Measuring the High Tech Sector (Quantities and Outcomes)

Session: Innovation Beyond R&D

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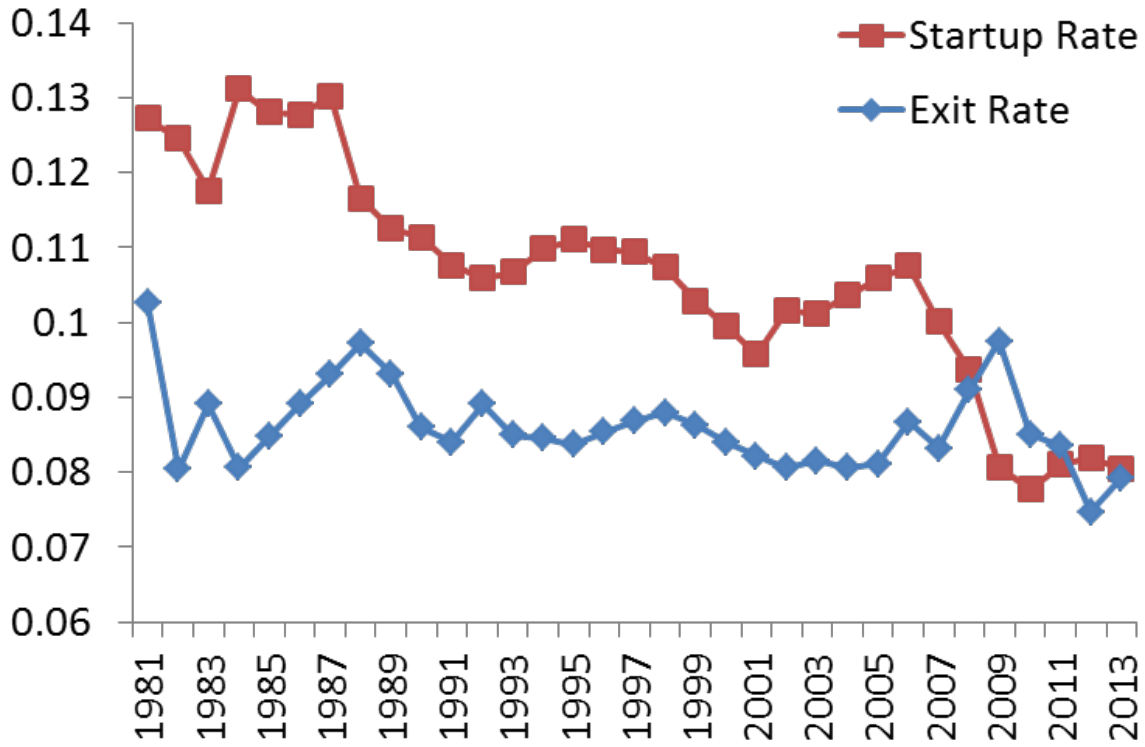
May 19-20, 2016
NCSES/CNSTAT Workshop on
Advancing Concepts and Models
of Innovative Activity and STI
Indicator Systems

Presentation draws heavily from research with:

John Haltiwanger, Ron Jarmin, Ryan Decker

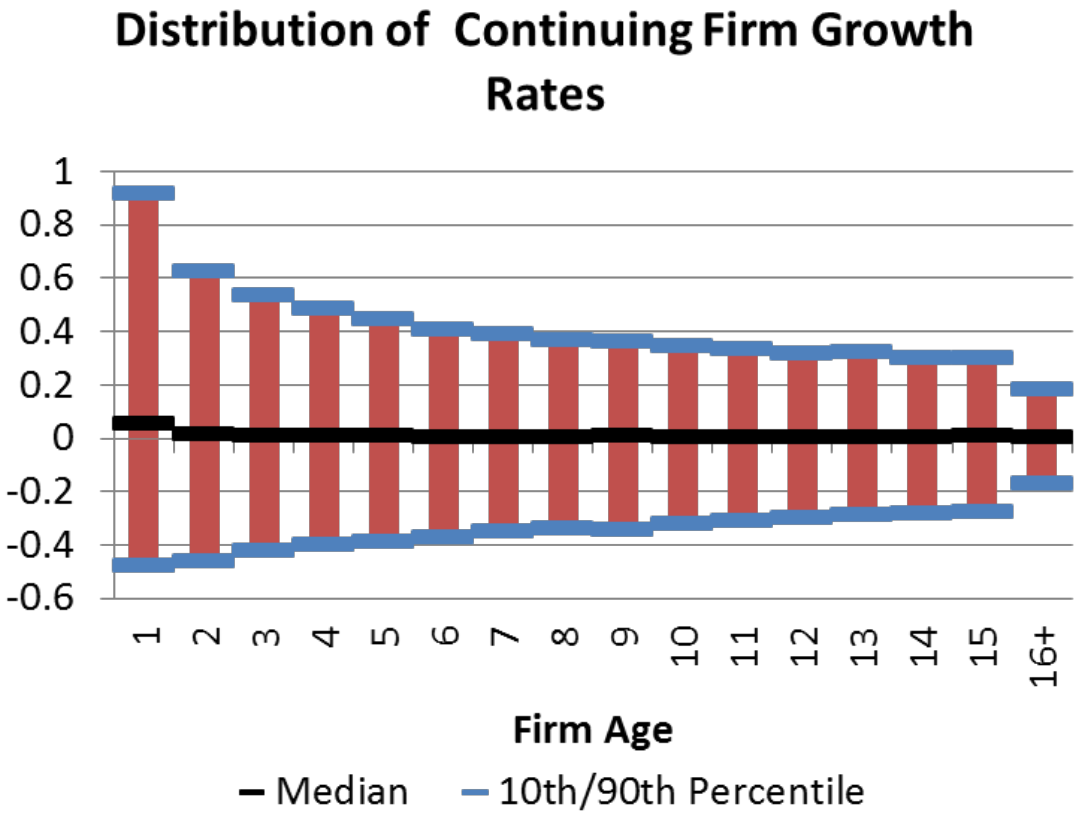
We thank the Kauffman Foundation for financial support. Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau or the Federal Reserve Board. All results have been reviewed to ensure that no confidential information is disclosed.

Startup and Exit Rates, 1981-2013 Nonfarm Private Sector



What type of startups have declined?

- **"Mom and Pop" businesses?**
- **Transformational entrepreneurs?**



- **Very few businesses achieve high growth**
  => high dispersion/skewness of young firms
- **What is happening in the high tech sector?**

Differences for Information sector striking. But High Tech is spread across numerous broad sectors including Information, Services, and Manufacturing. Using Hecker (2005) methodology for High Tech.

NAICS Code	Industry
Information and Communications Technology (ICT) High-Tech	
3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, electromedical, and control instruments manufacturing
5112	Software publishers
5161	Internet publishing and broadcasting
5179	Other telecommunications
5181	Internet service providers and Web search portals
5182	Data processing, hosting, and related services
5415	Computer systems design and related services
Miscellaneous High-Tech	
5417	Scientific research-and-development services
5413	Architectural, engineering, and related services
3364	Aerospace product and parts manufacturing
3254	Pharmaceutical and medicine manufacturing

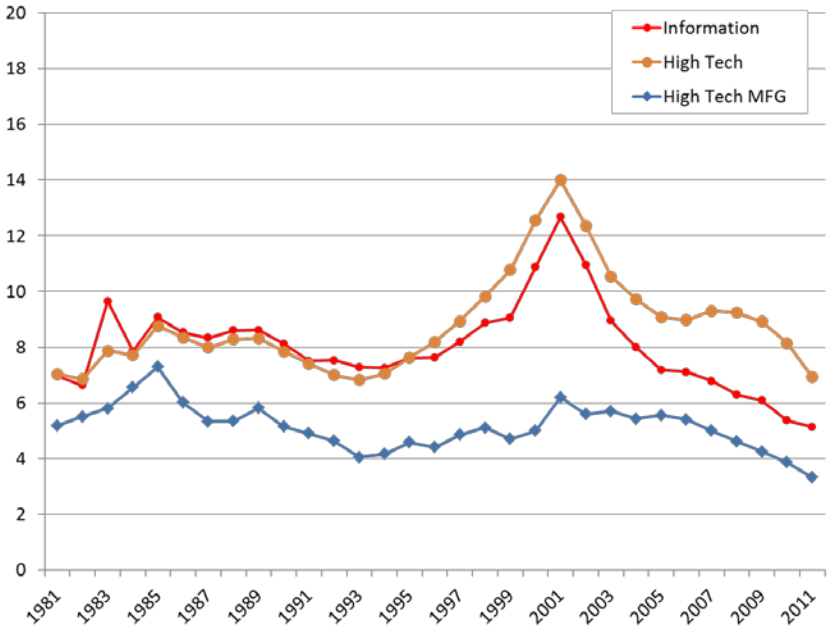
Manufacturing

Information

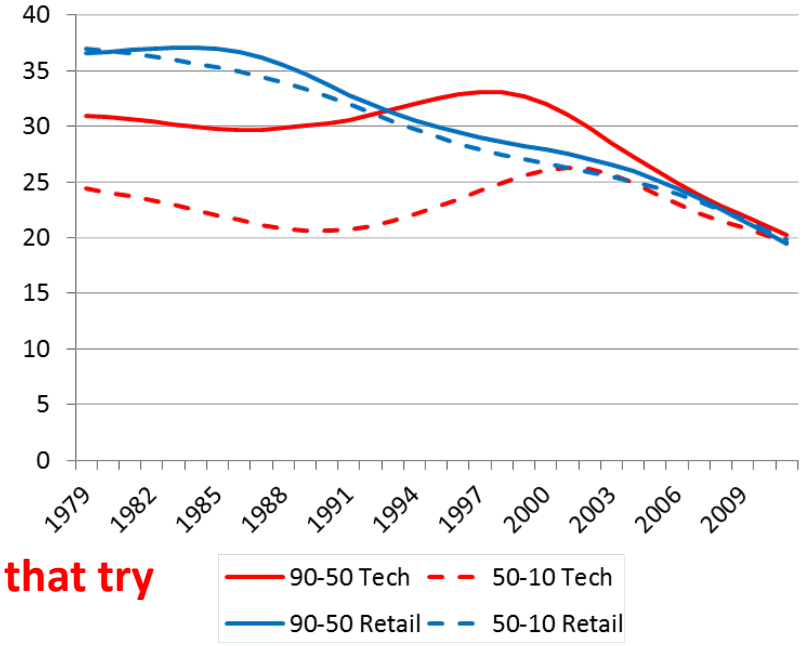
Services

We focus on High Tech sector since critical for innovation, productivity, and growth. Rapidly growing young firms part of "folklore" of High Tech.

Share of Employment in Young Firms in High Tech



Rising Skewness in High Tech through 2000 – Sharp Decline Post 2000



- **Decline post 2000 in startups in high tech**
- **There are fewer superstar conversions for those that try**

No skewness in Retail Trade – just Falling dispersion

Taking Stock

- Decline in dynamism and entrepreneurship very different across sectors:
  - Decline in 1980s and 1990s dominated by Retail Trade
    - Change in business model that has been productivity enhancing with less business volatility
  - Decline since 2000 dominated by High Tech sector
    - Key sector for innovation and productivity growth
    - Sector with evidence of transformational entrepreneurs (high positive skewness of young business growth rates)
    - Fernald (2014) shows that ICT productivity growth surged in late 1980s to late 1990s. Decline in productivity growth in post 2000 period – contributed to overall trend decline in post-2000 productivity growth for U.S. economy.
- We agree important to look beyond R&D! Here we show measures based on STEM intensive sector. More coming:
  - Exploit link to patent statistics to understand these trends in the context of innovation, employment and productivity growth better
  - Look at detail industry: are there different patterns within high tech? Is high tech services and manufacturing the same?
  - Understands links between upstream and downstream industries: ICT using and producing
  - Develop more timely measures of business activity: Business Formation Statistics
- Important to look at measures of dispersion and skewness to understand what is going on in the economy and in the high tech sector
- This could be reflected in official statistics (potential BDS extensions):
  - Upstream and downstream HT sectors
  - Dispersion and skewness statistics

New Census Products Related to Innovation

Kristin McCue, U.S. Census Bureau*

- No single measure captures innovation, but expect it to result in growth in productivity, market share, jobs
- New enhancements to Business Dynamics Statistics (BDS) program that will provide useful information on innovative businesses
- New surveys of small, young firms, which collect information about innovation that's not available from admin records

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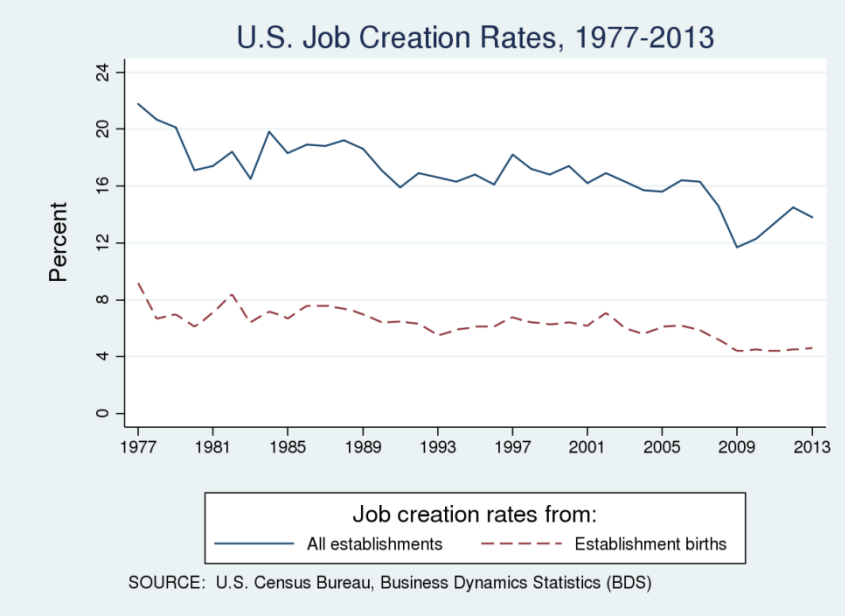
Core BDS



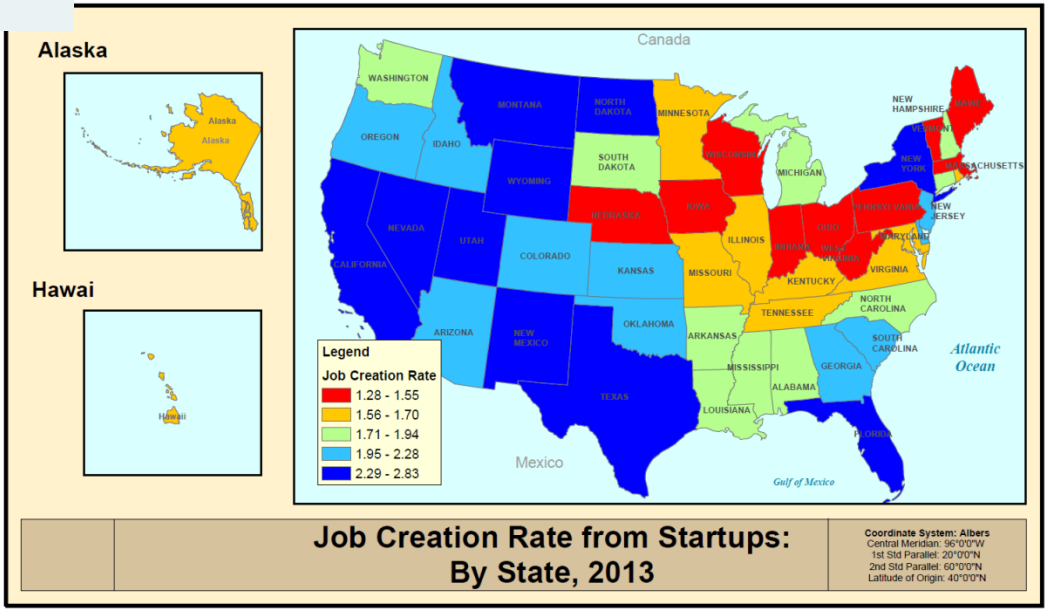
Measures:

Job creation/destruction

Establishment openings/closings

Number of startups/shutdowns

Age/size of firms, establishments



BDS-High Tech:

- Near term: statistics for grouping based on fixed set of industries with disproportionate STEM employment
- Longer term: BDS statistics by 4-digit NAICS so users can create own high-tech grouping

BDS-Human Capital:

- Owner/workforce characteristics, including
  - Age, gender, race/ethnicity, place of birth
  - Characteristics of prior employment
  - Education

BDS-High Growth Employers

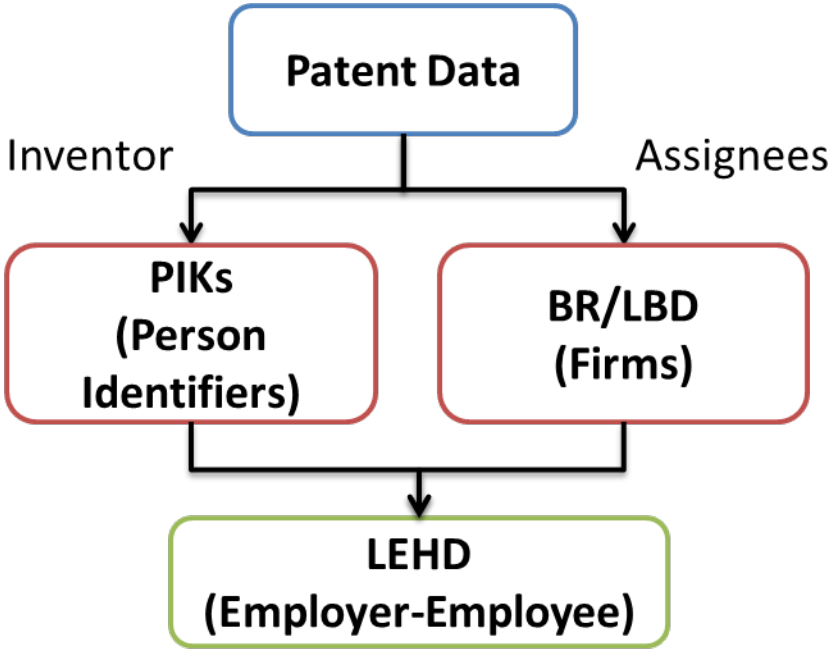
- Percentiles of employment-weighted growth distribution—capture skewness
- Trends in upper tail of distribution by industry, geography likely driven by innovation

BDS-Exporting Firms

- Statistics by whether business is involved in exporting based on links to trade transactions

BDS-Patenting Firms

- Statistics by whether business, employees have been involved in patenting activity
- Develop links using information on both inventor, assignee



New information on innovation by small/young firms

- New collections with content derived from NCSES's Microbusiness Innovation Science and Technology Survey (MIST)
- Micro BRDIS—under development
- 2014 module on Annual Survey of Entrepreneurs has 8 MIST questions asking about:
  - Process/product innovation
  - R&D costs, funding, purchases, and employees