Firm responsiveness over the business cycle: new evidence from Europe

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Motivation

- How firms respond to unexpected changes in profitability matters for:
  - Aggregate employment and output, resource reallocation, aggregate productivity
- Firms can respond by changing:
  - Employment → number of employees / hours worked
  - Capital stock → investment in tangible and intangible capital
- Firm behavior depends on aggregate state of the economy:
  - Can potentially amplify/mitigate the effects of recessionary events

This project:

- Documents how firm responsiveness varies over the business cycle and across Europe using new MDI firm-level data

Countries/Institutions participating :

- Slovenia, European Commission
- New countries/productivity boards very welcome!!

This project

- Construct measures of profitability shocks following TFP estimation
- Run firm-level responsiveness regressions for both employment and investment at firm level
- Separate responses into number of employees/ hours worked and tangible vs intangible investment
- Investigate which responses matter most over the business cycle and across countries
- Decompose firm responsiveness into intensive and extensive margin

Related Work

- 1) Role of firm responsiveness for aggregate outcomes: Miranda et al. (2020), Cooper et al. (2024)
- 2) Recessions, resource reallocation and productivity: Haltiwanger et al.(2014), Kherig (2014), Bartelsman et al. (2019), Santos et al.(2022)
- 3) Regulations and resource reallocation: Bartelsman et al (2009), Scarpetta et al. (2014)

What we add

- New cross-country evidence on firm responsiveness and business dynamism in Europe
- Document which adjustment margin matters most over the business cycle (labor vs capital)
- Decomposition of responsiveness into extensive and intensive margin

Why care:

- Firm responsiveness matters for macroeconomic outcomes
- Informs policy measures directed at supporting firms over business cycle
- Cross-country dimension relevant to shed light on different product and/or labor market regulations that explain firm behavior

What we plan to do: details

- **Revenue Function and TFP(R) innovations**:

  TFPR $\log Revenue_{i,t} = \alpha \log Employment_{i,t} + \beta \log Capital_{i,t} + \varepsilon_{i,t}$

  AR(1) $\varepsilon_{i,t} = \rho \varepsilon_{i,t-1} + \eta_{i,t}, \quad \eta_{i,t} \sim \mathcal{N}(0, \sigma_\eta^2)$

- **Responsiveness employment**:

  Ext. Margin $Pr(1^{adj} = 1) = c + \beta_1^{ext} \epsilon_{i,t-1} + \beta_2 D_t + \beta_3^{ext} \epsilon_{i,t-1} D_t + \gamma Employment_{i,t-1} + \nu_{i,t}$

  Int. Margin $g_{i,t}^{emp}|_{1^{adj}=1} = c + \beta_1^{int} \epsilon_{i,t-1} + \beta_2 D_t + \beta_3^{int} \epsilon_{i,t-1} D_t + \gamma Employment_{i,t-1} + \zeta_{i,t}$

  $$1^{adj} = \begin{cases} 0 & \text{if } g_{i,t}^{emp} \in [-2.5\%, +2.5\%] \\ 1 & \text{otherwise} \end{cases} \quad ; \; g_{i,t}^{emp} = \frac{e_{i,t} - e_{i,t-1}}{.5 * (e_{i,t} + e_{i,t-1})}$$

  D_t : indicator variable for aggregate state of the economy

  - Similar approach for investment responses

What we plan to do: details

- **Responsiveness investment** :

Ext. Margin $$Pr(1^{adj} = 1) = c + \beta_1^{ext}\epsilon_{i,t-1} + \beta_2 D_t + \beta_3^{ext}\epsilon_{i,t-1}D_t + \gamma Employment_{i,t-1} + \nu_{i,t}$$

Int. Margin $$g_{i,t}^{inv}|_{1^{adj}=1} = c + \beta_1^{int}\epsilon_{i,t-1} + \beta_2 D_t + \beta_3^{int}\epsilon_{i,t-1}D_t + \gamma Employment_{i,t-1} + \zeta_{i,t}$$

$$1^{adj} = \begin{cases} 0 & \text{if } g_{i,t}^{inv} \in [-2.5\%, +2.5\%] \\ 1 & \text{otherwise} \end{cases} \quad ; \; g_{i,t}^{inv} = \frac{k_{i,t} - k_{i,t-1}}{.5 * (k_{i,t} + k_{i,t-1})}$$

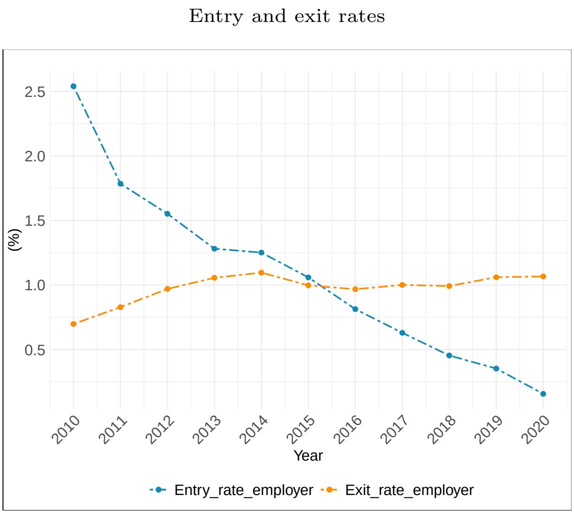
D_t : indicator variable for aggregate state of the economy

- Potentially separate investment into tangible and intangible capital

Today

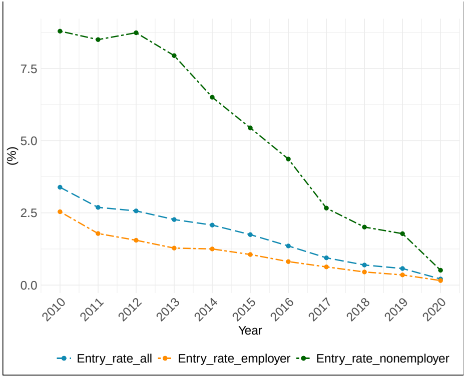
- First summary statistics to understand the data
- Observational evidence on measures related to firm responsiveness:
  - Firm entry, exit, job creation/destruction
- Dataset:
  - Country: The Netherlands
  - Time period: 2010-2020
  - Data sources: SBS
  - SBS in the Netherlands: all firms with > 50 employees + representative sample of firms with < 50 employees
- Add following countries in near future: France, Portugal, Finland, Slovenia, Austria, Germany, Italy

Entry and exit rates

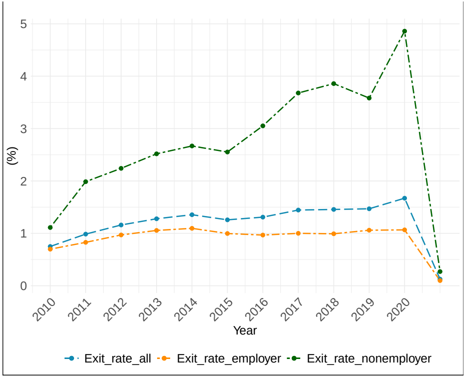


Entry and exit rates

Entry rates

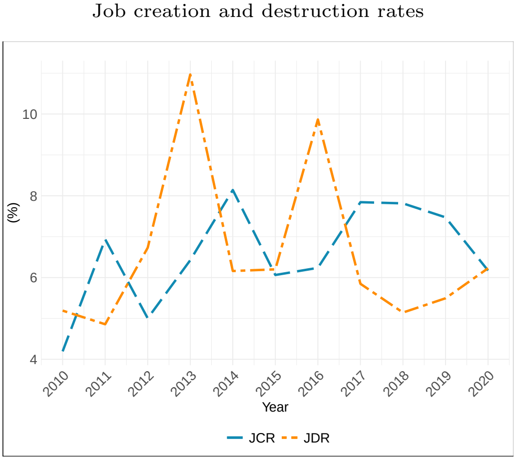


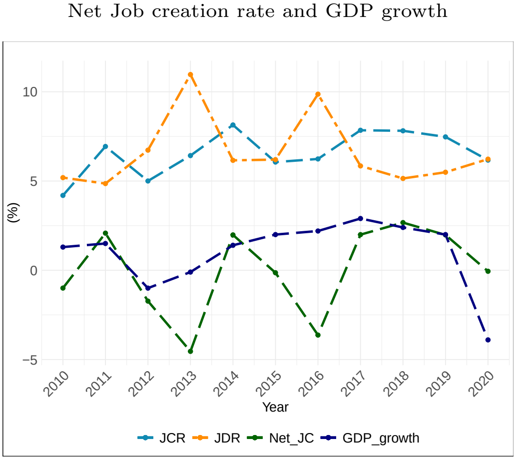
Exit rates



- Important distinction between employer and non-employer firms when computing entry and exit rates

Job creation/destruction rates

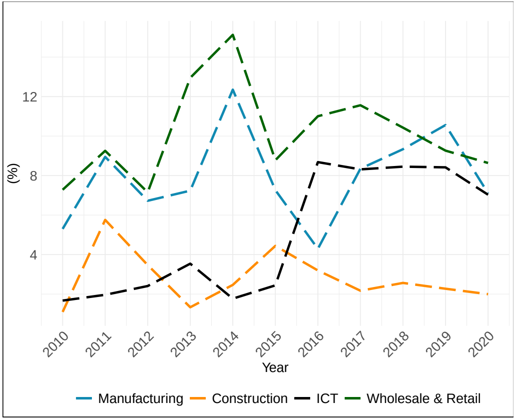




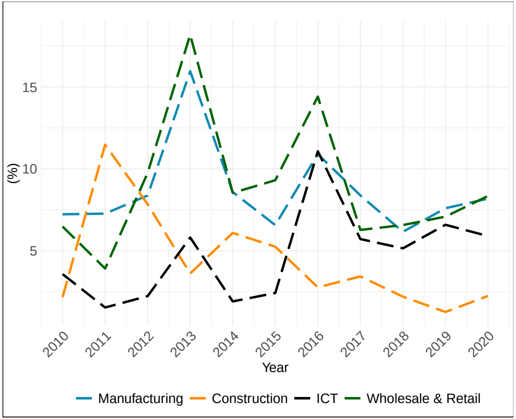
Notes: Panel (a) plots gross job creation and destruction rates. Panel (b) compares gross net job creation rates with GDP growth.

Job creation/destruction rates across sectors

Job creation across sectors

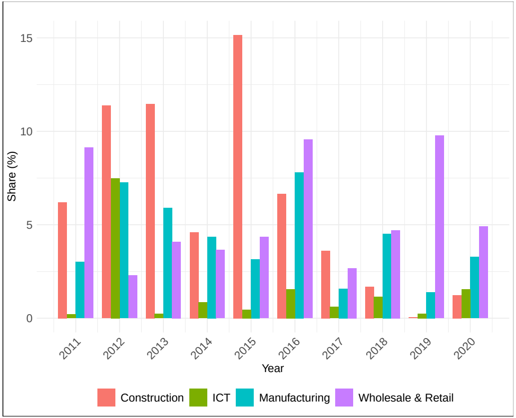


Job destruction across sectors



The role of firm exit

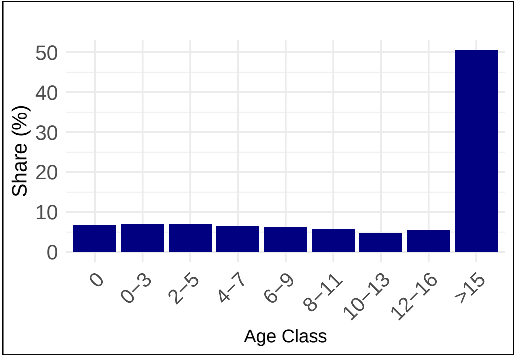
Share of job destruction at exiting firms



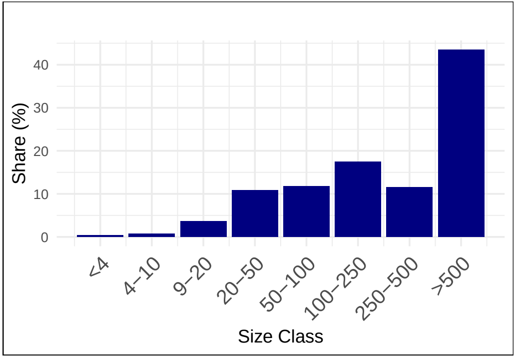
- Most job destruction happens at the intensive margin but firm exit still relevant in some sectors

Share of employment by size and age class

Share employment by age class



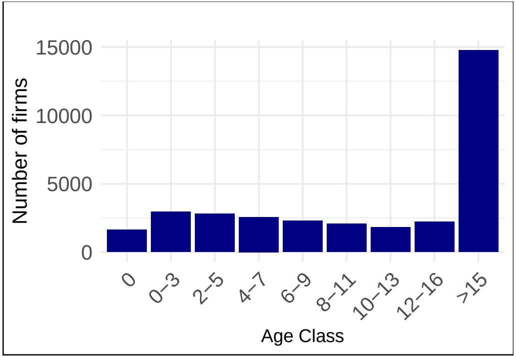
Share employment by size class



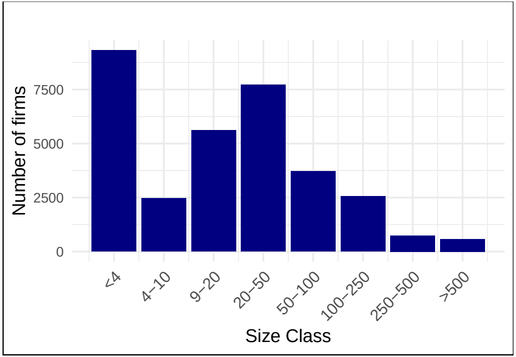
- Most employment generated by big and old firms

Distribution of firms by size and age class

Number of firms by age class



Number of firms by size class



Next steps

- Important: Explore data issues and alternative data
- Potential issues with SBS $\rightarrow$ switch to BR + BS?
- Produce summary and descriptive statistics to understand the properties of the different country-level datasets
- Estimate production functions at the 2 digit sector level
- Run responsiveness regressions as outlined
- Explore drivers of potential differences in responsiveness across countries and over the business cycle