Business Dynamics of Innovative Firms

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Disclaimer: Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed.
BDS-IF Motivation

- Innovation is intimately linked to the reallocation of labor and capital

- Innovation is a very broad term, covering many different types of activities
  - Inputs vs outputs (relationship between)
  - ICT/innovation users vs producers
  - Physical capital vs human capital (knowledge production)
  - Invention vs innovation (commercialization, diffusion)
  - Direct vs indirect impacts (spillovers)
Conceptualizing Many Dimensions of Innovation

Source: National Science Board (2012)
Conceptualizing Many Dimensions of Innovation

Source: Shanks and Zheng (2006)
Conceptualizing Many Dimensions of Innovation

Source: Tassey (2011)
BDS-IF Measurement Agenda

- Multidimensional approach to measuring the many facets of innovative activity

- Active components:
  - BDS-Patenting Firms (BDS-PF)
  - BDS-Trademarks (BDS-TM)
  - BDS-High Tech (BDS-HT)

- Future work:
  - Copyrights
  - R&D expenditures
  - Management practices
Patenting Firms (BDS-PF)

- Extend/improve triangulation matching methodology in Graham et al. 2015
  - US assignee match rate $\geq 90\%$ (foreign $\sim 60\%$)
  - US assignee precision $\sim 92\%$ (foreign $\sim 96\%$)

- Highlights
  - Patenting firms tend to be older, larger
  - More firms are patenting in Physics and Electricity
Characteristics in the Cross Section

![Graph showing firm share by age categories. The age categories are labeled (a) through (l). The categories are grouped into 0-1, 2-3, 4-5, 6-10, 11-15, 16-20, 21-25, and 26+ years. For each age category, there are bars representing all firms and patenting firms. The graph includes firm age distribution for BDS Innov Firms.]
Characteristics in the Cross Section

Firm Share

Firm Size

- All Firms
- Patenting Firms

Goldschlag, Perlman (CES)
BDS Innov Firms
AEA 2018 6 / 16
By Technology Class

![Graph showing the share of firms patenting by technology class from 2000 to 2014. The graph includes lines for Chemistry, Mechanical Engineering, Physics, Electricity, and All Patenting. The data shows an increase in the share of firms patenting in each category, particularly in the later years.]
Anatomy of Trademarking Firms

- Initial trademark-firm bridge created by Dinlersoz, Goldschlag, Myers, Zolas (2017)

- USPTO Casefile Database
  - > 5 million trademarks
  - Match rate over 75% and precision of 94%

- Highlights
  - First-time trademarking associated with employment growth
  - Good number of firms *only* trademark (no patents or R&D)
  - Almost half of trademarking firms in BRDIS also patent
Impacts of First-Time Trademarking

Source: DGMZ (2017)
Coincidence of Innovative Activities (BRDIS Sample)

Firms with TMs

- TM 19%
- TM + Pat 3%
- TM + Pat + R&D 44%
- TM + R&D 34%

Firms with Patents

- Pat 4%
- TM + Pat 3%
- TM + Pat + R&D 43%
- Pat + R&D 50%

Firms with R&D

- R&D 54%
- TM + R&D 16%
- TM + Pat + R&D 12%
- Pat + R&D 18%

Source: DGMZ (2017)
Coincidence of Innovative Activities (BRDIS Sample)

Only one activity

19% Firms with TMs

- TM + Pat + R&D 44%
- TM + Pat 19%
- TM + R&D 34%

4% Firms with Patents

- TM + Pat + R&D 43%
- Pat 4%
- TM + Pat 3%

54% Firms with R&D

- TM + Pat + R&D 16%
- TM + R&D 12%
- Pat + R&D 18%
- R&D 54%

Source: DGMZ (2017)
Coincidence of Innovative Activities (BRDIS Sample)

Also trademarking

Firms with TMs
- TM + Pat + R&D: 44%
- TM: 19%
- TM + Pat: 3%
- TM + R&D: 34%

Firms with Patents
- TM + Pat + R&D: 43%
- Pat: 46%
- TM + Pat: 3%
- Pat + R&D: 50%

Firms with R&D
- TM + Pat + R&D: 28%
- TM + R&D: 16%
- Pat + R&D: 18%
- R&D: 54%

Source: DGMZ (2017)
Coincidence of Innovative Activities (BRDIS Sample)

Also patenting

47% Firms with TMs

34% Firms with R&D

Source: DGMZ (2017)
Coincidence of Innovative Activities (BRDIS Sample)

Also R&D

78% Firms with TM

- TM + Pat + R&D: 44%
- TM + Pat: 19%
- TM: 3%

93% Firms with Patents

- TM + Pat + R&D: 43%
- TM + Pat: 3%
- Pat: 4%
- R&D: 50%

Firms with R&D

- TM + Pat + R&D: 16%
- TM + R&D: 12%
- Pat + R&D: 18%
- R&D: 54%

Source: DGMZ (2017)
What is High Tech?

- Concentration of STEM employment
- 15 4-digit 2007 NAICS industries, mining, manuf, information, and professional services

Highlights
  - 4% of firms, 6% of employment
  - Boom-bust in the 1990s, early 2000s
  - Boom driven by young firm activity
High Tech Job Creation

Source: Goldschlag and Miranda (2016)
High Tech Young Firm Activity in the 1990s

Source: Goldschlag and Miranda (2016)
thank you