The Growth Potential of Startups over the Business Cycle: a cross-country analysis

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ES North American Winter Meeting, San Francisco

University College London

January 2016
Motivation

aggregate business cycle

↑    ↓

firm startup decisions
Questions

- **How does startup behavior fluctuate over the business cycle?**
  - Effects through:
    - number of firms?
      - or
    - average firm size (composition)?
  - Aggregate implications?
    - persistent “damage” after period of weak firm entry?
Startups over the business cycle

- **Firm dynamics models (selection):**

- **Empirical work on startups over the business cycle (selection):**

- **Related empirical work (selection):**
This project

- *Follow* cohorts of startups (Sedlacek and Sterk (2012))
  - use aggregated and micro-level data

- Explore and compare data for the United States, Germany, and the United Kingdom.
1. United States

Sedlacek and Sterk (2012)
Data

- Business Dynamics Statistics (BDS)
- Population of employers
- Annual snapshot over the period 1979-2013
- Break down data by age ⇒ cohort-level data
- Focus on firms (but similar results for establishments)
Raw data
U.S. Business Dynamics Statistics

employment (cohorts)

age 0

age 5

year of birth

Raw data
U.S. Business Dynamics Statistics

number of firms (cohorts)

- age 0
- age 5
Raw data
U.S. Business Dynamics Statistics

average firm size (cohorts)

- **age 0**
- **age 5**
1. Cyclicality entrant employment

Figure 1: Cohort-level employment by year of birth and aggregate employment growth by year

Notes: Cohort-level employment in percent deviations from the respective mean across cohorts of firms of the same age and aggregate employment growth rate. Shaded areas are NBER recessions. Source: BDS, BLS.
2. Persistence cohort-level employment

Figure 2: Autocorrelations of cohort-level and aggregate employment

Notes: “corhot-level” refers to correlations of cyclical deviations of employment by cohorts of startups with those of the same cohort $a$ years in the future, i.e. $\text{corr}(\hat{N}_{0,t}, \hat{N}_{a,t+a})$, where hats indicated cyclical deviations. ”Aggregate” refers to correlations of cyclical deviations of aggregate employment in year $t$ and $t+a$, i.e. $\text{corr}(\hat{N}_{agg,t}, \hat{N}_{agg,t+a})$. Source: BDS, BLS.
2. Persistence cohort-level employment

Establishment-level data from synthetic LBD

Figure 21: Autocorrelations: SynLBD data

Notes: Correlation coefficients of employment in year $t = 0$ and in year $t + \text{age}$, with age = 1,2,...15 at both the level of a cohort born in period $t = 0$ and at the aggregate level. Source: BLS, SynLBD.
3. Extensive versus intensive margin

Variance decomposition based on:

\[
\ln N_{age,t} = \ln S_{0,t-\text{age}} + \ln M_{0,t-\text{age}} + \sum_{j=1}^{\text{age}} \ln \gamma_{j,t-\text{age}+j} + \sum_{j=1}^{\text{age}} \ln \delta_{j,t-\text{age}+j},
\]

where:

- \( N_{age,t} \): total employment in cohort
- \( S_{age,t} \): average firm size in cohort
- \( M_{age,t} \): number of firms in cohort
- \( \gamma_{age,t} = \frac{S_{age,t}}{S_{age-1,t-1}} \), \( \delta_{age,t} = \frac{M_{age,t}}{M_{age-1,t-1}} \)
3. Extensive versus intensive margin

Figure 3: Contributions to variation in cohort-level employment

Notes: Contributions of the number of firms and average firm size at different ages to the variation in cohort-level (in percent). Source: BDS.
2. United Kingdom
Data

Business Structure Database (BSD): 1997-2013

- constructed from tax records (VAT and Pay as you Earn)
- accounts for 99% of non-public economic activity in the U.K.
- annual snapshots, information over both enterprises (firms) and local units (establishments)
- Variables include:
  - employment, revenue
  - start date (censored at 1973)
  - termination date
1. Cyclicality entrant employment

Employment (HP-filtered)

- Black line: entrants
- Red dashed line: age 5
- Blue line: aggregate
2. Persistence cohort-level employment

Autocorrelations

- **cohort (level)**
- **cohort (HP-filtered)**
- **aggregate (HP-filtered)**

The graph shows the autocorrelations for different variables over time. The x-axis represents age, and the y-axis represents the correlation coefficient. The graph includes three lines, each representing a different type of cohort or aggregation.
3. Extensive versus intensive margin
3. Germany
Data

Establishment History Panel (BHP): 1975-2010
- collected by the Institute for Employment Research (IAB)
- 50% sample of all establishments with at least 1 employee
- snapshot at the 30th of June
- between 1.3 and 2.9 mil. establishments each year
- since 1991 also information on east German establishments
  - the following analysis is based on western Germany only
Data

Information on:

- establishment employment
- establishment age
- establishment entry and exit
  - spin-off versus new establishment
1 & 2. Cyclicality and persistence

Correlation (entrant employment, GDP growth) = 0.45
3. Extensive versus intensive margin
Consistent patterns across U.S., U.K. and Germany:

- Fluctuations in entrant employment large and pro-cyclical
- Variations in employment across cohorts are very persistent
- Important role for intensive margin, increasing with age