

# The Role of Startups in Job Creation, Innovation and Productivity Growth

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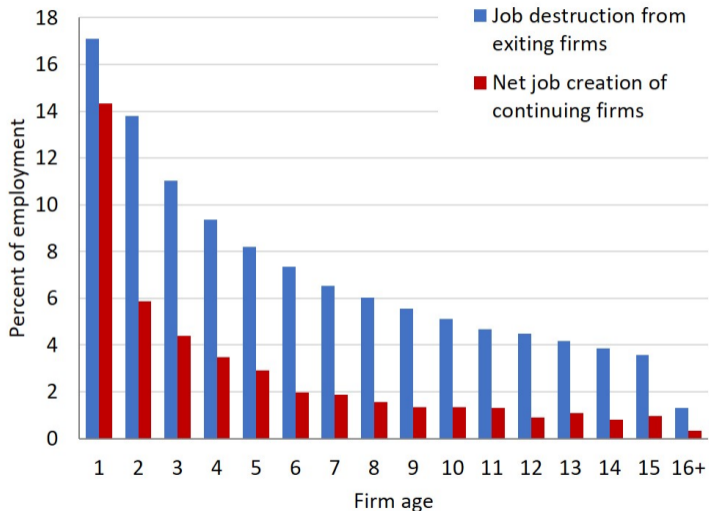
Fall 2019

This talk without implication draws on collaborative work with multiple co-authors. Citations to specific papers on slides.

# Overview

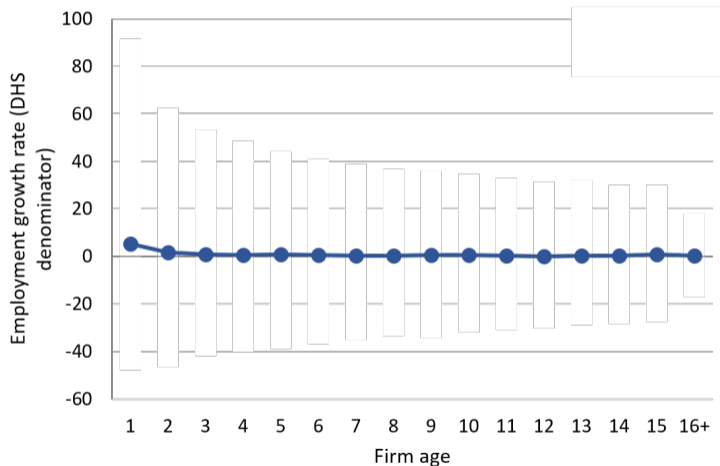
- ▶ Startups disproportionately contribute to job creation, innovation and productivity growth in U.S.
  - ▶ Basic Facts
    - ▶ Most startups fail or don't grow but a small fraction of high growth firms play disproportionate role.
    - ▶ High productivity startups grow rapidly, low productivity contract and exit
    - ▶ Surge in startups a leading indicator for subsequent productivity growth
    - ▶ In innovative-intensive industries, young firms are the most innovative-intensive
  - ▶ Open Question 1: Declining Dynamism and Startups (Post 2000)
    - ▶ In U.S., declining startups including in high-tech sectors (ICT).
    - ▶ Decline in high-growth startups in high-tech
    - ▶ Decline in overall productivity growth including in high-tech
  - ▶ Open Question 2: What Determines Startup Success?
    - ▶ Much attention on founders.
    - ▶ Explore role of founding team (beyond founders).
  
- ▶ Speculative Discussion: U.S. vs. Sweden

## Up or Out Dynamics for Young Firms



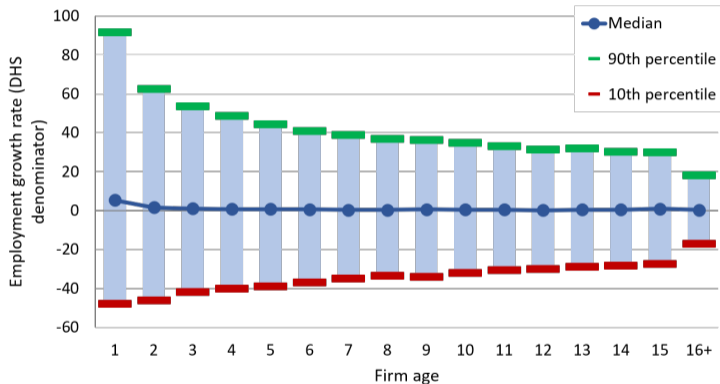
Most jobs created by startups are destroyed in first five years by exit. Conditional on survival, young firms have highest average net growth. Source: Decker, Haltiwanger, Jarmin and Miranda (2014)

# Median Surviving Firm Exhibits Zero Growth



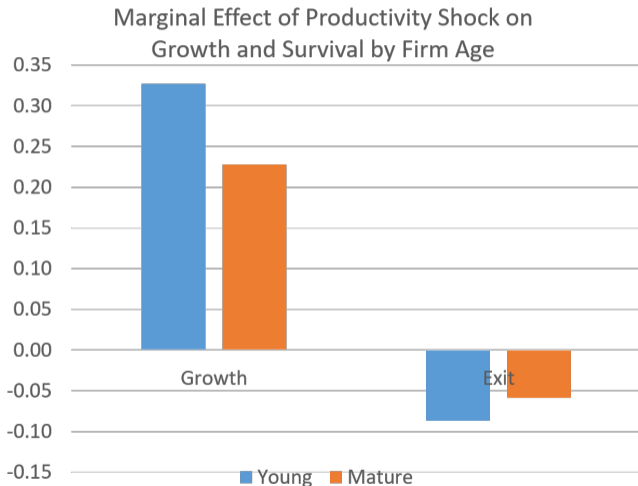
Source: Decker, Haltiwanger, Jarmin and Miranda (2014)

# High Average Growth of Young Firms Driven by High Growth Firms



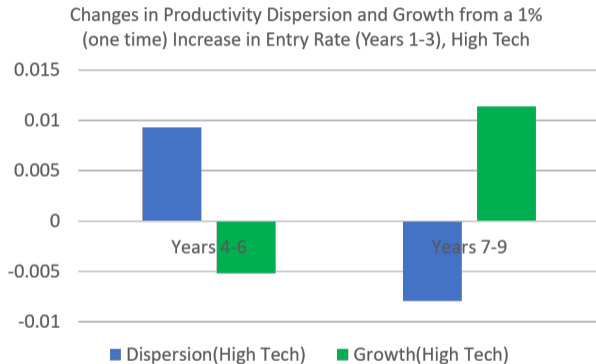
Source: Decker, Haltiwanger, Jarmin and Miranda (2014)

# Young Businesses Subject to Intense Selection on Productivity



Young: Age  $\leq 5$  Source: Decker, Haltiwanger, Jarmin and Miranda (2019)

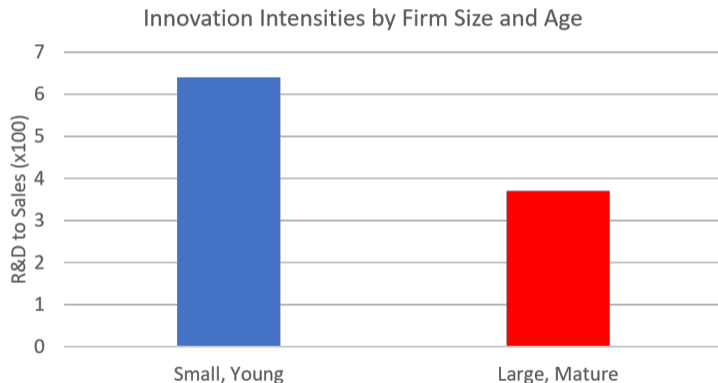
# Surge in Startups Leading Indicator for Productivity Growth



- ▶ Surge in entry in a three-year period leads to:
  - ▶ Rising productivity dispersion and falling productivity growth in next three-year period
  - ▶ Falling productivity dispersion and rising productivity growth in subsequent three-year period
  - ▶ Productivity Growth from shakeout process and within firm productivity growth of surviving firms
  - ▶ Using 4-digit NAICS sectoral data for High-Tech (ICT sectors).

Source: Foster, Grim, Haltiwanger, and Wolf (2018)

# Young Businesses More Innovative Intensive



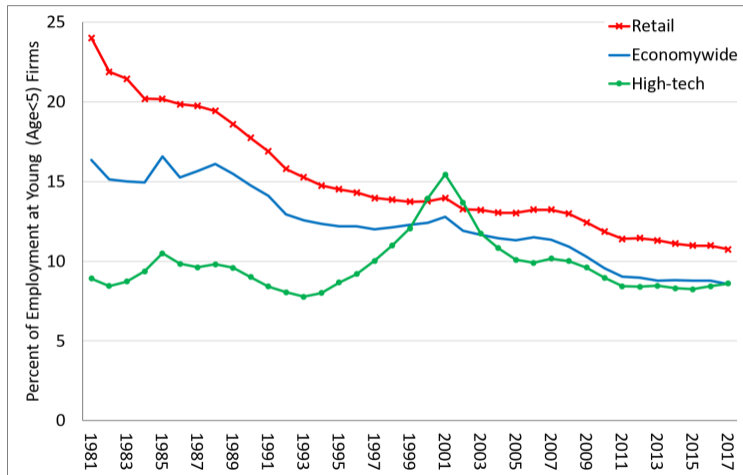
Young: Age  $\leq 9$  Source: Acemoglu et. al. (2019). Caution: Narrow sample of manufacturing, innovative firms (less than 5 percent of firms!).



## Open Question 1

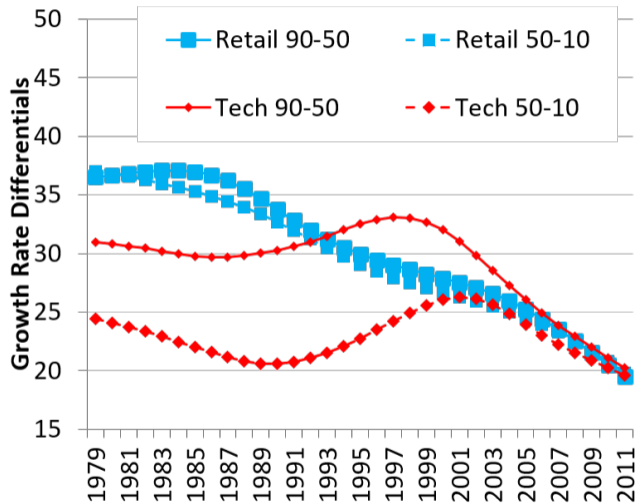
Declining Startups and Business Dynamism Post-2000

# Declining Entrepreneurial Activity Becomes Pervasive Post 2000



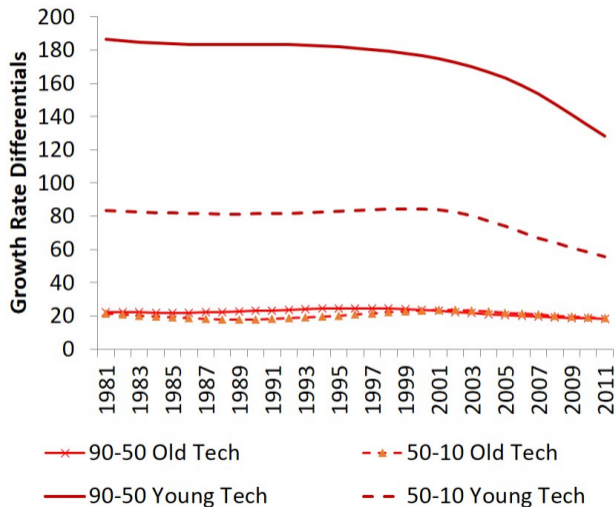
Retail Trade Decline in Entrepreneurship and Dynamism Due to Shift in Business Model. Much less clear for High-Tech. Source: LBD+BED.

# Declining Skewness in High Tech Post 2000



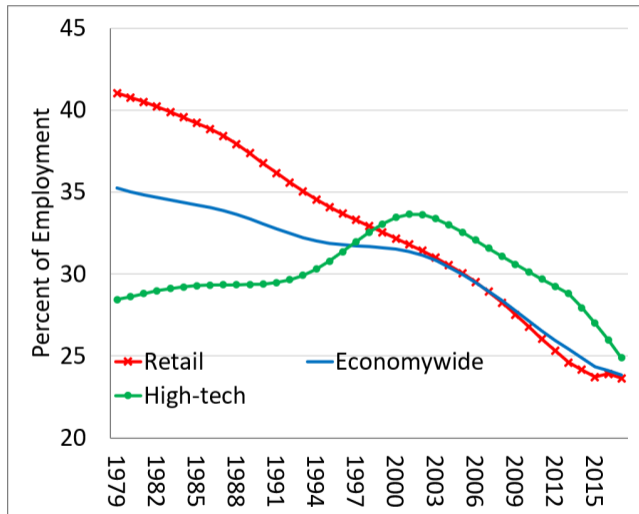
Source: Decker, Haltiwanger, Jarmin and Miranda (2016)

# Declining Skewness in High Tech Driven by Young Firms



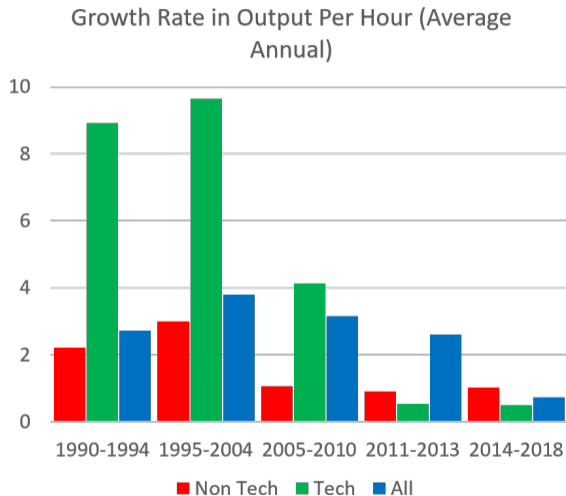
Young: Age  $\leq$  5. Source: Decker, Haltiwanger, Jarmin and Miranda (2016)

## Declining Job Reallocation Pervasive Post 2000 including in High-Tech



Source: Decker, Haltiwanger, Jarmin and Miranda (2019)

# Declining Productivity Especially in High-Tech Post 2000



Source: Decker, Haltiwanger, Jarmin and Miranda (2019)

## Open Question 2

What Determines Success of Startups?

One hypothesis is that the variation primarily reflects founders



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## Founding Team May Be Important



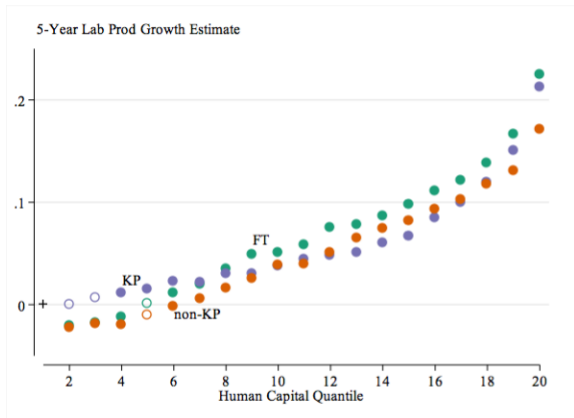
- ▶ Founders/founding team generate organizational capital at firm formation
- ▶ One hypothesis: organizational capital embodied in founding team (e.g. core business vision, norms and culture)
- ▶ Alternative: Once organizational capital created, founding team members are easily replaceable
- ▶ Horse (Firm: Idea, Product, etc.) vs. Jockey (Founder/Founding Team)

Founding team slides from: Choi, Goldschlag, Haltiwanger and Kim (2019).

# Tracking Founding Teams from Matched Employer-Employee Data

- ▶ Founding teams (FT) include founders and all workers in first year
- ▶ Proxy for human capital as prior earnings (contains skill, experience, tenure, etc.)
- ▶ Classify the FT as **key personnel** (KP) and **non-KP**
  - ▶ KP is top 3 by earnings for corporations, owner and top 2 for sole proprietors
  - ▶ The vast majority of active owners likely included in KP; KP likely includes non-owners with key leadership positions
- ▶ Startup outcome measures (scale, growth, productivity) for 6.2M firms
- ▶ Worker characteristics (demographics, premature death) for 72.8M FT members
- ▶ Coverage from 1990 to 2015

# High HC Startups Tend To Perform Better

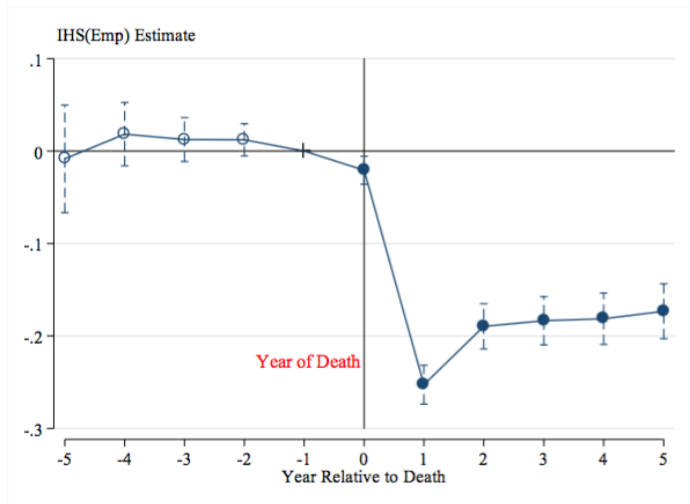


- ▶ Conditional positive correlation between founding team HC and firm performance (controlling for industry by year)
  - ▶ productivity growth (control for initial productivity)
  - ▶ employment growth (control for initial size)
  - ▶ survival rate (control for initial size)
- ▶ Correlations are hard to interpret due to endogeneity
  - ▶ High quality ideas attract high ability people

## Making Causal Inference

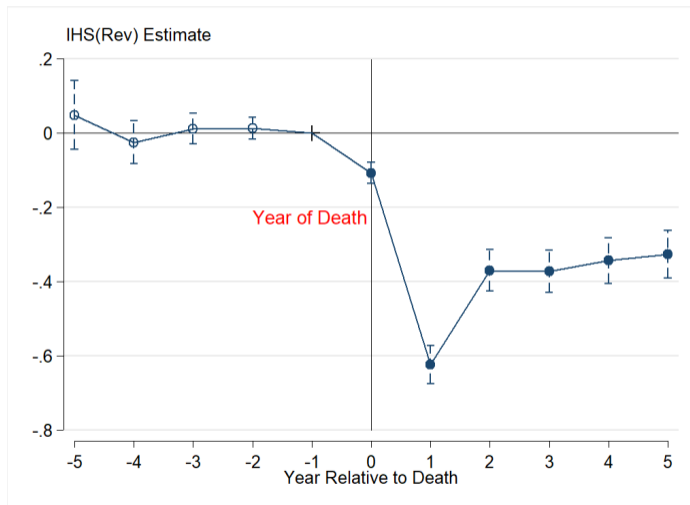
- ▶ Examine impact of exogenous composition of FT after startup via premature death
  - ▶ Death shocks: death of earnings active FT member that is less than 60 years old
- ▶ CONTROL: Match to control with same startup year, industry, state, size, age of FT without death.
- ▶ Use regression specification with firm fixed effects, age of firm and industry by time
- ▶ Examine pre-trends – are treated and control firms on the same path?
- ▶ Examine post-event changes: Does the loss of a FT member have an effect on scale and productivity (beyond initial impact) that persists?

# Losing FT Member Shrinks Firm – Persistent Effects Five Years After Loss



Notes: Controlling for firm effects, firm age and industry-year effects. Hollow points  $\rightarrow p > 0.05$ . Reference group  $t - 1$ .

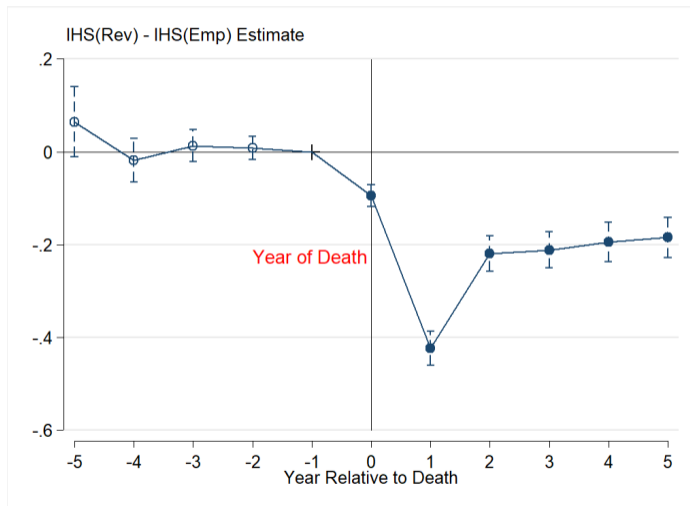
# Losing FT Member Decreases Revenue



Source: Founding Team Database (LBD, LEHD), author's calculations

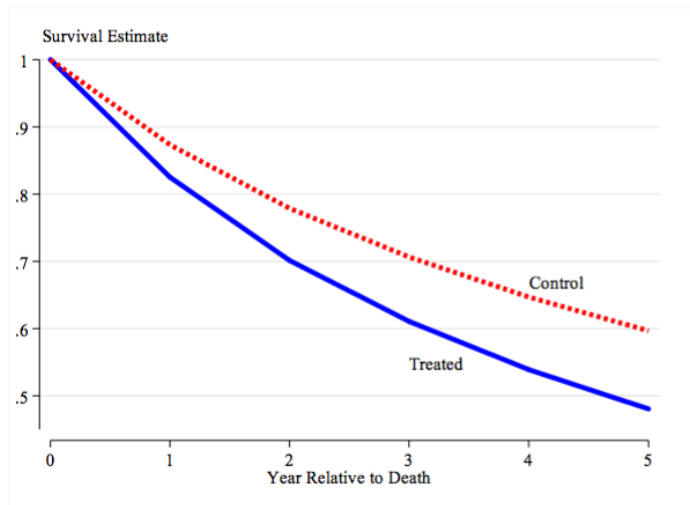
Notes: Controlling for firm effects, firm age and industry-year effects. Hollow points  $\rightarrow p > 0.05$ . Reference group  $t - 1$ .

# Losing FT Member Reduces Revenue More than Employment



Notes: Controlling for firm effects, firm age and industry-year effects. Hollow points  $\rightarrow p > 0.05$ . Reference group  $t - 1$ .

## Extensive Margin(exit) Impact is Substantial

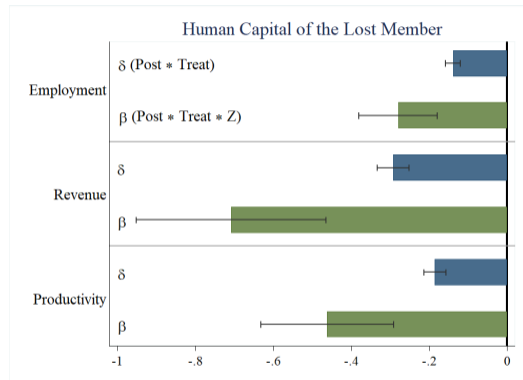
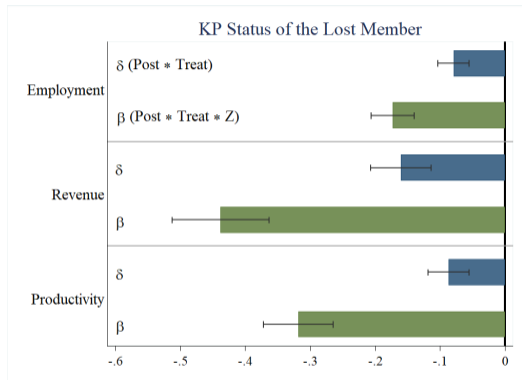


Source: Founding Team Database (LBD, LEHD), author's calculations

Notes: Cox estimate 0.35 (0.013).

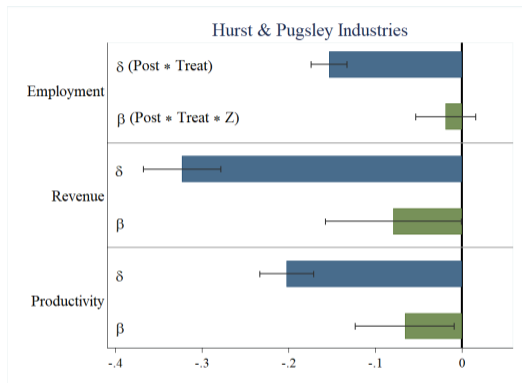
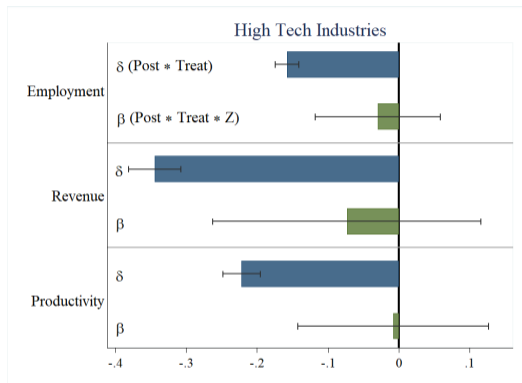


# Losing KP and High HC Member Results in Larger Negative Effect



- ▶ Non-KP and the average HC also yield nontrivial, negative and persistent effect

# No Particularly Larger Effect in High Tech or in Small Business Sector



- ▶ Quantitatively similar (slightly larger) effects found for High Tech or Hurst & Pugsley industries only sample

# Discussion

- ▶ Results consistent with organizational capital embodied in FT
- ▶ Alternative Mechanisms?
  - ▶ Loss of valuable worker always matters? Jager and Heining (2019) find that workers are largely replaceable.
  - ▶ Emotional distress? Effects are persistent and vary by KP/earnings.

## Speculative Discussion: U.S. vs. Sweden

- ▶ More questions than answers
- ▶ Traditional interpretation is U.S. more flexible, dynamic and entrepreneurial.
  - ▶ This is case U.S. policymakers made to the ROW in 1990s (including to European economies)
- ▶ But Sweden has undergone numerous market reforms in from late 1980s through 2000s with accompanying reasonably steady growth in the post 2000 period.
  - ▶ Studies by Heyman, Norback and Persson (2019) argue the post 1990s turnaround due to micro policies improving allocative efficiency.
- ▶ Meanwhile the U.S. has exhibited decline in dynamism, entrepreneurship and slowdown in (productivity) growth (even pre Great Recession).
- ▶ Some evidence of declining dynamism and entrepreneurship in Sweden in the last decade.

## Extra Slides

## Making Causal Inference – Technical Details

- ▶ **TREATED:** We exploit exogenous variation in composition of FT after startup via premature death (Jones and Olken, 2005; Jaravel, Petkova, and Bell, 2018)
  - ▶ Death shocks: death of earnings active FT member that is less than 60 years old
- ▶ **CONTROL:** Coarsened exact matching strto find control firms
  - ▶ Matching on startup cohort, industry, state, number and average age of active FT members in quarter of death shock
- ▶ Event study regression specification

$$Y_{i,j,t} = \sum_{k=-5}^5 \lambda_k d[k]_{i,t} + \sum_{k=-5}^5 \delta_k d[k]_{i,t} \times TREAT_i + \alpha_i + \gamma_{j,t} + \epsilon_{i,j,t}$$

- ▶ Firm  $i$ , time  $t$ , industry  $j$ . Also control for firm age.