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

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Motivation

aggregate business cycle

$\Uparrow \qquad \Downarrow$

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)**:
  - Lucas (1978), Jovanovic (1982), Hopenhayn (1992), Hopenhayn and Rogerson (1993), Campbell (1998), Samaniego (2008), Lee and Mukoyama (2008), Clementi and Palazzo (2010), Sedlacek (2011), Kaas and Kircher (2011), Melitz, Bilbiie and Ghironi (2012), Siemer (2012), Drautzburg (2012), Sedlacek and Sterk (2012), Schott (2012).

- **Empirical work on startups over the business cycle (selection):**
  - U.S. manufacturing plants: Campbell (1998), Lee an Mukoyama (2008).
  - U.S. population of firms (employers): Sedlacek (2011), Siemer (2012), Sedlacek and Sterk (2012), Fort, Haltiwanger, Jarmin and Miranda (2014), Siemer and Gourio (2015).

- **Related empirical work (selection):**
  - Dunne, Roberts, and Samuelson(1989), Davis, Haltiwanger and Schuh (1996), Poschke (2012), Haltiwanger, Jarmin and Miranda (2013), Decker, Haltiwanger, Jarmin and Miranda (2014), Pugsley and Şahin (2014), Haltiwanger, Foster and Grim (2014), Moscarini and Postel-Vinay (2014).

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

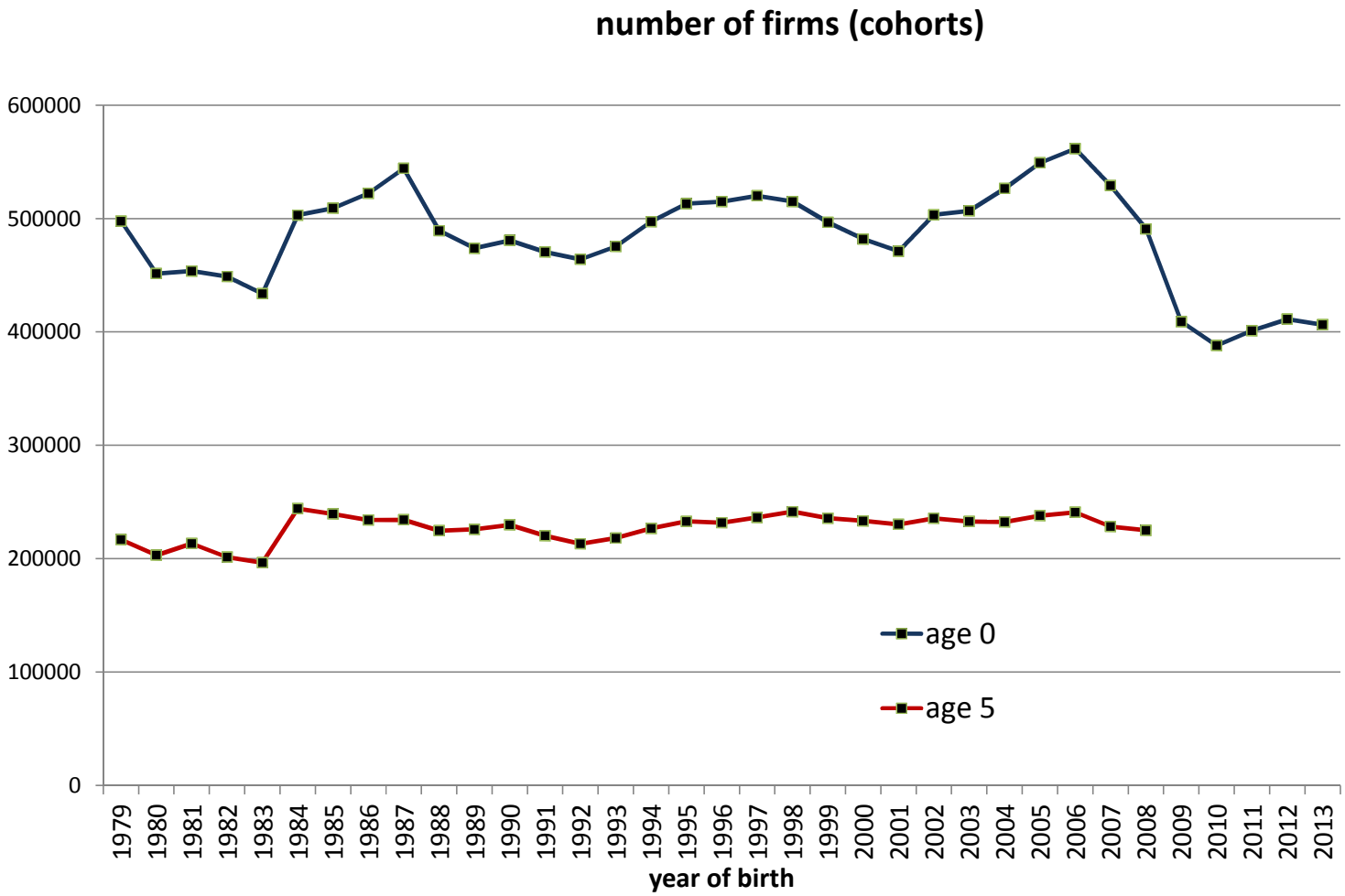
- Business Dynamics Statistics (BDS)
- Population of employers
- Annual snapshot over the period 1979-2013
- Break down data by age $\Rightarrow$ cohort-level data
- Focus on firms (but similar results for establishments)

Raw data

U.S. Business Dynamics Statistics

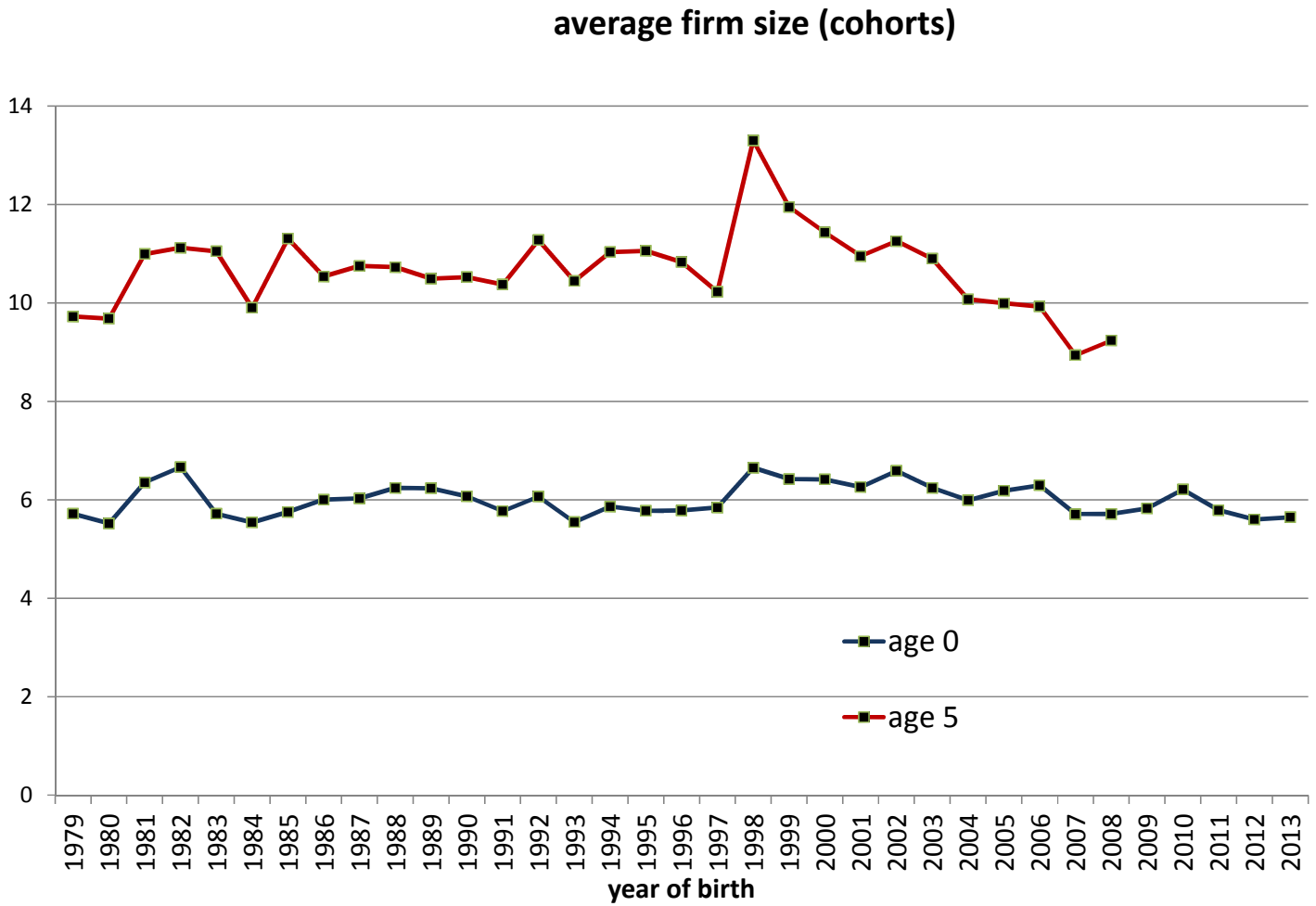
Raw data

U.S. Business Dynamics Statistics



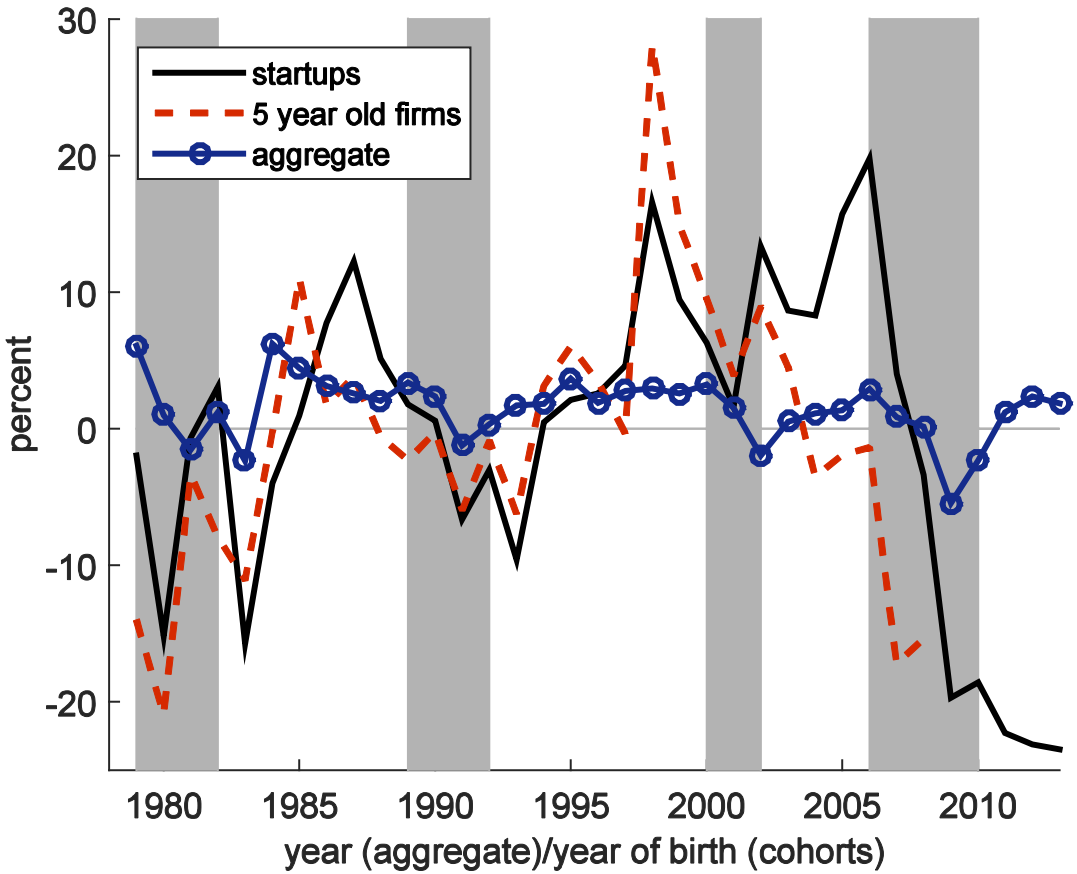
Raw data

U.S. Business Dynamics Statistics



1. Cyclicality entrant employment

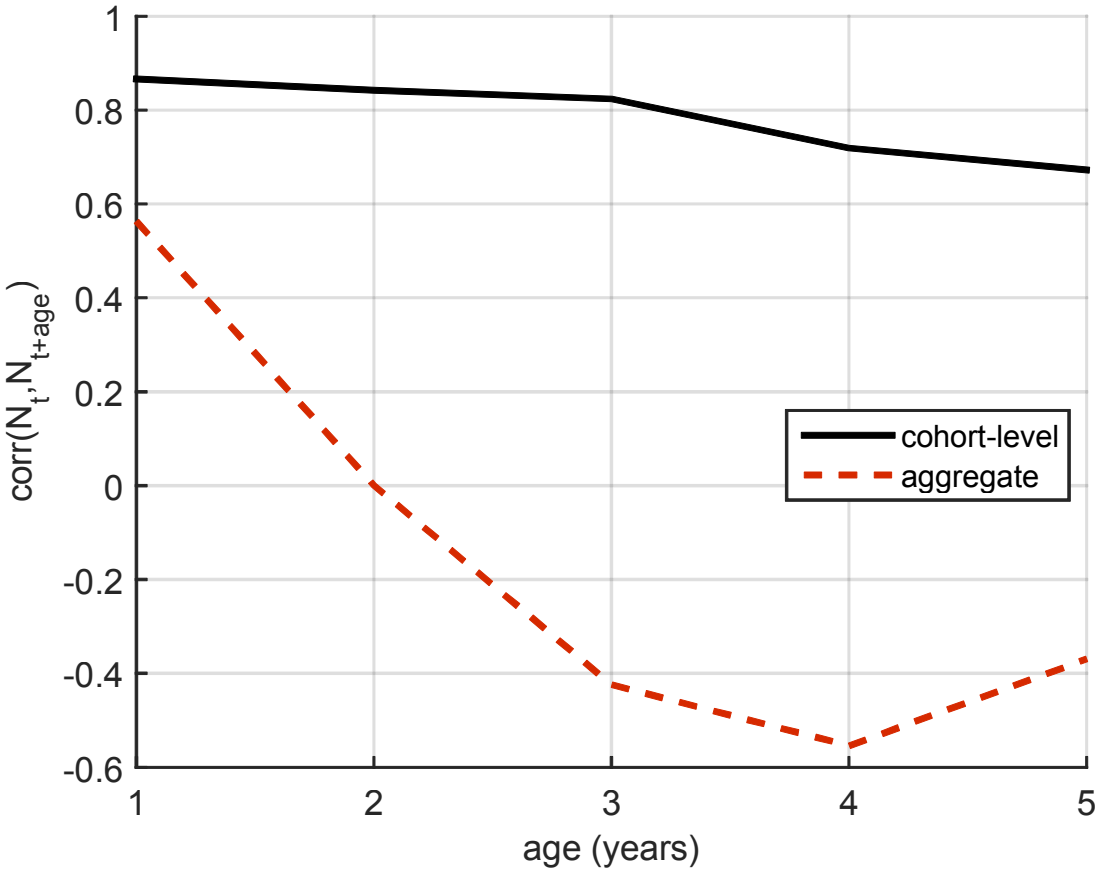
Figure 1: Cohort-level employment by year of birth and aggregate employment growth by year



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

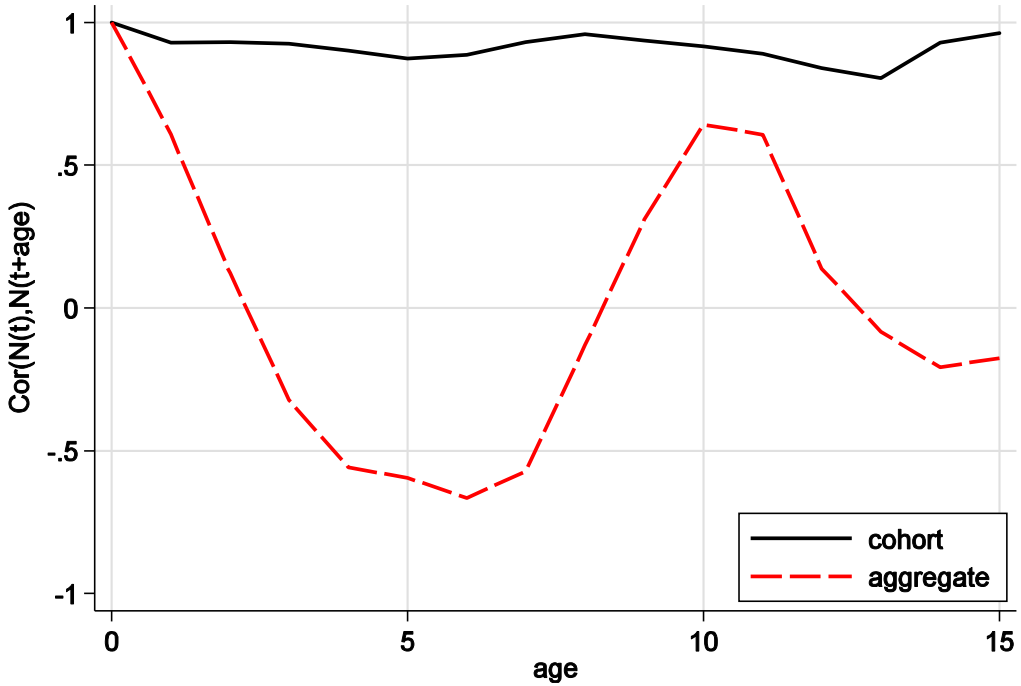


Notes: "corhot-level" refers to correlations of cyclical deviations of employment by cohorts of startups with those of the same cohort a years in the future, i.e. $\text{corr}(\hat{N}_{0,t}, \hat{N}_{a,t+a})$, where hats indicated cyclical deviations. "Aggregate" refers to correlations of cyclical deviations 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 + 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:

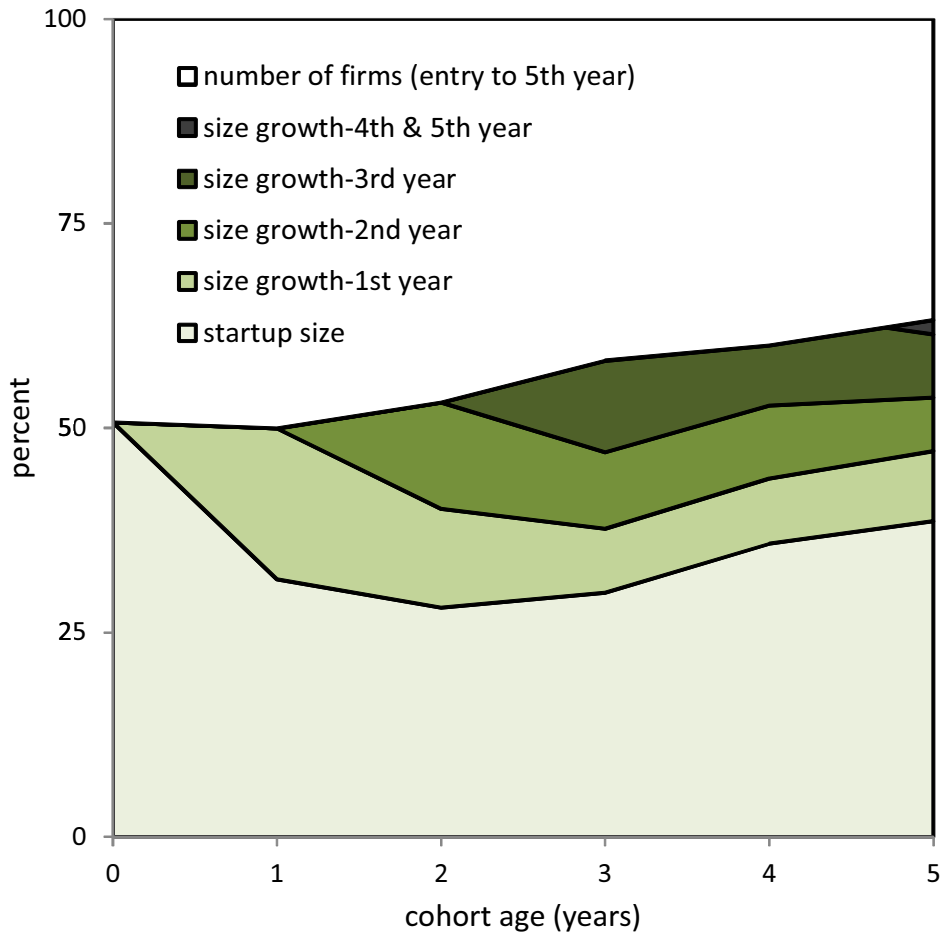
$$\ln N_{age,t} = \ln S_{0,t-age} + \ln M_{0,t-age} + \sum_{j=1}^{age} \ln \gamma_{j,t-age+j} + \sum_{j=1}^{age} \ln \delta_{j,t-age+j},$$

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.

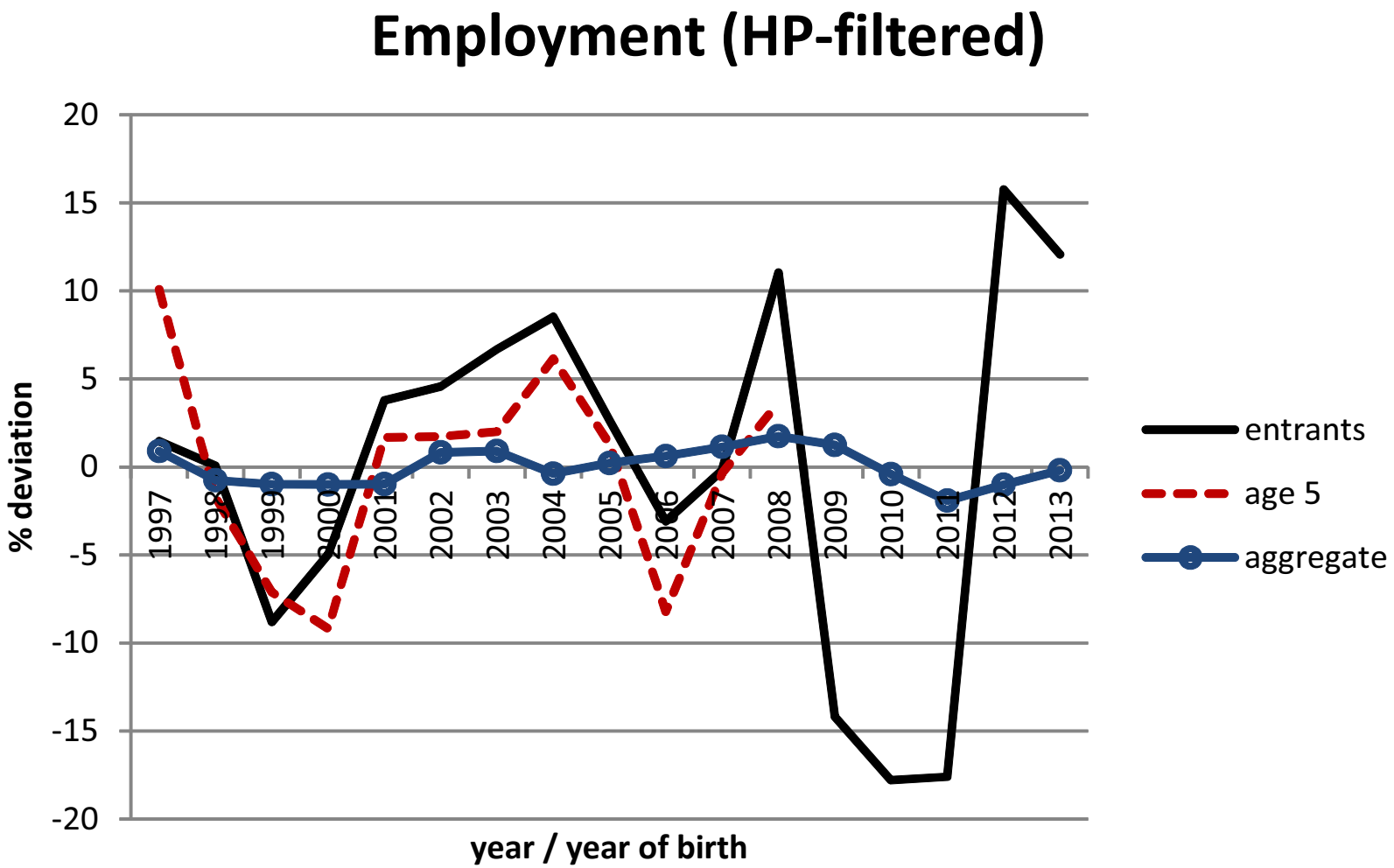
2. United Kingdom

Data

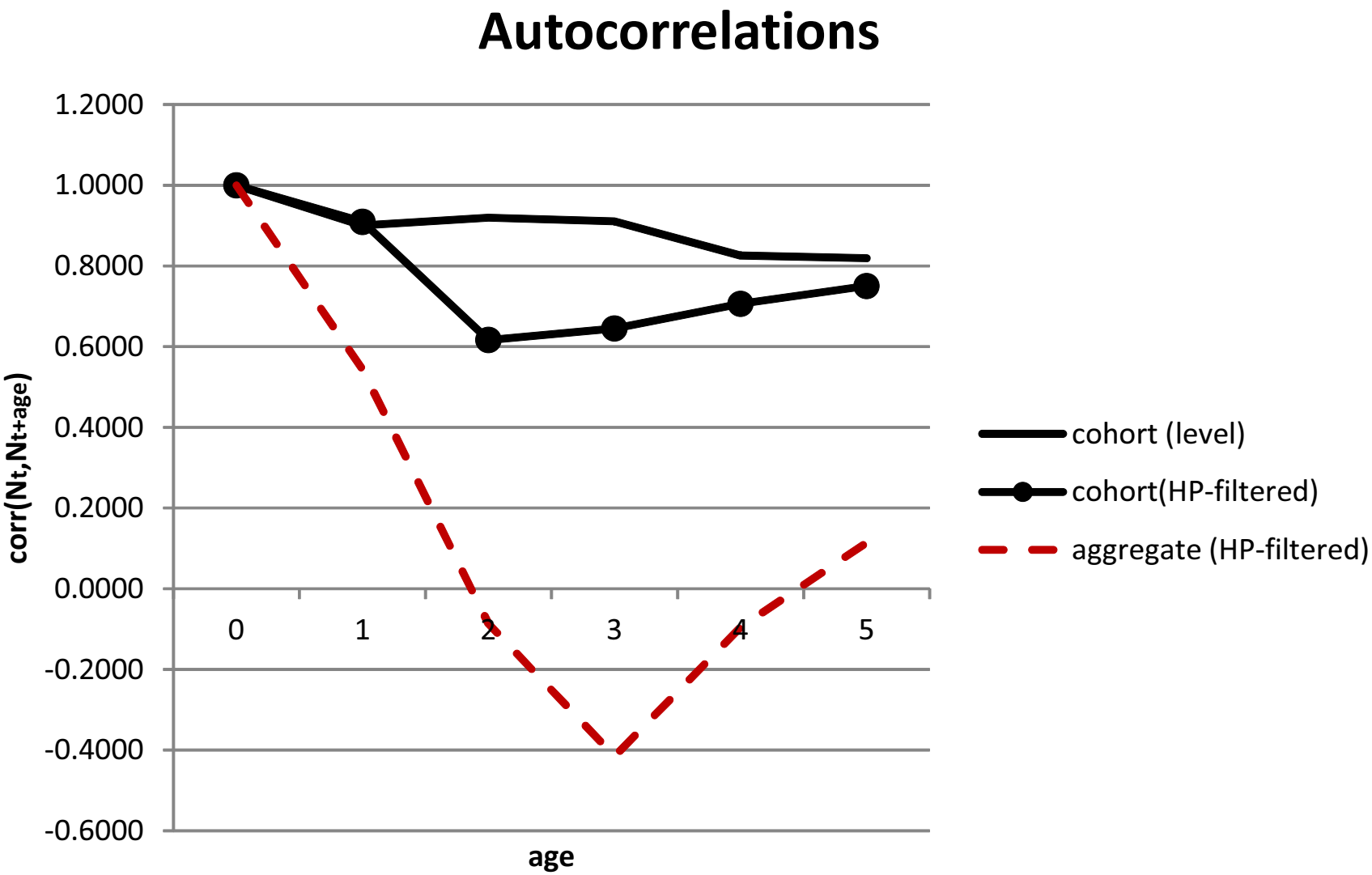
Business Structure Database (BSD): 1997-2013

- 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

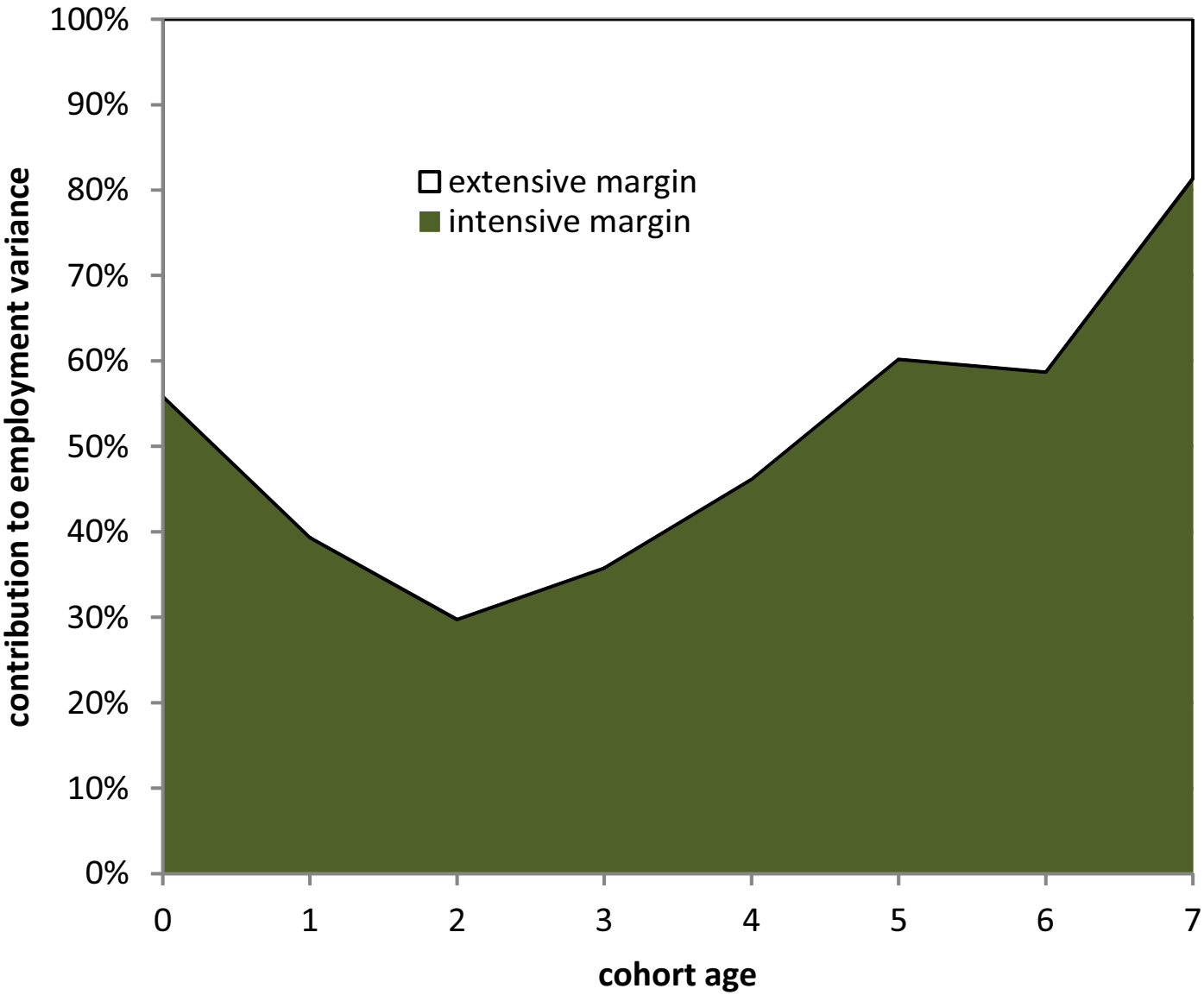
1. Cyclicality entrant employment



2. Persistence cohort-level employment



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

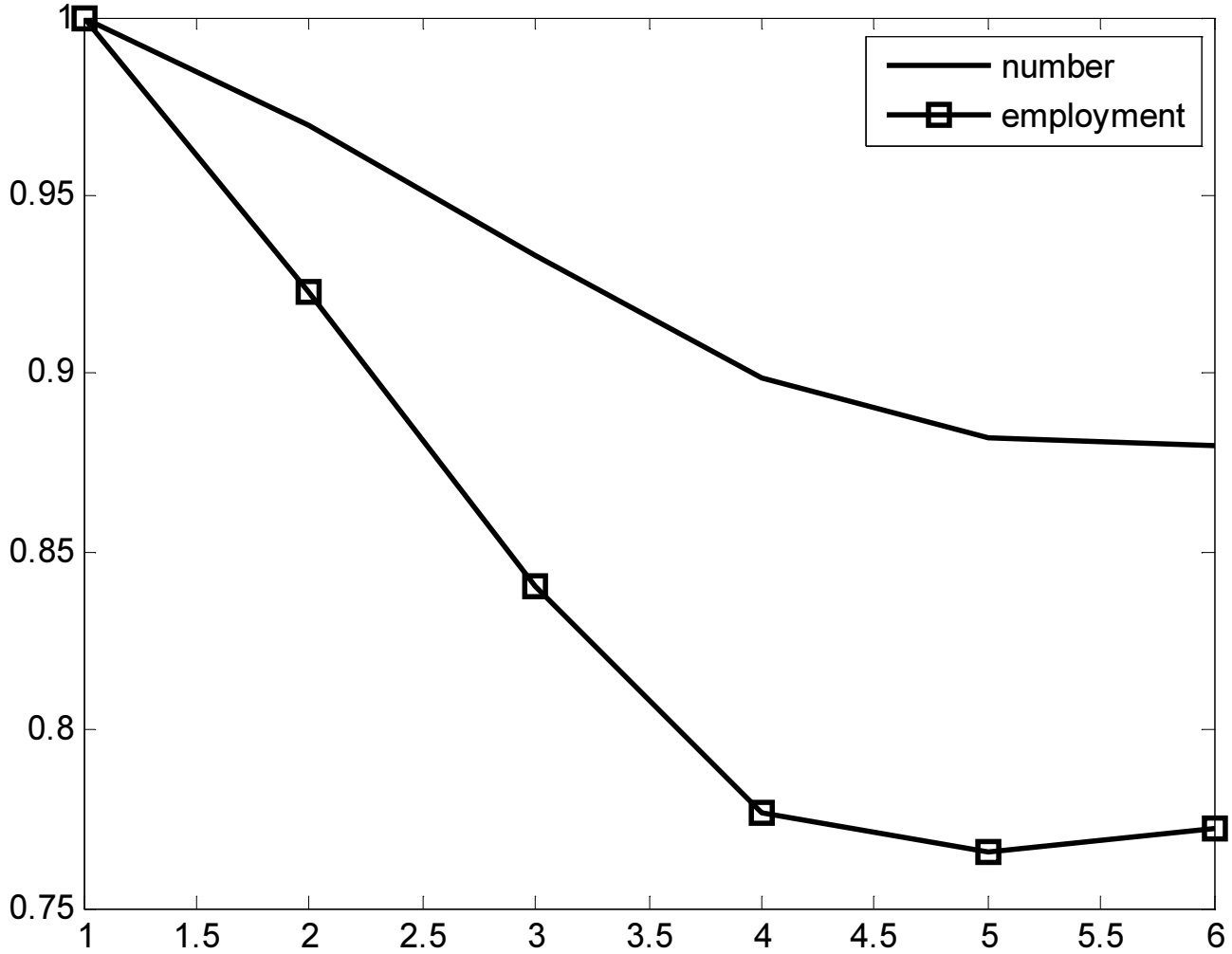
Data

Information on:

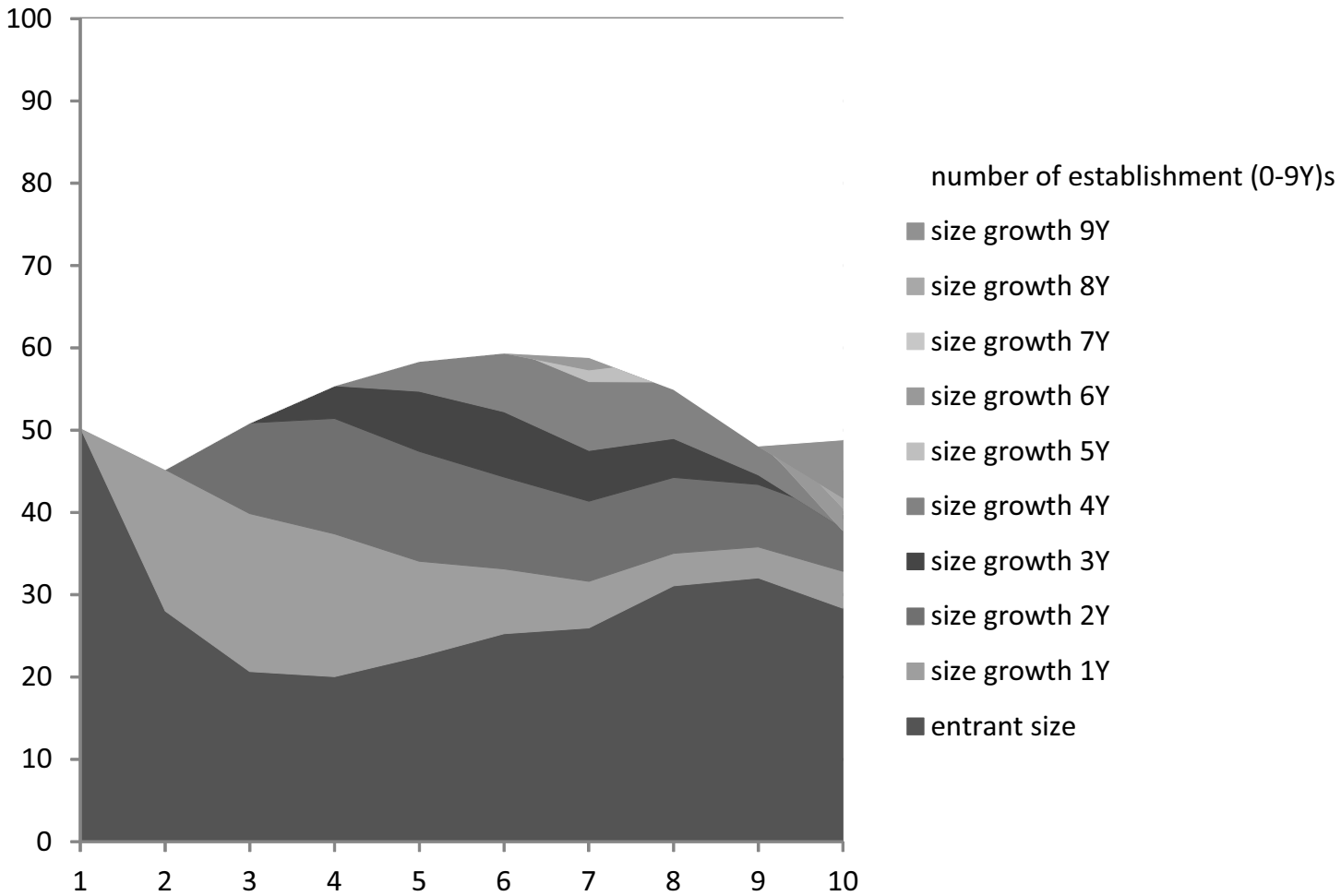
- establishment employment
- establishment age
- establishment entry and exit
  - spin-off versus new establishment

1 & 2. Cyclicality and persistence

Correlation (entrant employment, GDP growth) = 0.45



3. Extensive versus intensive margin



Conclusions

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