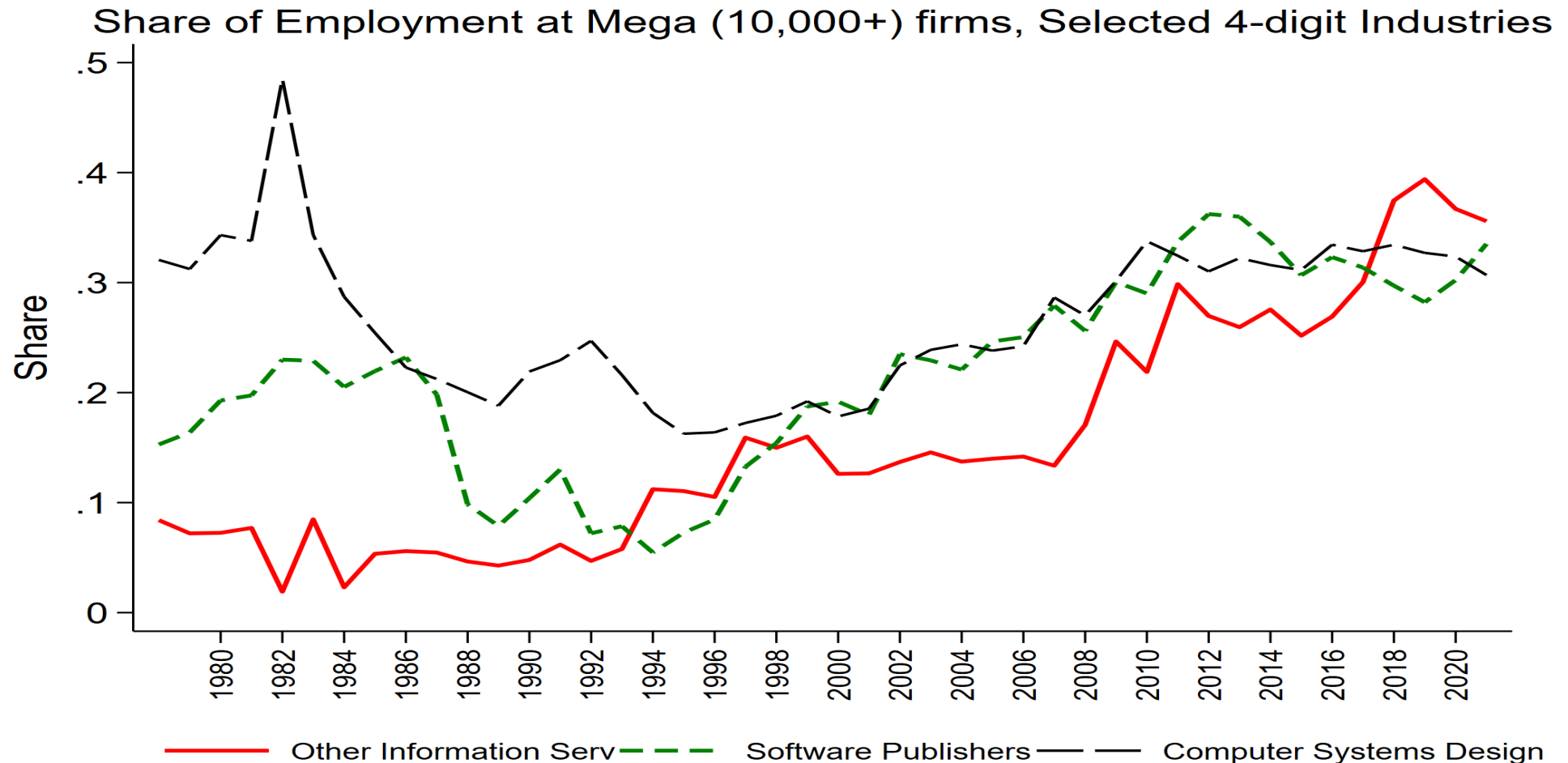
b. Decline in Between Firm Productivity Dispersion.

c. Rise In productivity Growth

Why long lags? Experimentation and needed complementary Intangible capital investments

Non-manufacturing High Tech Sectors have exhibited substantial increases in share of activity at Mega Firms post 2000

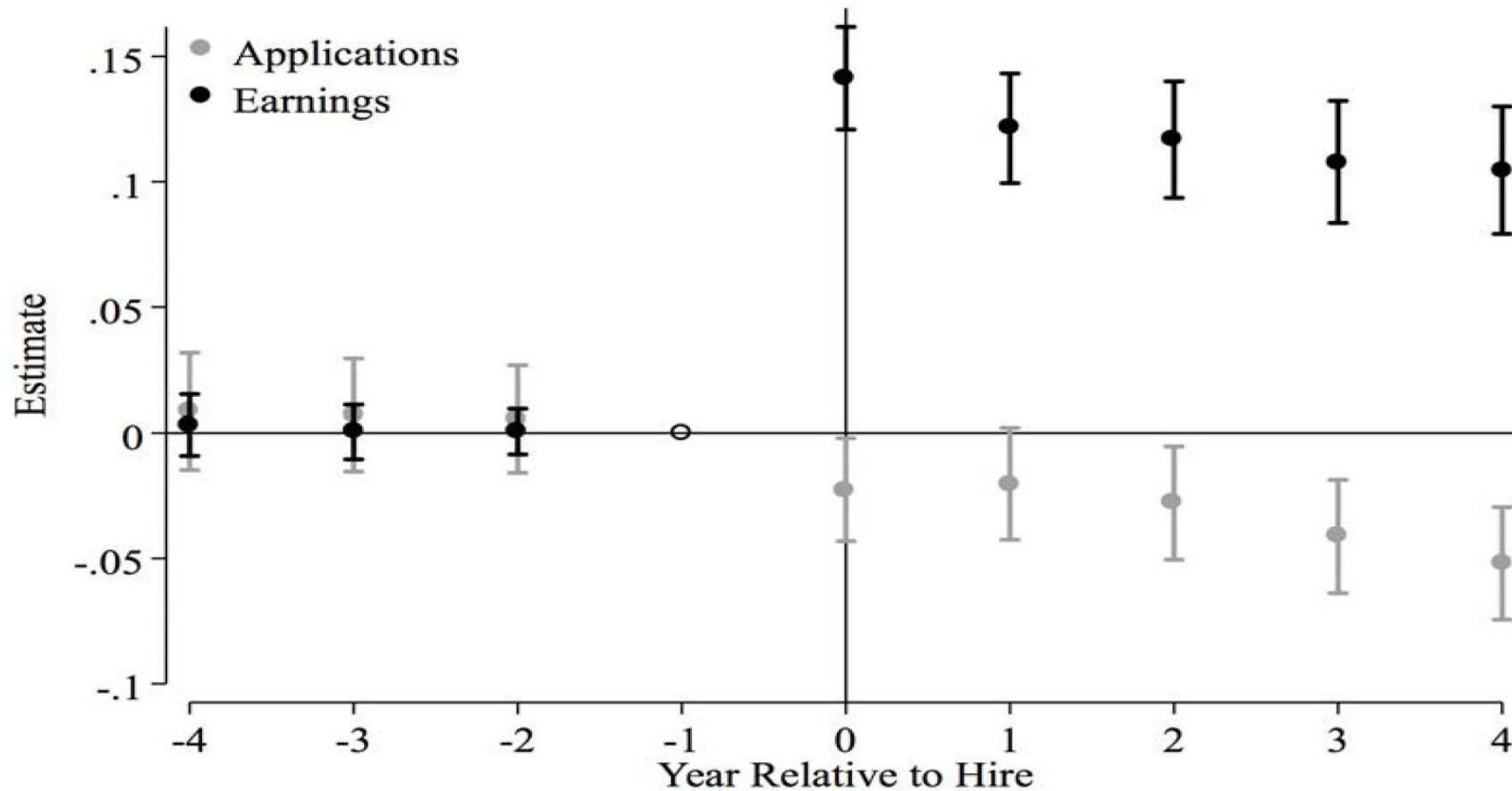
(Note: Other information services includes web search portals, social media, web based publishing)



Source: Census Bureau Business Dynamics Statistics

Innovators moving from young to mature (incumbent) firms have increase in earnings and decrease in patent applications

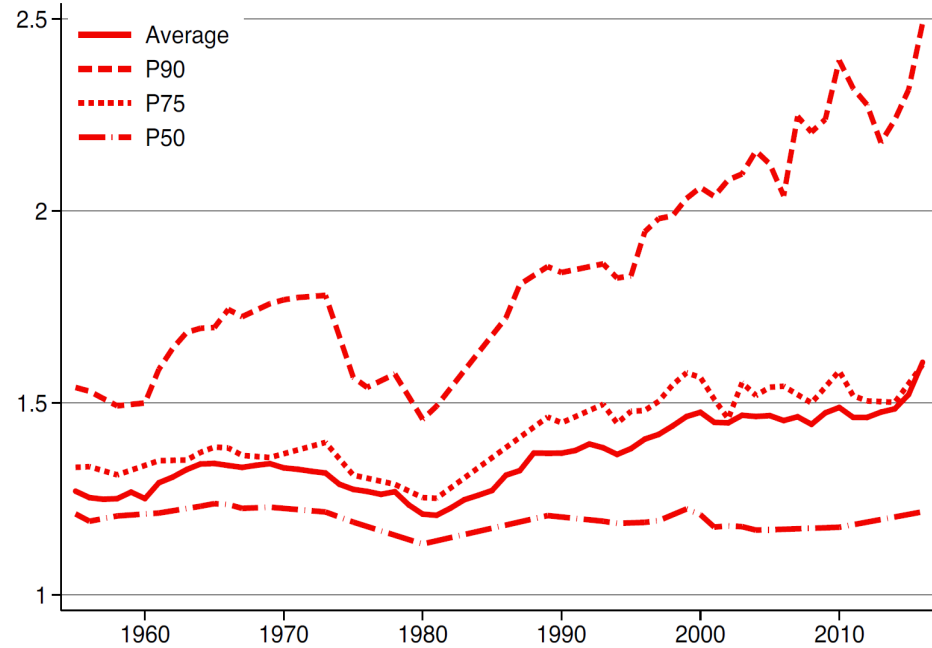
FIGURE 4: YOUNG AND INCUMBENT INVENTOR HIRES



This exercise tracks Earnings and innovation Productivity for Innovators that switch from a young firm to a mature incumbent.

Hypothesis? Large Incumbents reluctant to cannibalize their market share

Rising Markups: Dispersion increasing, Markups higher for large firms, Large firms becoming more important



(B) Percentiles markup distribution (revenue weight)

FIGURE III

The Distribution of Markups μ_{it}

Source: De Loecker et. al. (2020)

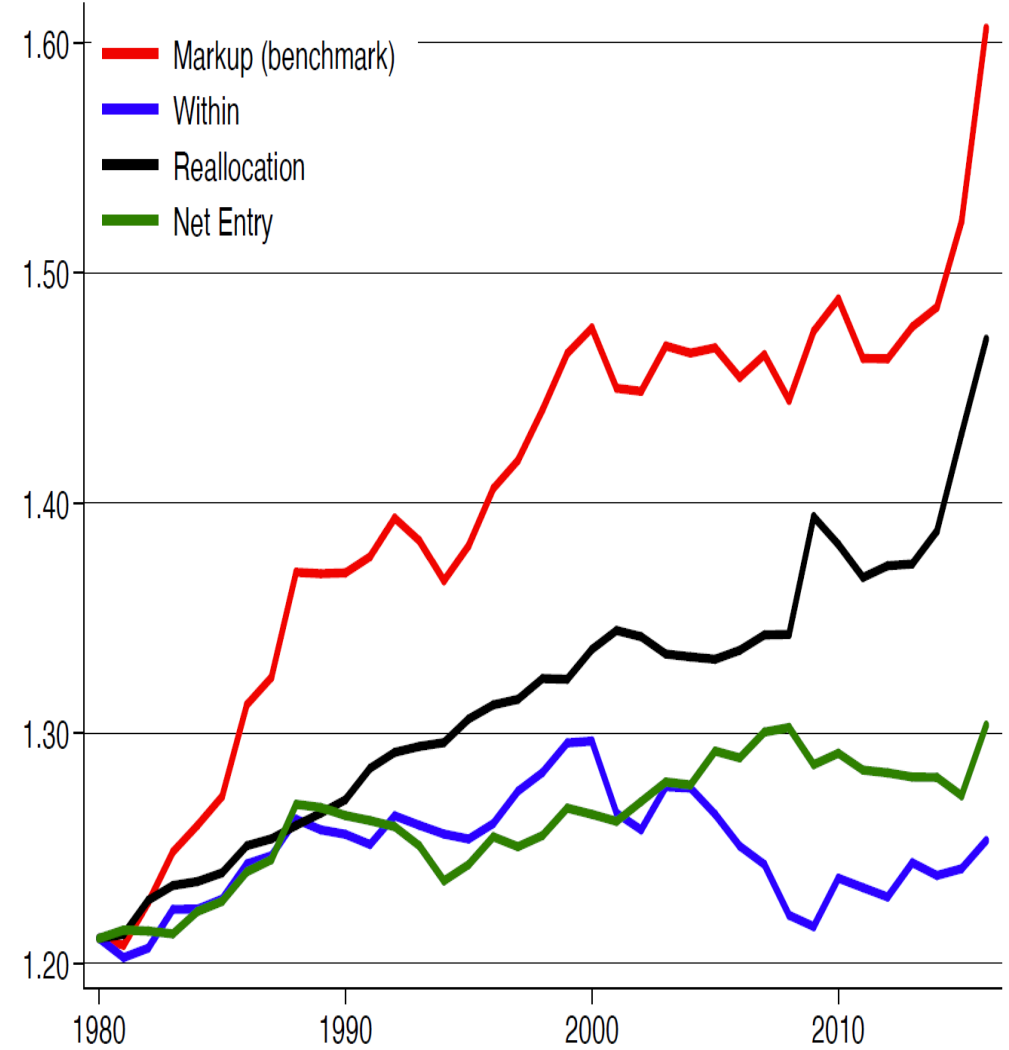
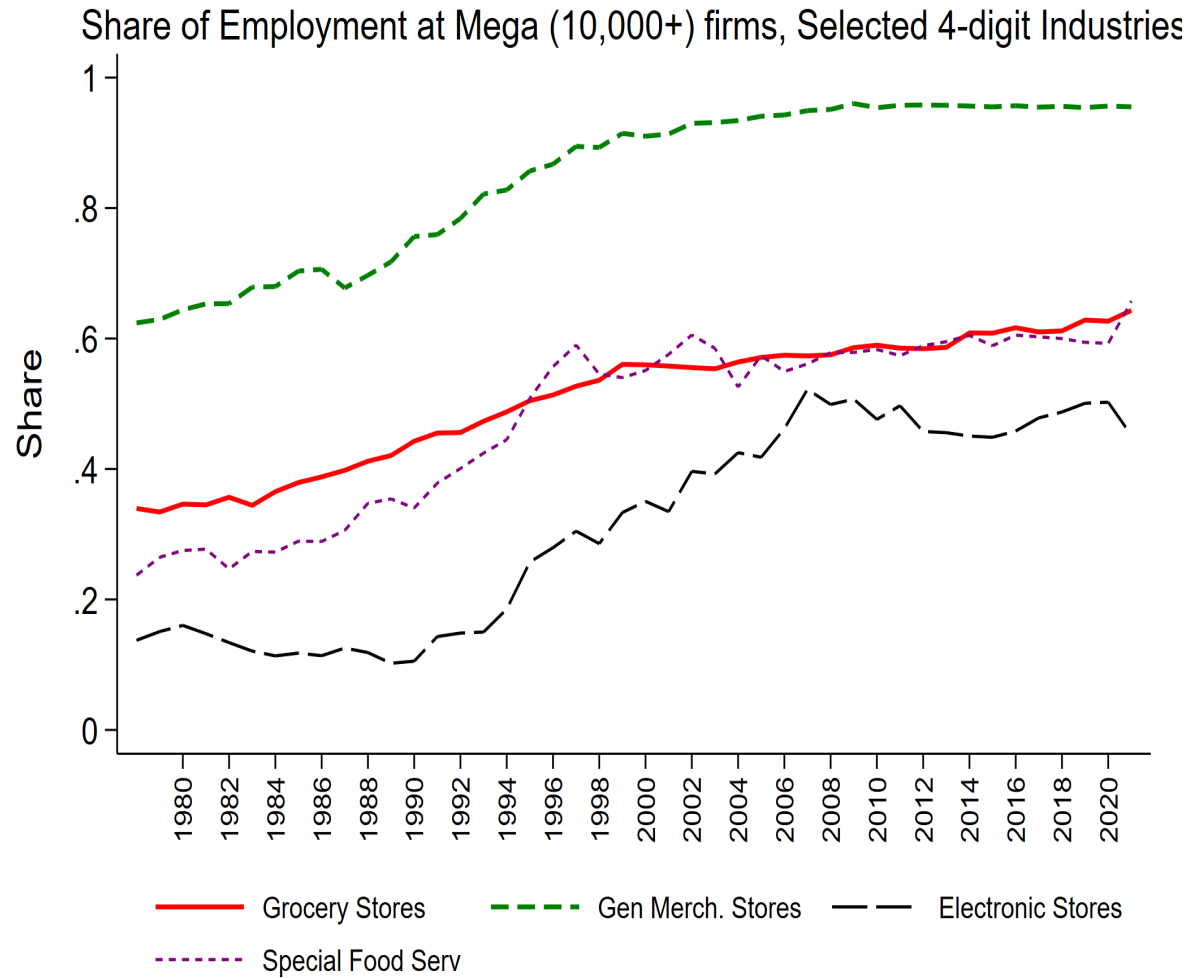
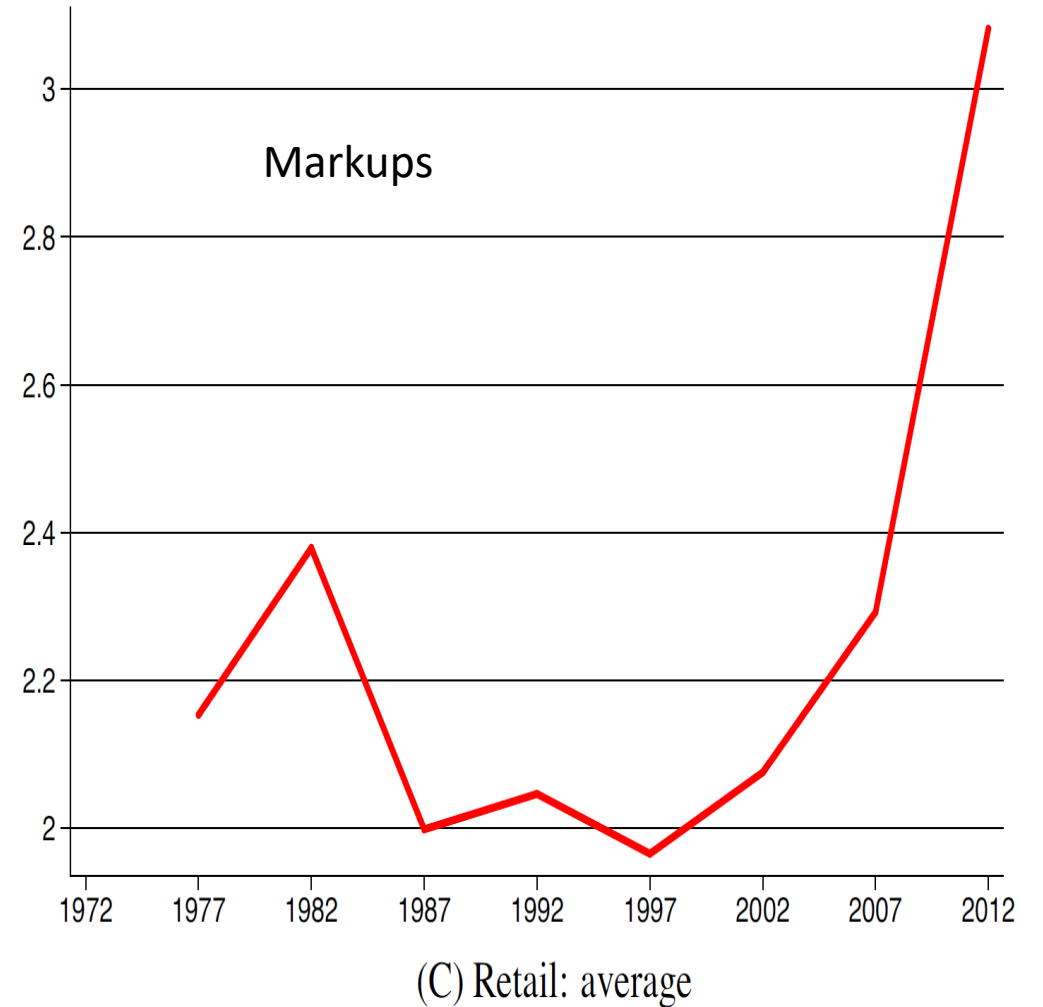


Figure 4: Decomposition of markup growth at the firm level.¹²

Back to Retail Trade: Consolidation in Retail in 1980s and 1990s, Rising Markups Post 2000 – Productivity Gains In the 1980s and 1990s have slowed down.



Source: Business Dynamics Statistics



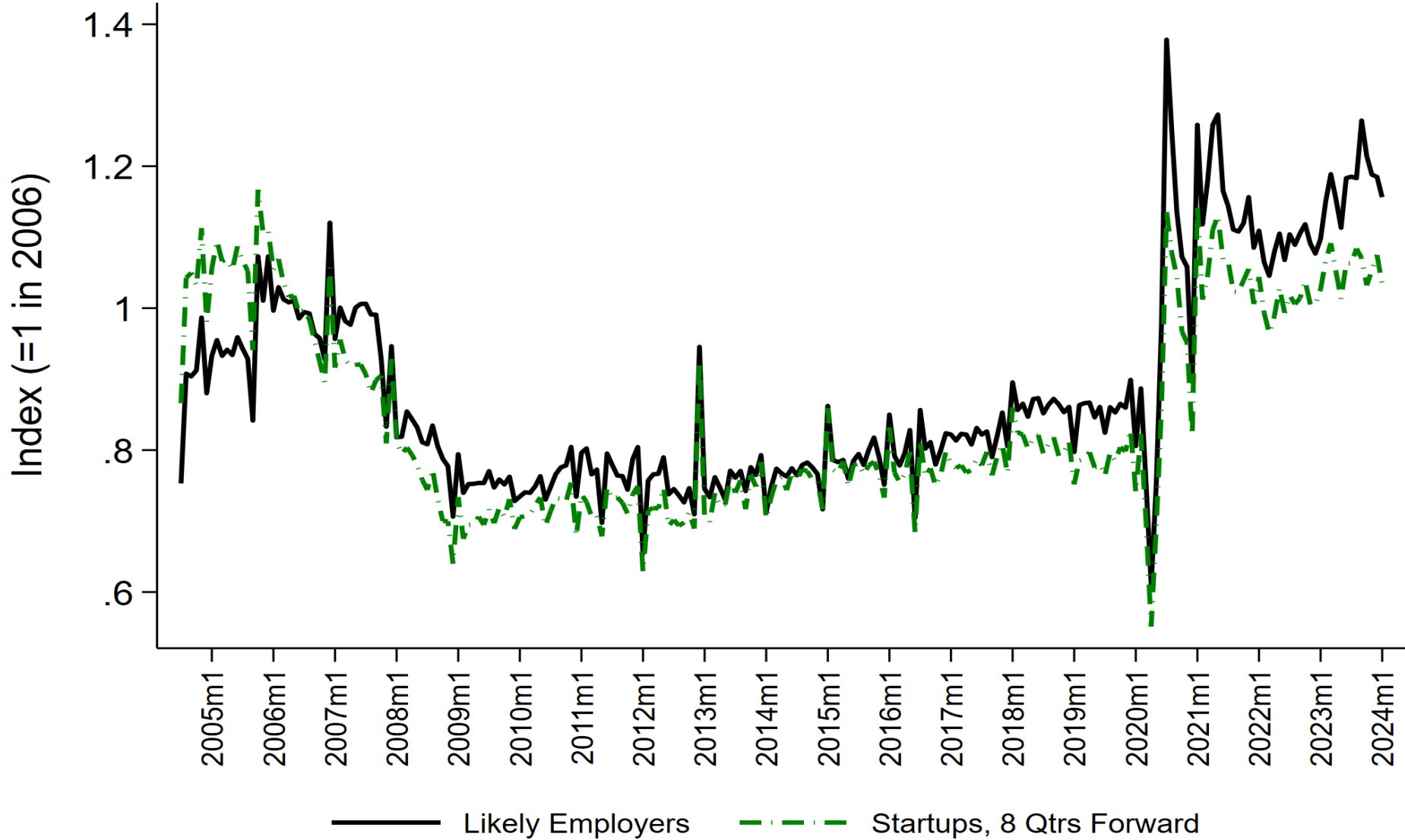
Source: DeLoecker, Eeckhout and Unger (2020)

Why did entry and productivity slow down even in innovative intensive industries?

- Not fully understood, but various theories with some supporting evidence
 - Typical Gort and Klepper innovation cycle for ICT – nothing else has yet had this impact
 - Demographics
 - Business climate
 - Occupational licensing, employment at will, zoning restrictions
 - Rising political and economic uncertainty
 - Rising adjustment frictions – declining responsiveness -- due to these and other factors?
 - Globalization and Network externalities favor large firms
 - Sowed the seeds of own destruction.
 - Rising concentration and market power have reduced innovation
 - Change in business model
 - Some of this is benign as in Retail Trade?
 - More costly knowledge investment and/or slowing diffusion

Bonus: Has there been a turning point in the pandemic and recovery?

Applications for Likely Employers and Business Formations

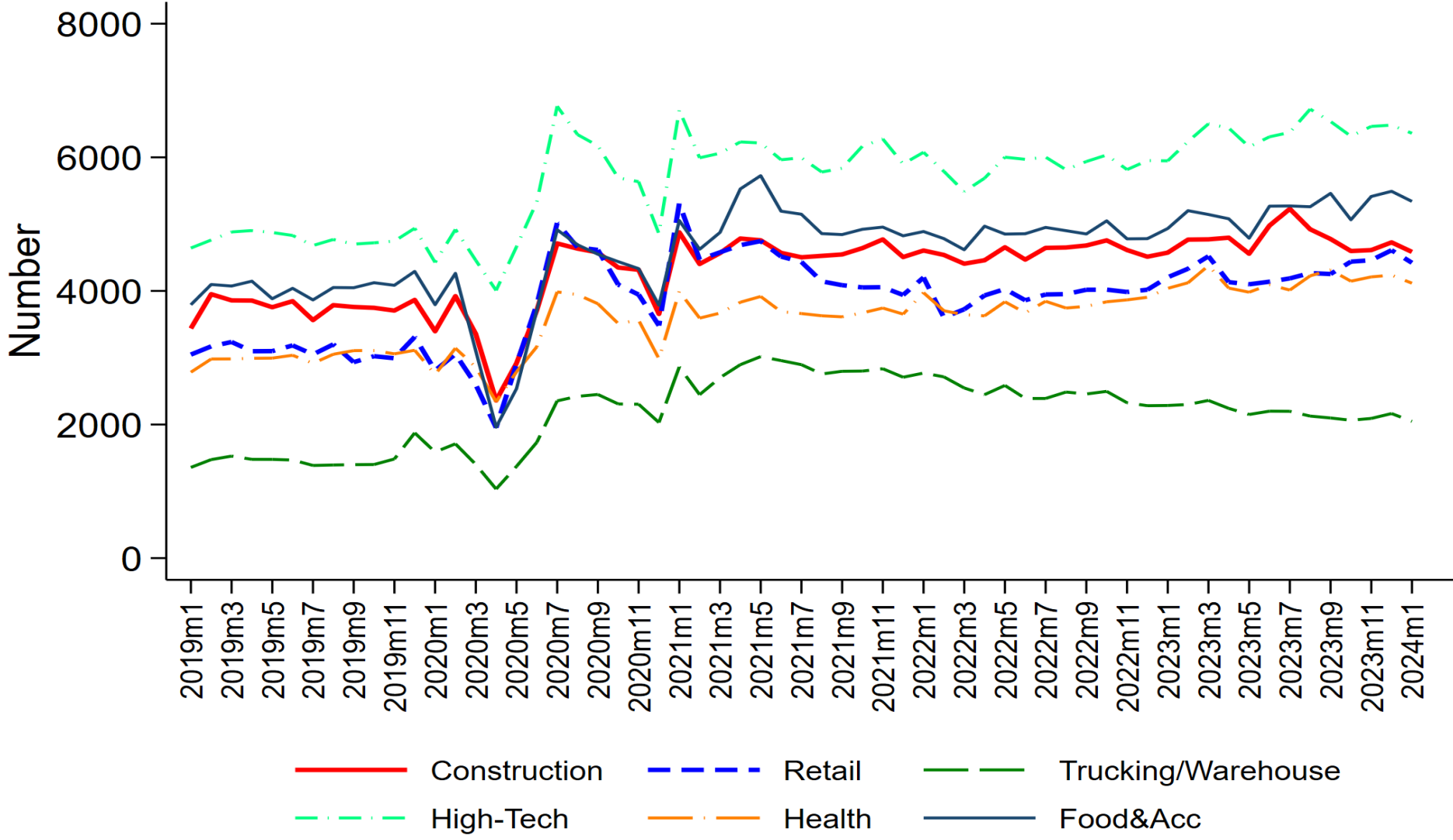


Pandemic a turning point?

Applications for likely employers and projected business formations Still more than 30% higher in Feb 2024 relative to 2019.

Source: US Census Bureau, Business Formation Statistics. Startups (Actual through 2019, Projected 2019 forward). See Decker and Haltiwanger (BPEA, Fall 2023) for more in depth analysis.

Projected New Employer Businesses (8Q), Selected Sectors



Surge partly due To WFH and Remote Activity:

E-commerce (Retail)

Surge in Food & Acc in Suburbs

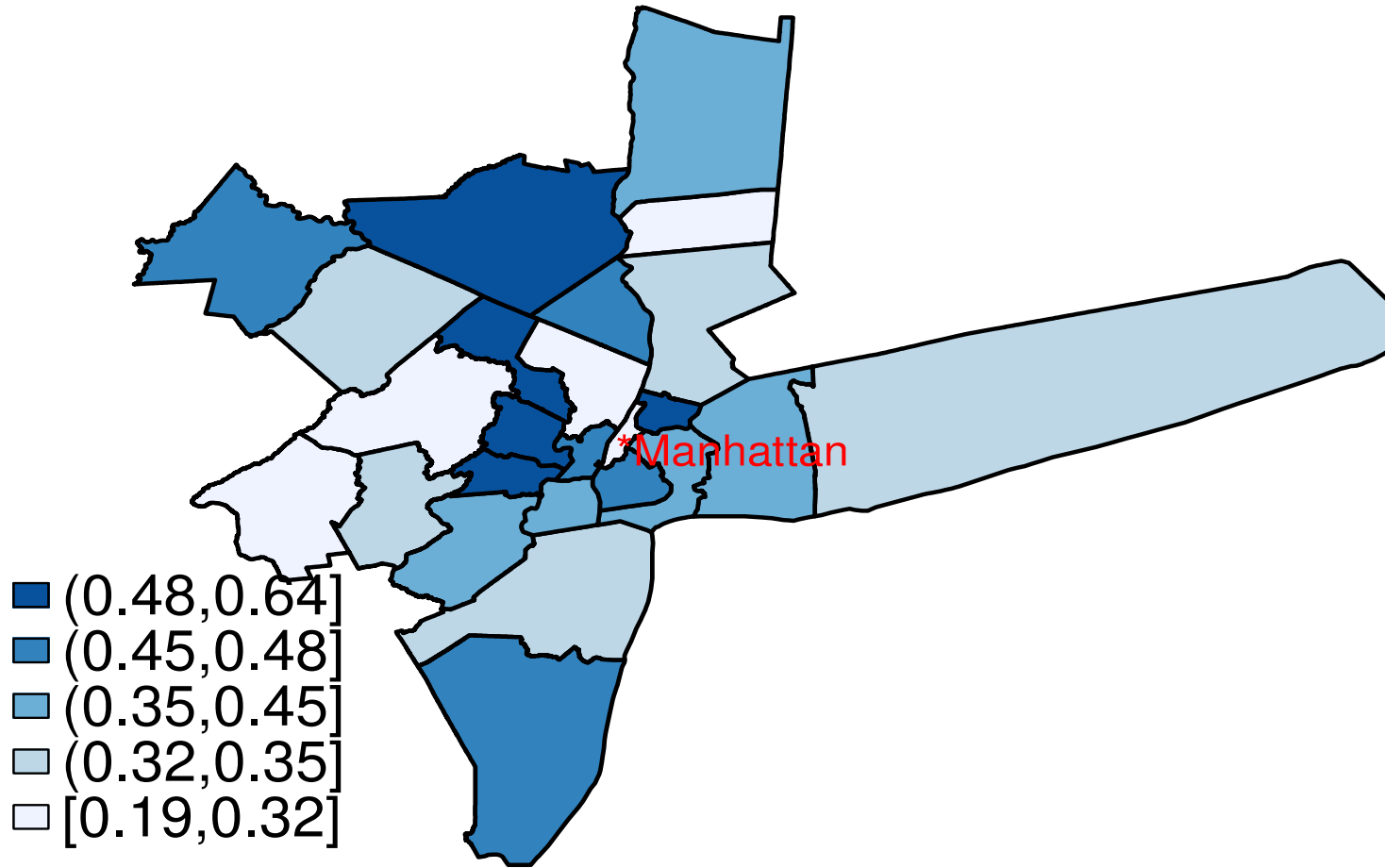
But also in High-Tech!

(Note: AI startups likely classified in NAICS 51 (Information) or 54 (Prof, Sci, Tech Service)

As background, Open AI is classified in NAICS 541 (public domain sources).

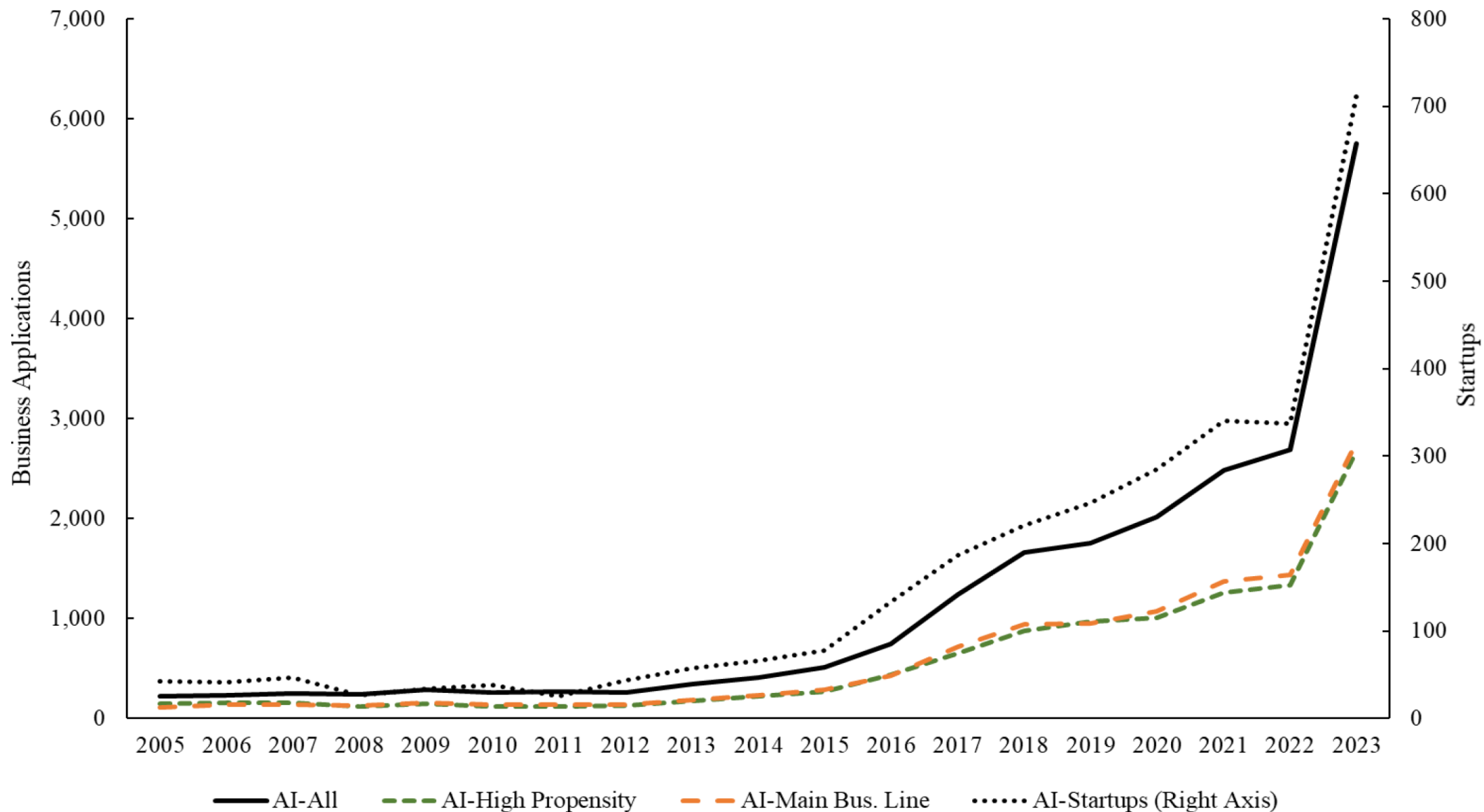
Source: US Census Bureau, Business Formation Statistics. See Decker and Haltiwanger (BPEA, Fall 2023) for more in-depth analysis.

Applications show within-city restructuring...



Donut effect in cities related non-linearly to pop density, estab density, and changes in WFH.

Using text information from applications --- surge in High Tech Startups AI driven



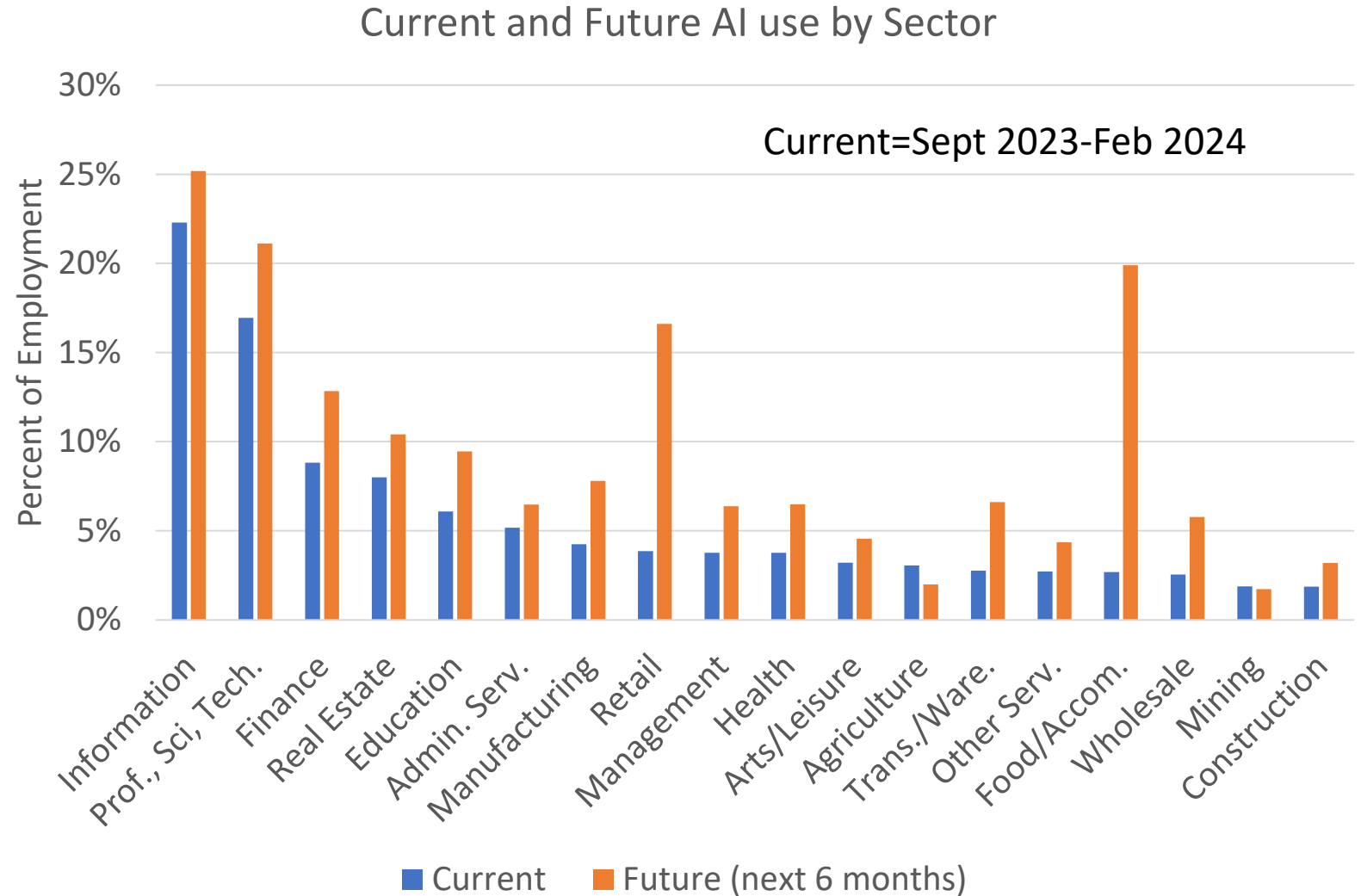
Are we about to have another technology boom and productivity surge?

News reports indicate that ChatGPT currently has around 180.5 million users. The website generated 1.6 billion visits in January 2024. And according to OpenAI chief Sam Altman, 100 million weekly users use ChatGPT.

Source: <https://explodingtopics.com/blog/chatgpt-users>

“I’m betting that productivity Growth is maybe significantly higher in the 2020s than the CBO is projecting. They projected 1.4 percent average per year. I think it could be twice that – closer to 3 percent – maybe more”

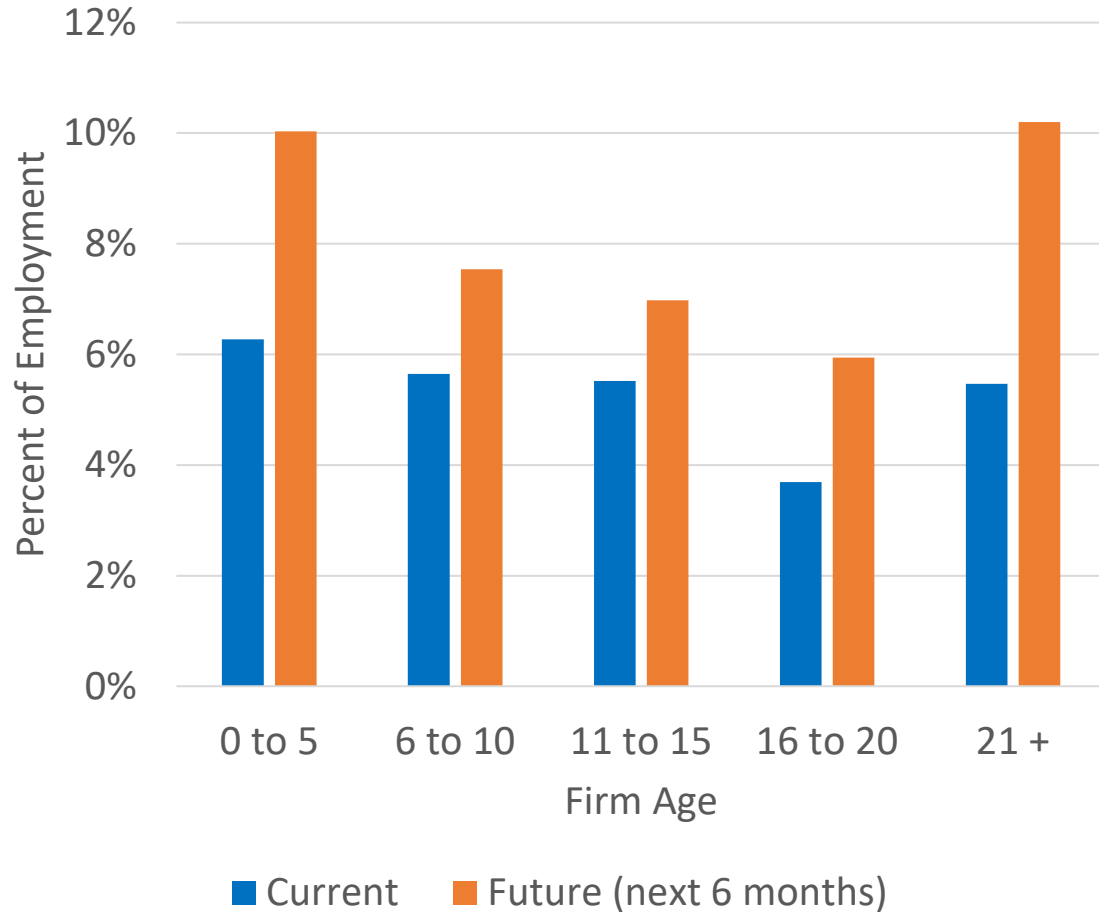
Source: Erik Brynjolfsson, Financial Times, January 31, 2024



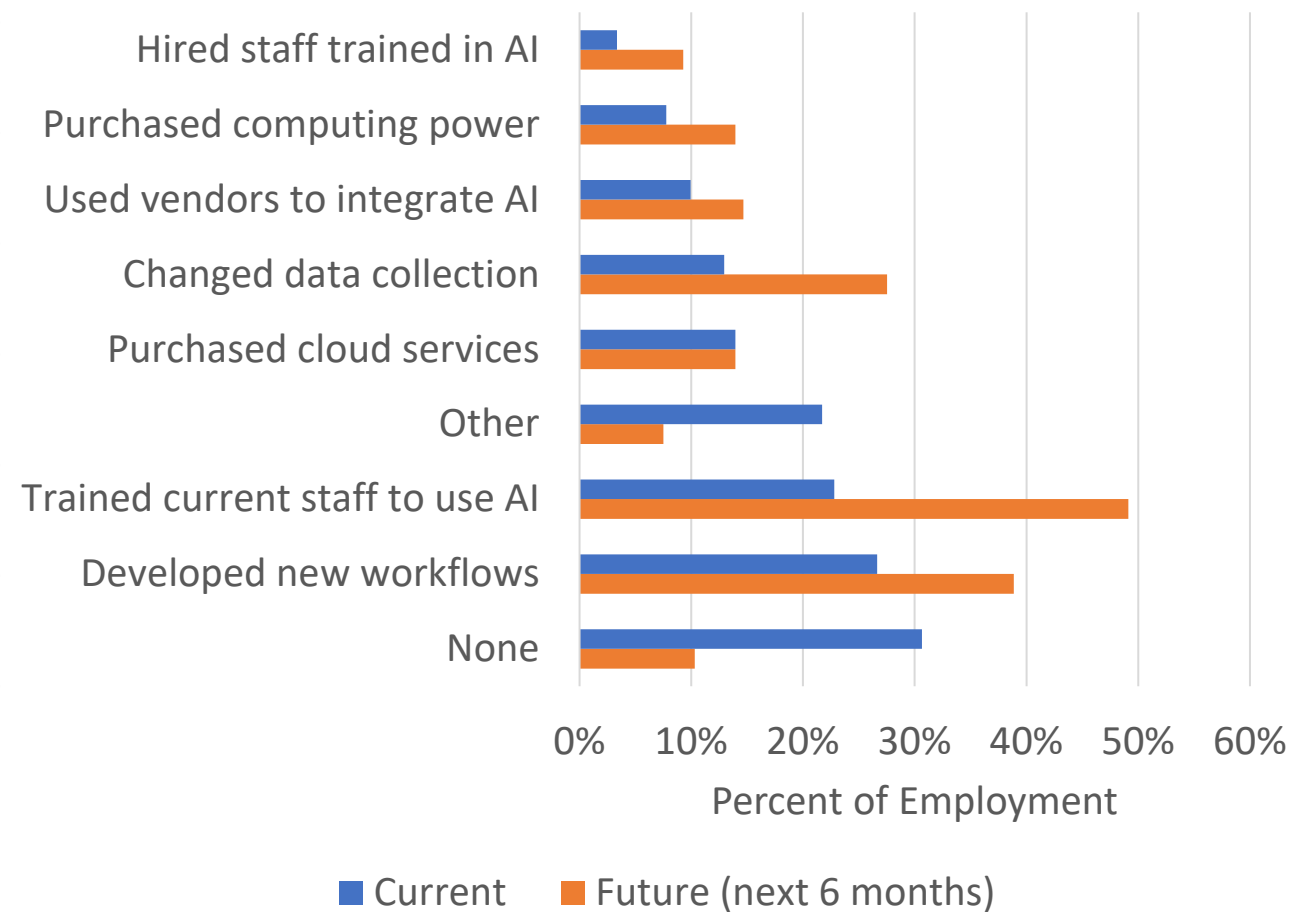
Source: US Bureau of Census, Business Trends and Outlook Survey

Evidence of Experimentation and Changes in Business Practices

AI Use by Firm Age

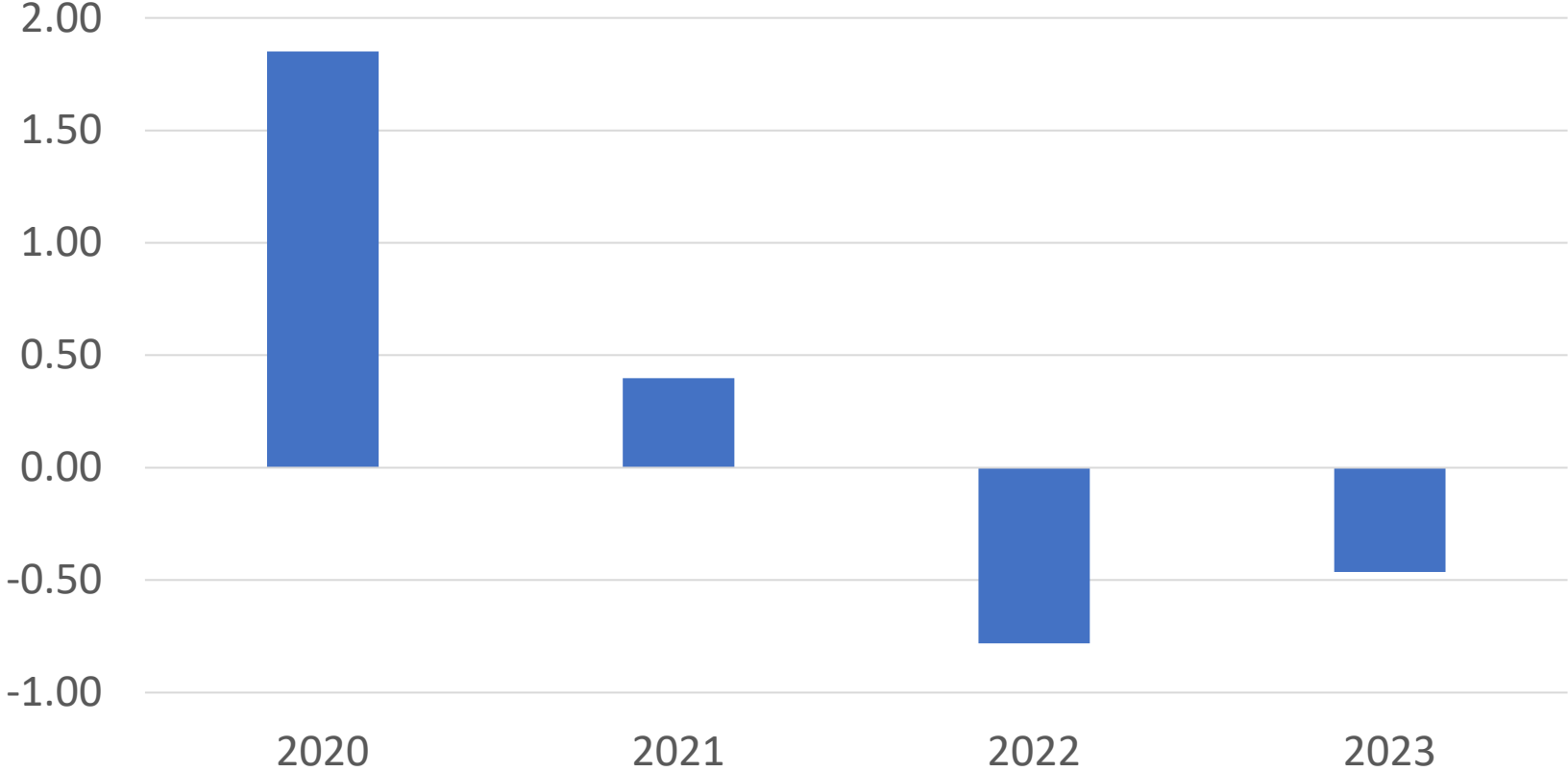


Change in Business Practices for AI users



Pandemic has exhibited volatility in productivity but negative in 2022 and 2023. Are we in experimentation phase? How long will this last?

TFP Growth in the Pandemic and Recovery



Productivity surged
In 4th quarter of 2023
But overall year is negative

Source: BLS and San Francisco Federal Reserve (TFP is utilization adjusted)

Whither Dynamism, Innovation and Productivity?

- Pre-pandemic view often expressed (with apologies to Robert Solow, 1987 “We see AI, Cloud, Robotics and other advanced technology everywhere but the productivity statistics”?)
 - Often when I heard this pre-pandemic I would ask “where is the entry?”
- Did the pandemic induce or accelerate innovation or adoption of advanced technology?
 - Some of the surge in entry supports changing work and lifestyle (“reshuffling”)
 - However, some of the surge in entry is in High-Tech (consistent with experimentation phase)
- Past experience suggests this will take time to unfold – years, not months -- Optimists on AI suggest this time is different...

Policy challenges in the US? Relevance for the ROW?

- Headwinds to dynamism have not been eliminated
 - Adjustment frictions have increased
 - Regulatory frictions?
 - Economic and policy uncertainty?
- Rising concentration and markups
 - Is this stifling adoption?
 - Antitrust policy more challenging in ICT environment compared to 20th century collusion.
- Policies rarely consider the impact on entrepreneurship
 - Subsidizing incumbents (even R&D) can have adverse effects on entrepreneurship
- Have we seen this surge in entry in the ROW?