BANCA D'ITALIA
EUROSISTEMA

Discussion of

The impact of industrial robots on EU employment and wages: A local labour market approach

(Chiacchio, Petropoulos, Pichler)

By Eliana Viviano

Bank of Italy

ECB-CEPR workshop, 7th December 2018

The problem: how does robotization reshape LM? (1)

This is (obviously) a key question.

Robot: Automatically controlled, reprogrammable, multipurpose manipulator … for use in industrial automation applications

Addressed in similar ways by the literature:

Data from International Federation of Robots: aggregate data by industry for a bunch of countries

The problem: how does robotization reshape LM? (2)

- Local labour market approach: exposure to robots and outcomes (productivity, employment, wages)

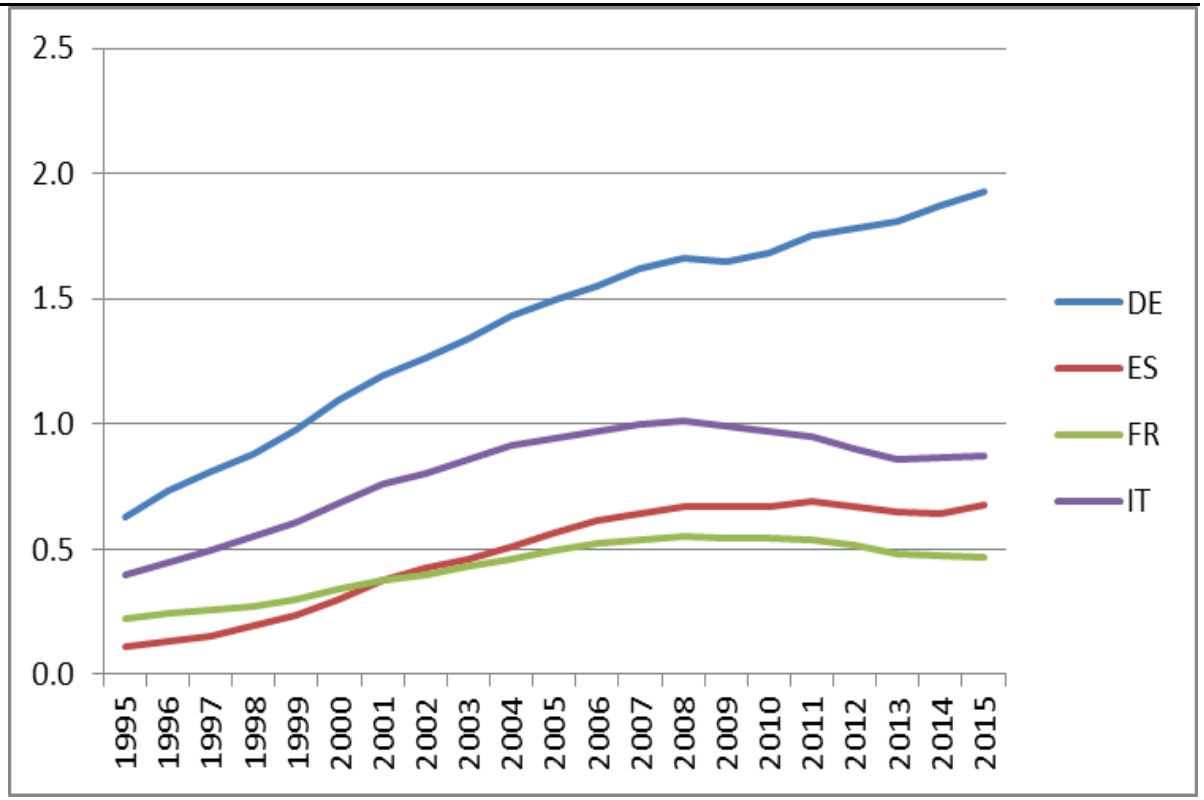
- Data on robots (IFR) from mid-ninenities to the pre-Crisis (2007), merged with other LM datasets, e.g. EU-KLEMS

- In this paper EU-SILC (ECHP prior to 2000), and LFS (for employment rates and wages)

Aggregate evidence

(IFR + Eurostat)

Figure 1- Number of robots per 1,000 inhabitants (1995-2015)



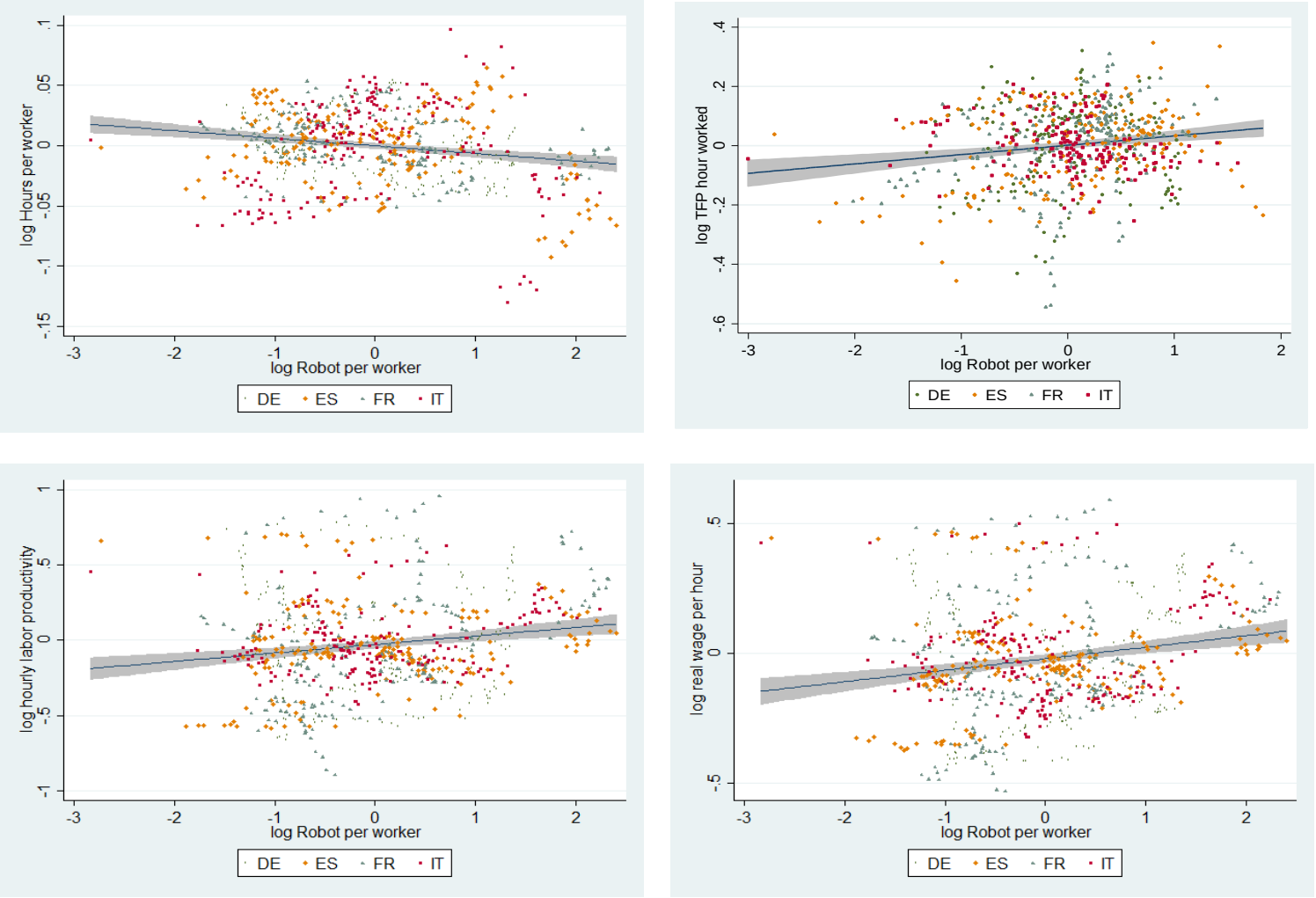
Source: Eurostat Census data as of 2001 and IFR, 1995-2015.

This is also the period of:

1. **ICT revolution**
2. **Globalization**
3. **Tertiarization**

At a first look a positive relationship

Figure 6- Correlations between robot intensity, working hours, productivity and wages. (1995-2015)



Notes: Authors' calculations on Eurostat national Accounts and IFR, 1995-2015.

Literature results

ICT, globalization and labour supply used as control variables (also in this paper)

Results:
Acemoglou and Restrepo (2017): Robots negative effects on wages and employment (US)

Dauth et al. (2017): Germany. No evidence of total job losses, but recomposition (towards services)

Gaetz and Michaels (2017): Positive effects on Y/L and TFP; no effect on employment, but low-skill workers.

This paper: Results

- Negative effects on employment, for the period before the Great Recession (previous version on the paper)
- No effect on total employment (with data until 2015)
- Sectoral negative effect: manufacturing
- Negative effect on wages (in the older version, not so large if we include 2015)

This paper: Technical comments (1)

- A lot of data efforts to get regional employment rate. Check consistency with official data.

- Empirical specification:
  1. Robot exposure:

$$\Delta robot\ exposure_{r,1995-2007} = \sum_{j \in J} \frac{emp_{rj,1995}}{emp_{r,1995}} \times \left(\frac{robots_{j,2007}}{emp_{j,1990}} - \frac{robots_{j,1995}}{emp_{j,1990}} \right)$$

where r labels each NUTS2 region and j each industry.

This paper: Technical comments (2)

2. Cell-level data: employment rate by gender, age-group, ect

$$\Delta employment\ rate_{rg,1995-2007} = \beta_1 + \beta_2 \Delta robot\ exposure_{r,1995-2007} + u_{rg}$$

$$\Delta wage_{rg,1995-2007} = \beta_1 + \beta_2 \Delta robot\ exposure_{r,1995-2007} + u_{rg}$$

where r labels NUTS2 regions and g the demographic group.

- Why using socio-demo groups? Regional data?
- Why do not adjust robot exposure to socio-demo?

This paper: Technical comments (3)

3. Clustering: by country and then adjusted. Why?
(wild clustered bootstrapping used, but it's problematic see Canay Santos Shaikh, 2018).

- Why not country*socio-demo group? (relevant supply changes in that period)
- Why not region*time?
- Absence of pre-trends?

This paper: more general comments (1)

- IVs (UK and DK frontier, EPL) and controls for other factors like ICT. Stressed in the paper not in the presentation. My point is: why these countries? Robots much more present in the in DE and IT. Did they really are a technological frontier?

- Why ICT has a positive effect? Why ICT and labour show complementarities and labour and robots do not?

This paper: more general comments (2)

- Results by occupation: why middle-skilled? How does this paper reconcile with standard polarization story?

- Polarization is (originally) a demand story, then more recently supply (e.g. Cerina and Moro, 2018, Basso et al. 2018).

- What about tertiarization (Buera and Kabovsky, 2012). Again a demand story, consumption of services with high-skill content.

Thank you very much for your attention