The Causal Impact of Innovation on Tasks: An Analysis Using Employer-Employee Administrative Data

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The impact of innovation on the labour market. Background discussion and open issues

What the literature usually measure

- How many jobs are created or destroyed
- In which occupations and sectors
- Tasks imputed from occupation codes (e.g. O*NET): fixed by construction

What we usually miss

- How work changes for people who stay in their job
- Who inside the firm is affected

Two questions

1. Do process and organisational innovations increase the routinisation of work for incumbent workers?
2. Are the effects even across the occupational hierarchy, or concentrated in some groups?

Three ways work becomes more routine

Outcome variables, i.e. tasks affected by innovation

Repetitiveness

Continuous repetition of the same gestures or operations

Technical control

Pace of work set by the automatic cadence of a machine, digital device or production flow

Bureaucratic control

Pace set by computerised tracking, quantified objectives, impersonal monitoring

Two types of innovation, kept separate

Process innovation
When new machinery or production technique is introduced

Organisational innovation
When new management practices, restructuring, new ways of allocating and evaluating work is introduced

Following the same workers over time

Data: Worker panel

- **French Working conditions Survey** (DARES). 2013, 2016, 2019.
It asks whether innovations where introduced, and the tasks performed at work
It follows the same individual over time.

- **Administrative data** (FARE and BTS): Used for robustness tests, due to matching difficulties.

Treatment

Control group:
Workers who work in firms that never innovate

Treatment group:
Workers who in 2016 and/or 209 experience an innovation at work
In the past 12 months.

Matching

To equalise characteristics of both groups of workers.

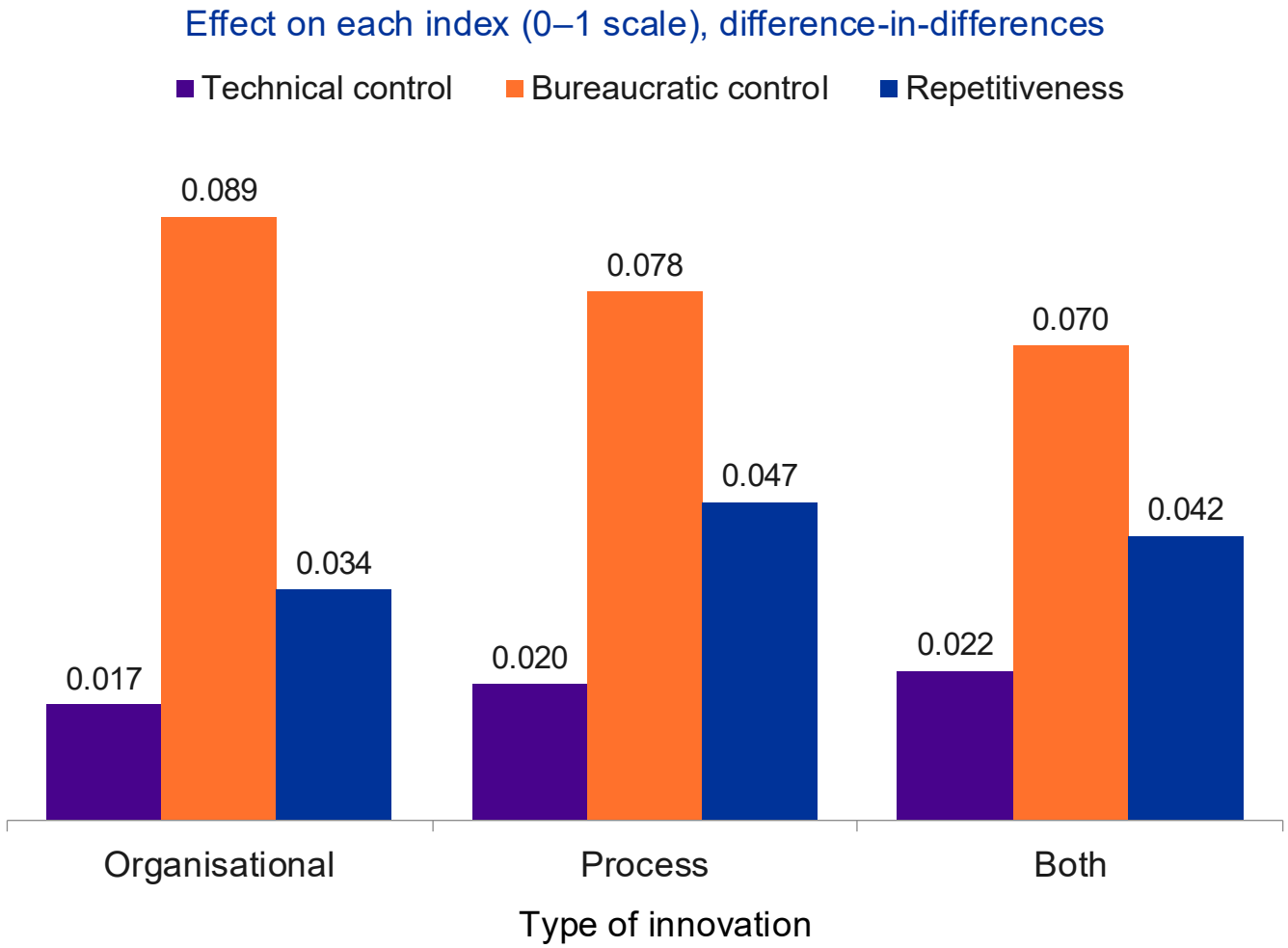
Final sample: between 900 and 3,000 workers

Estimation

How tasks for treated workers change compared to untreated (control) workers)

Difference-in-differences: two-way fixed effects, checked with Callaway–Sant'Anna.

Aggregate Results: The impact of innovation on tasks.



Largest

Bureaucratic control responds most to every type of innovation

Robust

Holds with Callaway–Sant'Anna and with firm-level administrative controls

Occupational results: Effects concentrate in top and middle jobs

	Bureaucratic control	Technical control	Repetitiveness
Top Managers, professionals, technicians	**Organisational innovation ✓** **Process innovation✓**	**Organisational innovation ✓**	No significant effect
Middle Clerks, sales workers	**Process innovation✓**	No significant effect	No significant effect
Bottom Craft, operators, elementary	No significant effect	No significant effect	No significant effect

The codification of discretion

Jobs thought to be sheltered from routine keep their complex tasks but face more targets, reporting and computerised monitoring.

Bottom: no effect ≠ unaffected

These jobs already have the highest repetitiveness and technical control, leaving less room for further increases.

Implications

Main finding: innovation standardises work. Bureaucratic control (targets, reporting, computerised monitoring) rises most, and mainly in top and middle occupations.

Skills anticipation and training

Change in tasks and skills happens also inside occupations. Forecasts by occupation, with fixed tasks imputation, miss it. Anticipation needs to account for change in task indicators too especially across diverse countries.

Prepare workers for changing ways of working. Workers may need to interpret data, work with targets and question performance metrics—not just use digital tools.

Skills use, not only supply. Less discretion can leave skills underused. Train managers in job design, not only workers.

Data for labour market intelligence

Measure tasks at worker level, repeatedly. Add a short module on tasks, autonomy, pace-setting, targets, digital monitoring and repetitiveness to existing surveys.

Build data linkage in from the start. Our panel shrank because firm IDs were collected for only part of the sample.

Combine sources. Use harmonised questions over time and, where feasible, link worker, employer and administrative data from the outset.

Can results be generalised? France, 2013–2019, with protective labour institutions. Effects may differ where informal and small-firm employment is larger: replication in partner countries is an open question.

Take-home messages

1

Innovation changes work for those who stay

Mainly by extending targets, procedures and computerised monitoring.

2

It reaches the jobs assumed to be sheltered

Top and middle occupations, not the bottom, show the clearest increases in control.

3

You need the right data to see it

Worker-level task panels, linked to employer and administrative records.

Discussion: Which existing data sources could capture (or be adapted to capture) changes in work within occupations and how could this evidence inform occupational standards and training?

Thank you



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