

# Job polarisation, technological change and routinisation: evidence from Portugal

Tiago Fonseca<sup>†\*</sup>, Francisco Lima<sup>†</sup>, Sonia C. Pereira<sup>‡</sup>

<sup>†</sup>Instituto Superior Técnico, Universidade de Lisboa, and CEG-IST; <sup>‡</sup>Bernard College, Columbia University and Columbia School of Social Work

\*contact: tiago.fonseca@tecnico.ulisboa.pt



## Motivation

Technology appears to have a different role in shaping post 1990s labor markets. While the relative growth continues for the high-skilled, low-skilled employment seems to grow unlike before, **howling out middle-skilled jobs — job polarisation.**

## Main Objectives

- Understand what is the role of technology shaping Portuguese Labour Market. Does Portugal is experiencing job polarisation?
- Is it because human labour being substituted by computer-driven machines?

## Data

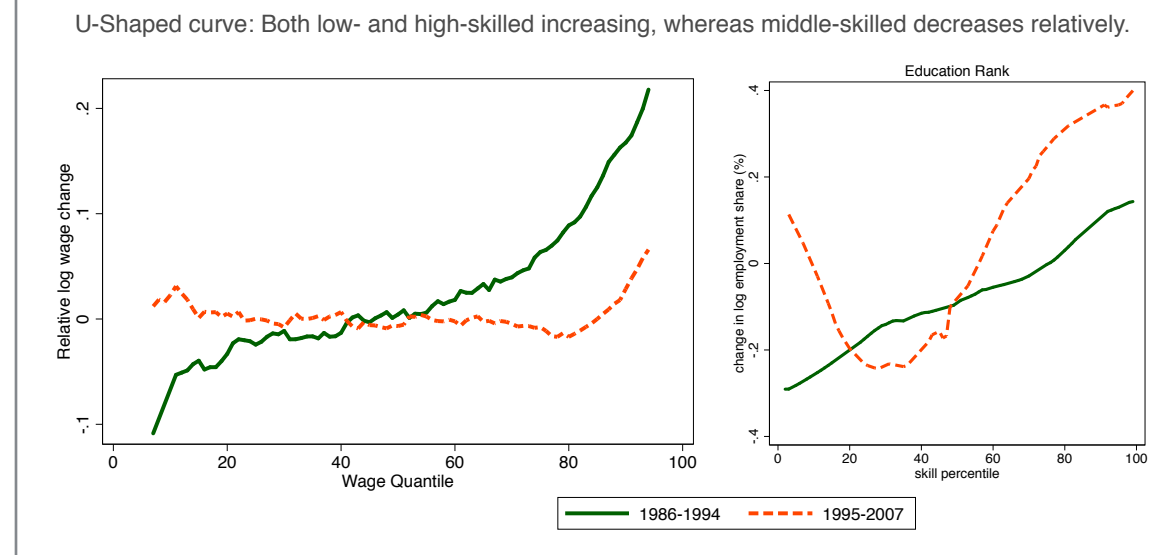
- We use Quadros de Pessoal, the Portuguese firm census created by the Ministry of Labor
- Includes all firms with at least one employee
- Longitudinal data from 1986-2007
- Additionally we use O\*NET dataset to construct occupational task measures.

## Task measures

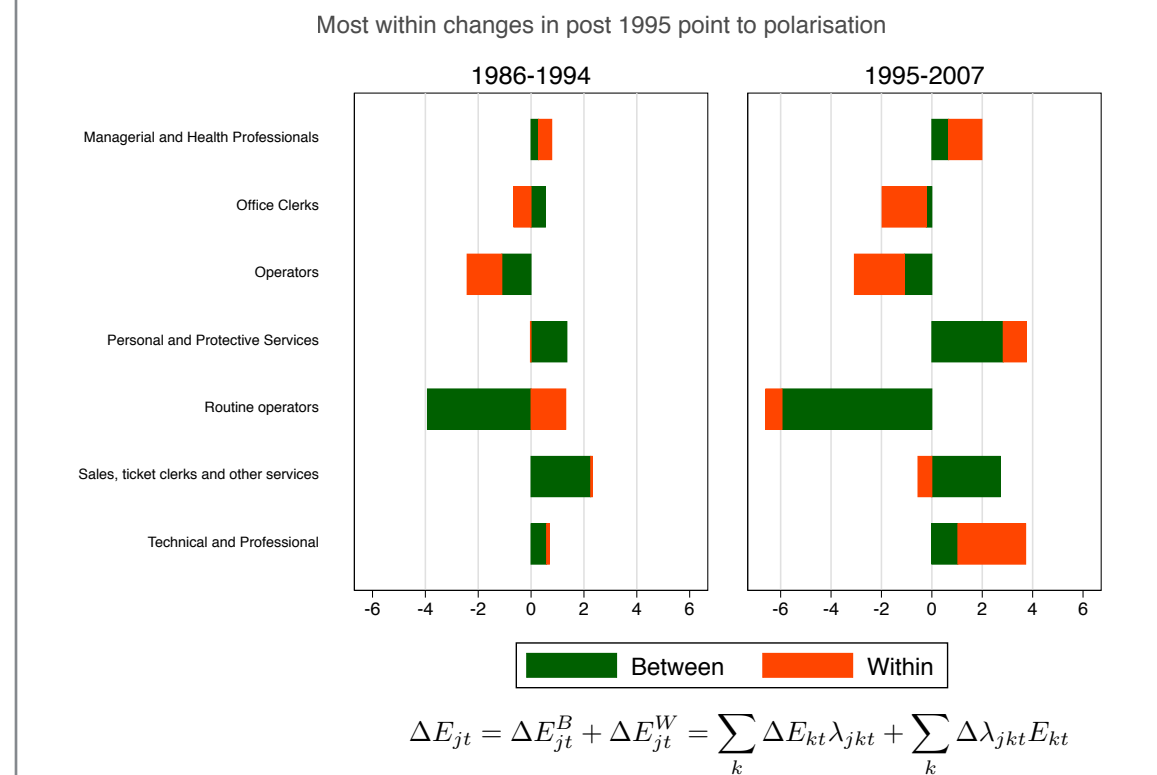
Task groups constructed from O\*NET are:

- **Abstract** — cognitive, requires complex problem solving and complex decisions (e.g., engineers, managers, physicians)
- **Routine** — perform well set of instructions, repetitive work (e.g., office clerks, cashiers)
- **Manual** — non-cognitive, but requires flexibility and adaptability (e.g., cleaners, plumbers)

## Polarised Employment and Wages



## Not due to change in industrial composition



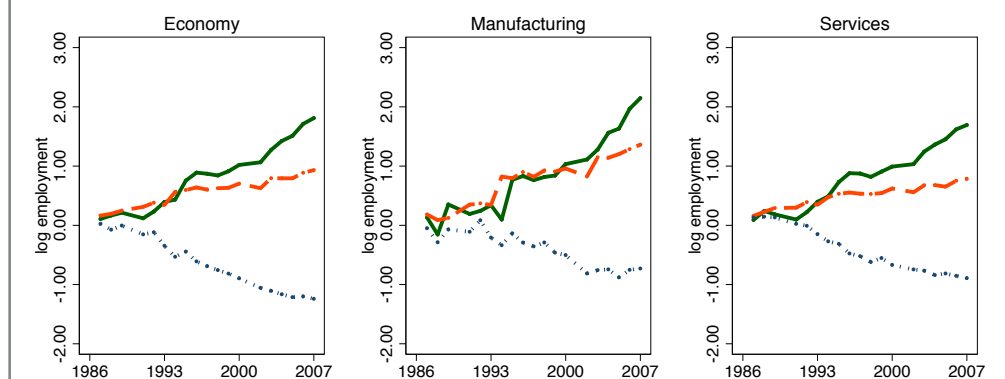
## Econometric Results

We test the **routinisation hypothesis: computer driven-machines complementing Abstract, substituting Routine** and being neutral do Manual workers. We test it by estimating regressions based on age-gender-education-industry-region cells. The model is then defined as such:

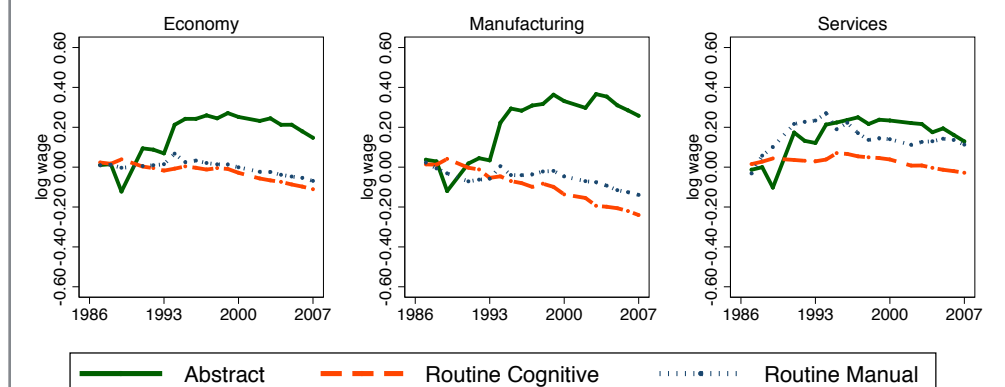
$$\Omega_{it} = \mathbf{t}_{it} \alpha + \mathbf{T}_{it_0} \times \mathbf{t}_{it} \gamma + \mathbf{X}_i \beta + \epsilon_{it}$$

Annotations:  $\Omega_{it}$  is log employment or log wage;  $\mathbf{t}_{it}$  are time dummies;  $\mathbf{T}_{it_0}$  is a vector of initial employment share in all tasks for cell in time  $t_0$  (1986);  $\mathbf{X}_i$  are cell fixed effects.

### A: Employment



### C: Wage - with controls for minimum wage



## Conclusions

- Portuguese labor market exhibits job and wage polarisation since mid 1990s.
- Technology is replacing routine tasks and complementing abstract.
- Policy implications: promote non-routine skills, investment in college education; S-D mismatch due to technology can be a probable cause of long term unemployment and thinning of the middle class.