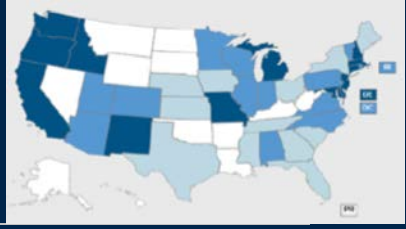

# Can We Learn More from State-Level Innovation & Entrepreneurship Programs?

# Using Administrative Data for Outcome Metrics and Research Design

**Rosemarie Ziedonis**
**Boston University**

NCSES/CNSTAT Workshop
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# A Rugged Landscape

- VC remains tightly agglomerated in bicoastal states…

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- VC remains tightly agglomerated in bicoastal states…

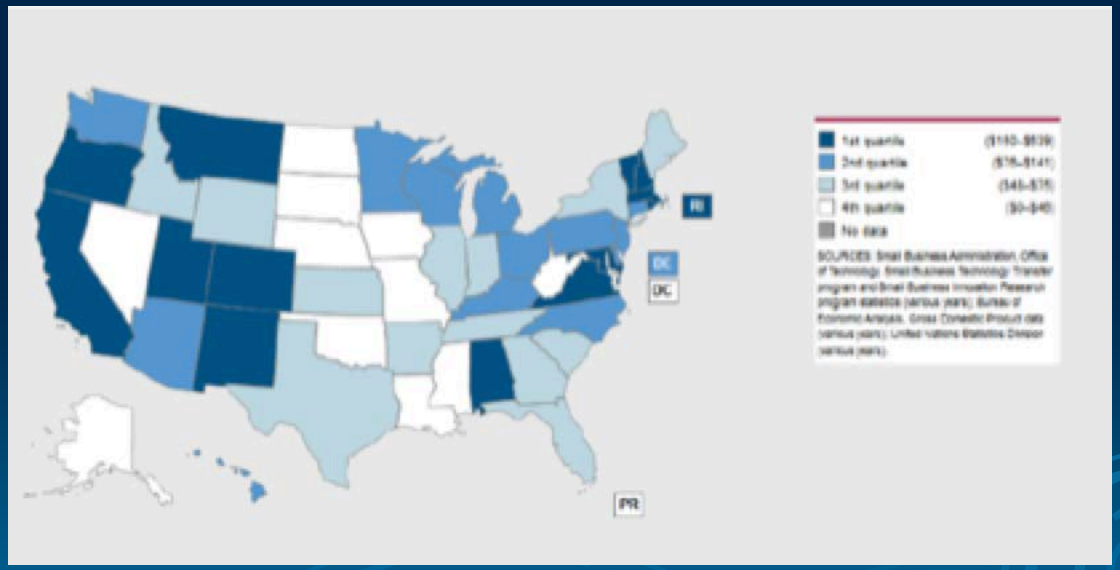
| VC funds dispersed by startup location | | |
|---|---|---|
| | 1995 | 2014 |
| CA | 39% | 56% |
| MA | 9% | 10% |
| NY | 4% | 9% |
| Combined Share | 52% | 75% |
| | | |
| Median | 0.31% | 0.23% |

Source: National Science Board Science & Engineering Indicators 2016; based on PwC/NVCA data

# A Rugged Landscape

- …yet science and technology companies spawn from research labs, universities & established firms across U.S. states & regions

# SBIR/STTR grants per $1m GDP in 2012




Source: National Science Board Science & Engineering Indicators 2016, Fig 8-53.

# Increased State-Level Activism

- Common concern:
  - Funding gaps in local markets for entrepreneurial capital
  - Out-migrations of young/small companies when they start to grow
  - Under-developed ecosystems for young/small innovation-based companies
- Common solution:  directly fund and/or support for young science and technology companies
  - Utah Science & Technology Research (USTAR) subsidized ~570 startups between 2002 and 2008 (SRI, 2009)
  - The Ohio Third Frontier Program funded “hundreds” of startups by 2010 (Duran 2010)
- Many intervention programs = competition-based, modeled after SBIR program
- Useful data on the applicant pool & project scores exist!
  - but are buried & hard to access…

# The Evaluation Challenge

- **Ideal: Random Assignment**

- **Not ideal but still useful:**
  - Case studies
  - Follow firms that are "treated" (surveys, analysis)
  - Match to "similar" firms
  - Use "close-call" applicants than win or fail by small margin (Jaffe 2002; "regression discontinuity" designs)
    - Common approach used to test effects of public $ on individual and team-level outcomes (e.g., Arora and Gambardella 2005; Jacob and Lefgren 2011)
    - A few recent studies use to test effects of R&D grants on firm-level outcomes (e.g., Bronzini & Iachini 2014; Howell 2015)

# The Michigan R&D Loan Study (Zhao & Ziedonis, 2016)

- Leverages data on startups that seek but do not necessarily receive funding & scores of their projects
    - Sample: 297 proposals from 241 startups, 2002-2008
- Tests effect of public R&D financing on recipient startups
    - Survival (based on state business registry data)
    - Follow-on financing (VCs & SBIR)
    - Broader business activity (proxy: news articles)
    - Production of patents
- Finds that, among close-call applicants, award receipt...
    - Reduces likelihood of business failure (up to t+6)
    - Is a greater stimulus to follow-on financing & business expansion for startups when information challenges are more severe
    - Has no discernible impact on patent-based outcome measures
- Has obvious limitations: 1 program in 1 state, lacks reliable time-varying data on R&D, employment or sales; = working paper

# The Program(s)

MICHIGAN Economic Development Corporation

**Michigan Life Science Corridor (MLSC)**

**Michigan Technology Tri-corridor (MTTC)**

**21st Century Jobs Fund Program (21CJF)**


**Competitive R&D loan program, with added ‘services’ for winners**

# Overview

- Competitive R&D Loan Program, 2002-2008
  - Fund allotment = pre-determined
  - Sector and Location Requirements
  - Multi-stage selection process
  - Merit-based scores by external reviewers

- Typical applicant:  4-year old life science company

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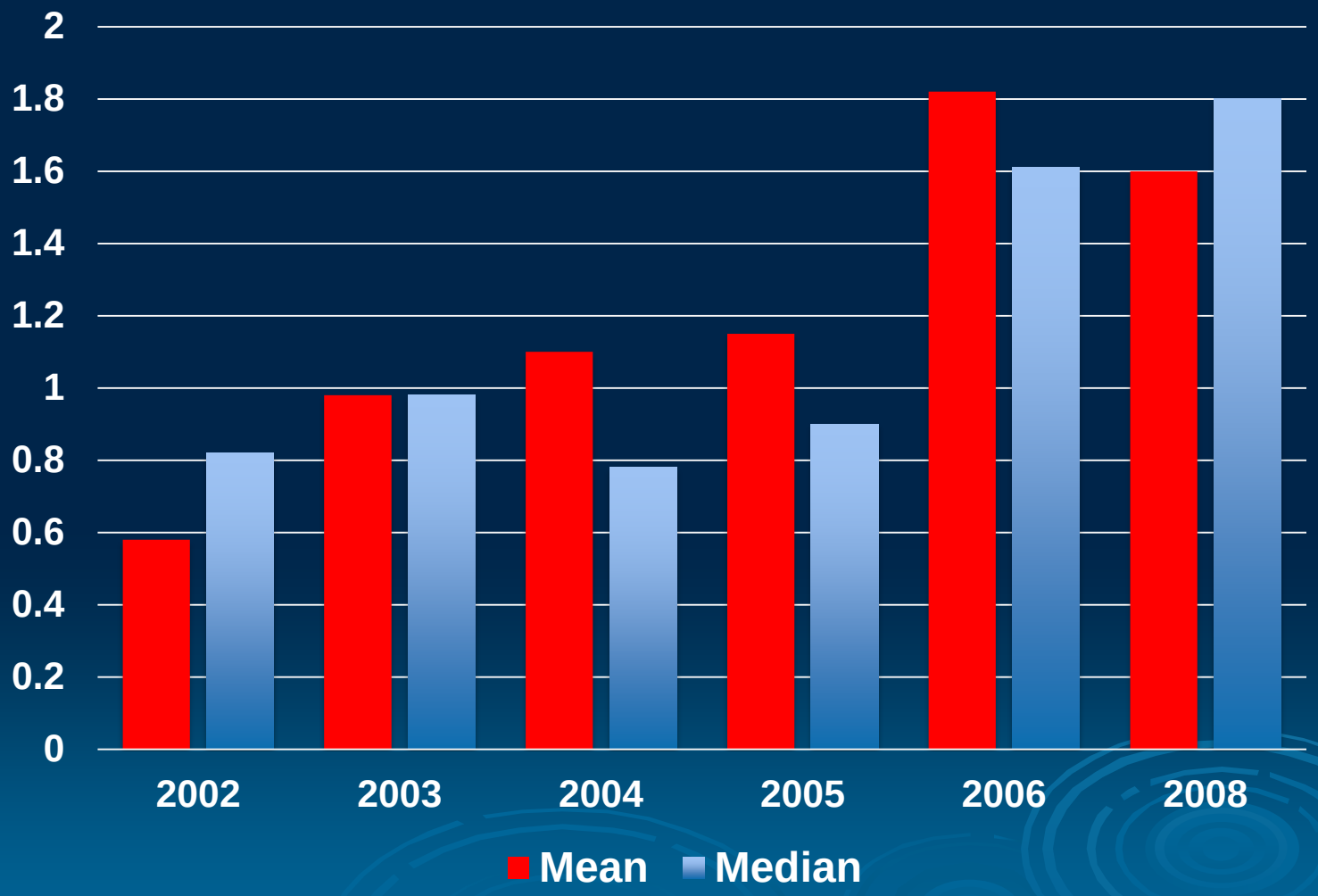
- Typical applicant:  4-year old life science company

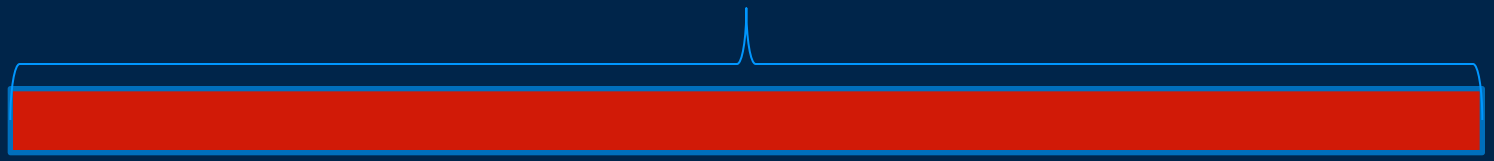
- Typical “treatment”:
  - Financing:  $1 million loan with 3 year payback period
  - Added services

# Mean and Median Loan Amounts ($m)



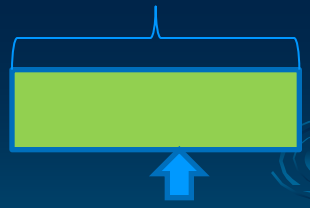
# Data

First Round (297 obs)



Second Round (154 obs)

Recommended for funding (88 obs)



Received funds (64 obs)

**Data:**

**Program administrative data from MEDC**

All for-profit company applicants and awardees, 2002-2008

**Information includes**

Organization name, industry sector, application category, age, 1st and 2nd round scores, amount of funding requested and whether (and how much) they are funded

**Outcome variables:**

(1) Firm survival (Michigan LARA database)

(2) Funding from other sources

SBIR/STTR Awards (SBA TECH-Net Database)

Venture Capital Investment (VentureXpert)

(3) News Articles (Factiva)

(4) Patents (Delphion)

**Sample - 297 applications from 241 firms**

# Main Findings

1. Close-call applicants have similar characteristics ex ante
2. No evidence of systematic score manipulation or out-of-order funding
3. Among close-call applicants, award receipt
   - Increases likelihood of business survival by ~20% six years following the competition
   - Stimulates follow-on financing, particularly from VC (vs. SBIR) sources
   - “Matters more” for follow-on financing & business expansion when information challenges are more severe (startup age, prior external $, driving distance of HQ location from state innovation hub)
   - Fails to have a statistically discernible effect on patent-based outcome measures (Sector composition? External IP owners?)

# Summary

- Illustrates a useful method for program evaluation
  - Requires data on entire applicant pool & outcome metrics for young/small companies
- Leaves important questions unanswered:
  - Do these findings generalize to other contexts?
    - Smaller award sizes
    - Loan v. subsidy programs
    - Other state/local environments
  - Are other policy levers more effective?
  - What are the broader implications for economic development and “stay rates” of entrepreneurial firms?
- Administrative data = useful for measuring outcomes and designing program evaluation studies