On some applications of the longitudinal databases

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*The opinions expressed are those of the author and do not necessarily reflect the official views of the Danish Economic Councils

De Økonomiske Råd

Background

- CVR is a useful unit of observation for pure statistical purposes
- However, economic policies target firms, which introduces several challenges:
  - Firms changing CVR
  - Firms comprised of many CVR
- For policy evaluation purposes longitudinal databases are therefore a considerable improvement

- **Some caveats:**
  - Works best for large firms where additional registers, for example with detailed accounting statistics, are readily available

Danish Economy, Spring 2025

Chapter III on mergers, competition and productivity

Economy and Environment, 2024

Chapter III on R&D subsidies, innovation and green technologies

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LONG datasets

- **LONG** tracks all Danish legal units (CVR) and complex economic units (KØK or OK) over time in order to identify business demographic events
- A **demographic event** is a transfer of workplaces or employees between firms
- **Three integrated registers:**
  1. *LONG_DEMO* – records demographic events and links between "sender" and "receiver" units, incl. event codes.
  2. *LONG_REL* – tracks relations between legal units (CVR) and complex economic units (OK), and identifies changes in these relationships over time.
  3. *LONG_UDV* – contains aggregated flows of employees between units involved in events (e.g. number of workers transferred), incl. metrics that allow assessing scale and relevance of the transfer.
- **Advantages:**
  - Captures complex economic units (OK) when companies consist of multiple legal entities
  - Enables consistent tracking of large groups across years (OK_OT_ID)
  - Includes entire population of firms (not only those involved in events)

Identification of M&A

Simplified procedure

Core approach

- Combine LONG registers with firm accounts (FIRM) and group data (KONC)
- Track when a legal unit (CVR) moves between economic entities
- Confirm that employees transfer and firms actually integrate

Procedure

1. Detect CVR shifts between economic units (via LONG_REL)
2. Restrict to shifts occurring within the firm's legal life (FIRM)
3. Link demographic-event registers (LONG_DEMO / LONG_UDV)
4. Exclude internal reshuffles within the same economic unit
5. From 2009: exclude intra-group restructurings (KONC)
6. Require positive employee transfers
7. Require employee flows consistent with firm size
8. Require the seller to cease operations soon after
9. Require the buyer to exist (or be newly created)
10. Apply analysis filters: (1) exactly two firms involved; (2) >5 employees; (3) valid accounts and positive value added; (4) ≥7 consecutive years of observation

Identification of M&A

Sample size

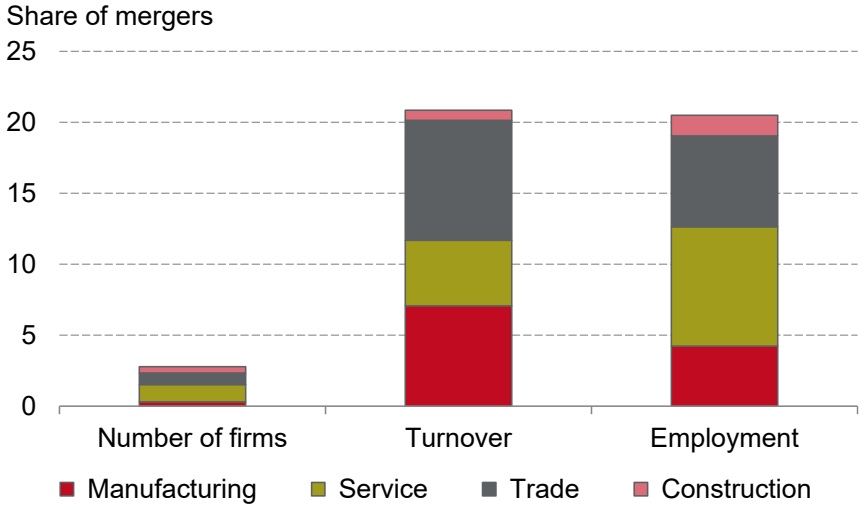
- **Resulting samples** included in the empirical analysis
- **Firm-level** event studies
  - 4,763 manufacturing firms
    - 101 mergers
  - 8,238 service firms
    - 221 mergers
- **Product-level** analysis for firms in manufacturing
  - 1,874 firms across 467 product markets
    - 76 mergers

- *Purpose of filtering*: ensure only genuine, economically meaningful mergers enter the causal analysis.

Not many mergers, but they involve big firms

- In 2020, companies merged between 2001 and 2020 made up only ~3% of all companies
- Yet they accounted for ~20% of revenue and employment
- Showing that merged companies are generally larger than other companies

- Mergers in manufacturing typically involve larger firms
- Buyers are often larger than targets



Cross-validation

Approach I

- *Levonyan and Mengano (2024)* show that after a merger, one can generally expect the revenue of a continuing firm to be the sum of revenues of merged entities
- This so-called *revenue transfer hypothesis* can be tested by estimating the following equation:

$$B_{t+1} - B_t(1 + \bar{g}_n) = \beta T_t + \varepsilon_t$$

- B – buyer's revenue, T – target's revenue, $\bar{g}_n$ – buyer's average revenue growth rate n periods before the merger
- **Expect β = 1 after a merger**

Approach II

- Matching LONG to the list of mergers approved by KFST (known mergers)

Remaining challenges

- Mergers in the chapter represent 95% of all identified merger cases and are mergers between two entities, where
  - one of the two CVRs continues after merger
  - or a new CVR is created
- Some large mergers not covered in the chapter are however more complicated
  - 3% of cases are mergers with one buyer and several targets
  - 2% of cases are mergers with several buyers and one target
- Our identification strategy relies on the fact that mergers specifically most often happen between larger firms, where additional data is readily available
  - Restructurings involving smaller firms in early stages of development might be harder to track and identify

R&D subsidies, innovation and green technology

Economy and Environment, 2024

- Analysis of about 6.000 firms that applied for a direct R&D subsidy in the period 2002-21
  - 4.000 subsidised firms
  - 2.000 rejected firms
- Effects on R&D expenditures, patents and exports up to 5-7 years after subsidy
- Separate focus on green projects

Firms receiving R&D subsidies

Small firms in early stages of development

Quartiles of R&D labor costs	R&D subsidy	R&D labor cost	Revenue	Labour
	---------- Million DKK ----------			FTE
Q4	1,3	34,6	1.377,3	1.363,0
Q3	1,3	2,2	328,1	154,6
Q2	1,0	0,7	249,4	98,5
Q1	0,8	0,3	117,4	50,5

Average R&D personnel expenditure among all applied firms is 14,6 million DKK.

Average R&D personnel expenditure among all research-active firms in Denmark is 4 million DKK.

- R&D expenditures are skewed and concentrated among top firms
- Not many large firms in general
- The size of R&D subsidy does not vary a lot with firm size
- **Implication:** some CVRs were impossible to follow for the full time horizon of 5-7 years. *But can we be sure that they just exit the market?*

An example of a potentially complicated case

Based on public info from Det Centrale Virksomhedsregister

- **Ørsted A/S**
- CVR starts in 1972, still active

– Historiske stamdata

Virksomhedsnavn

Fra	Til	Historisk stamdata
19.04.2006	29.10.2017	DONG ENERGY A/S
21.05.2002	18.04.2006	DONG A/S
27.03.1972	20.05.2002	DANSK OLIE OG NATURGAS A/S

- About 10-15 employees i 2025

- **Ørsted Wind Power A/S**
- CVR starts in 2008, still active

– Historiske stamdata

Virksomhedsnavn

Fra	Til	Historisk stamdata
19.03.2012	29.10.2017	DONG ENERGY WIND POWER A/S
31.10.2008	18.03.2012	DE EM NR. 1 2008 A/S

- About 1.500 employees in 2025

- **What happens?** Big merger in 2006. In 2017 DONG energy rebrands as Ørsted and goes public. At the same time, employment is moved to a ”younger” CVR according to annual reports.
- Assume it is not an FKV firm. **Unclear how it would be reflected in LONG.** Complication – many more CVRs involved. Or not a problem since most of them share the same address?

Conclusion

- Longitudinal databases can identify cases of company (or economic unit) restructuring
- The main challenge is to clearly determine the underlying reasons and motives
- In many cases, substantial supplemental data is needed to interpret demographic changes

- **Particularly challenging areas:**
  - Demographic changes involving foreign actors
  - Young firms with limited available data (imputation issues etc.)

THANK YOU!

Danish Economic Councils

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