

DID COVID-19 (PERMANENTLY) RAISE THE DEMAND FOR “TELEWORKABLE” JOBS?

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MOTIVATIONS

- The COVID-19 pandemic wrought profound shifts in both people's lives and firms' operations and the adoption of remote work (working from home, WFH) became widespread (Barrero et al. 2023; Bick et al. 2023; Bartik et al. 2020)
- Extant research extensively explores the impact of WFH on productivity (Angelici and Profeta 2023; Morikawa 2022; Bartik et al. 2020; Etheridge et al. 2020; Feng and Savani 2020), analyzes the actual use of WFH (Aksoy et al. 2023), the “teleworkability” of the current workforce or the characteristics of workers working from home (Alipour et al. 2023)
- Other studies have examined the **potential re-allocative impact** of COVID-19 in the labor market (Bonacini et al. 2021), predicting large changes

BUT

- Evidence on the **actual reallocative effects of the pandemic towards teleworkable jobs** is still lacking!



MOTIVATIONS

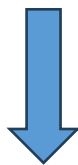
Understanding how the pandemic influenced the demand for teleworkable jobs throws light on:

- the adaptability of work structures in response to crises ➡ A guide for future workforce planning strategies;
- potential shifts in required skills and qualifications, a crucial information for educational institutions and policymakers to align training programs with evolving job requirements;
- understanding the labor market dynamics post-COVID-19, aiding in informed economic policymaking;
- potential changes in the **quality** of available employment opportunities. Indeed, **teleworkable jobs** are often considered “**good jobs**,” offering higher pay, requiring advanced qualifications, and providing increased work autonomy



AIM OF THE PAPER

- The aim is to focus on uncovering whether COVID-19 induced a **lasting transformation** in the occupational fabric of the economy
- Specifically, we analyze **the effect of COVID-19 on the composition of new hires in terms of jobs suitable for “working from home” (WFH)**



- We employ **high-quality data from Italy**: information on job creation from **an employer-employee administrative dataset** provided by the Italian Ministry of Labor and Social Policies: *Sistema Informativo Statistico delle Comunicazioni Obbligatorie* (SISCO). To classify occupations according to their potential for WFH, we utilize the *Indagine Campionaria delle Professioni* (ICP) conducted by INAPP with the collaboration of ISTAT.
- Thus, this study leverages detailed administrative data on firms’ job flows and differences across Local Labor Markets (LLMs) in the spread of COVID-19 to **investigate shifts in labor demand prompted by the pandemic**



RELATED LITERATURE (1)

- Dingel and Neiman (2020), using the rich information on worker activities and occupational characteristics in the O*NET database, build an index of propensity to work from home showing that nearly 37% of jobs in the U.S. can be performed entirely from home. They also highlight significant variations across cities and industries, and the fact that remote jobs tend to be more highly paid than non-remote jobs
- Barbieri et al. (2022), using highly detailed information on the attributes of fine-grained occupations collected from ICP-INAPP, estimate that the share of Italian employees that could potentially work remotely is around 33% in the total Italian economy
- Buia et al. (2023), analyzing the European SHARE survey, found that around 22% of men and 30% of women were working remotely between 2020 and 2021
- Crescenzi et al. (2022): relying solely on survey data may overestimate the share of jobs that are carried out remotely. They suggest that only 12% of the workforce was able to work remotely



RELATED LITERATURE (2)

WFH could be not a temporary phenomenon but lead to structural changes

- Basso et al. (2020): it is very likely that training in digital skills will be required a structural transformation, with a permanent shrinkage of certain occupations and a growth in labor demand in other jobs or sectors
- Barrero et al. (2021) show that short-term impact of the pandemic caused three new hires for every ten layoffs. The authors predict that a 42% of recent layoffs becoming permanent job losses, and that almost 22% of full workdays will be supplied from home (about four times the pre-pandemic WFH share)

The implementation of WFH arrangements affects also productivity

- Bloom et al. (2015): WFH led to a 13% increase in productivity, which they attributed to a quieter working environment and reduced time spent on commuting
- Angelici and Profeta (2023): causal evidence that flexibility in time and place of work (“smart working”) increases the objective productivity of workers and improves their well-being and work-life balance
- Bloom et al. (2023): total factor productivity (TFP) fell by up to 5% during 2020-21 in the UK, but hourly labor productivity was positively affected

WFH adoption are likely to have uneven effects on workers

- Bonacini et al. (2021), Alipour et al. (2023): a permanent adoption of WFH raises average labor incomes, benefits mainly high-educated and high-paid employees. So, increased polarization



THE DATASET

A unique dataset obtained by linking an **administrative archive on job flows** to a **survey on occupation characteristics**

- The archive of the Compulsory Communications System (*Sistema delle Comunicazioni Obbligatorie*, COB) provided by the Ministry of Labor and Social Policies: it records from 2009 information on each job relationship that started, changed or ended for firing, dismissal, retirement, or transformation for all individuals working in Italy as employees. Moreover, it includes occupational (5-digit) and educational information
- The *Indagine Campionaria delle Professioni* (ICP) conducted by INAPP. The ICP survey was last run in 2013 and involves 16,000 workers recording detailed information on all the 5-digit occupations (i.e., 811 occupational codes) in the Italian labor market. The ICP is the Italian equivalent of the American O*NET
- Mortality data from the Italian National Institute of Statistics (ISTAT): the count of daily deaths for each LLM in Italy by individual municipality of residence
- The period: from **2017Q1 to 2021Q4**
- **Sample selection:** all contractual arrangements activated to employees aged between 17 and 64 years. Drop all contracts with a duration below 30 days (10th percentile). The **final sample** is composed by **5,998,993 observations**



THE WFH INDEX AND THE EXCESS MORTALITY MEASURE

- By utilizing ICP, we identify occupations that are more likely to adopt WFH arrangements. **The teleworkability of each profession at the 3-digit level by averaging the responses to seven specific questions** (Dingel and Neiman 2020):
 - (i) importance of physical activities (reversely); importance of working with computers; (iii) importance of maneuvering vehicles or equipment (reversely); (iv) Requirement of face-to-face interactions (reversely); (v) dealing with external customers (reversely); (vi) physical proximity (reversely); (vii) time spent standing (reversely)
- **The ICP Index measures how much occupation j is prone to WFH:** equal to 1 if the occupation has an ICP value in the top 33% of the ICP distribution (Author and Dorn 2013), and 0 otherwise
- **Excess mortality measured at the LLM level** captures the differential firms' exposure to the pandemic shock depending on the LLM in which they were located. The excess mortality ratio is computed as:

$$Exc_l = \frac{M_{l,2020} - \bar{M}_{l,2015-2019}}{\bar{M}_{l,2015-2019}} * 100$$

- Where $M_{l,2020}$ is the number of deaths over the March-May 2020 period and $\bar{M}_{l,2015-2019}$ represents the average number of annual deaths in the period 2015-2019, in each / Local Labor Market. The variable is standardized to have mean=0 and SD=1.



THE SPATIAL DISTRIBUTION OF EXCESS MORTALITY

Excess Mortality by Local Labor Markets (LLMs)

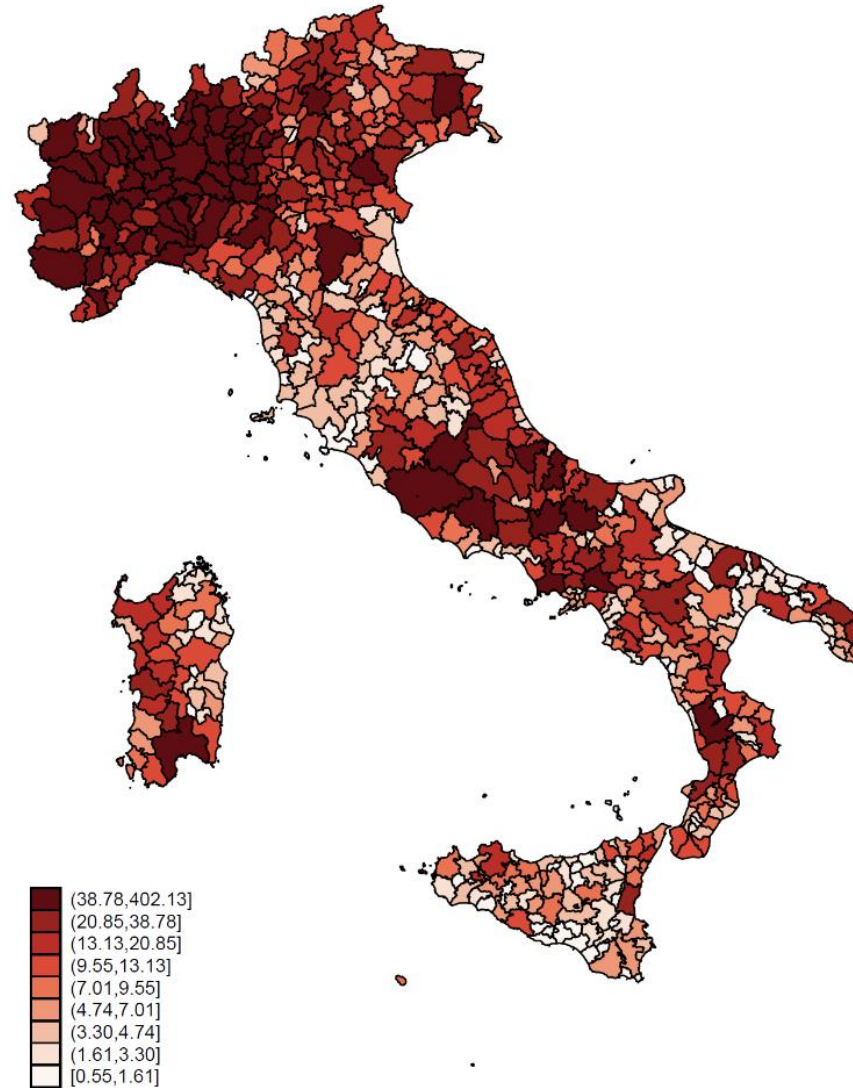


Table 1: COB Dataset composition

Characteristic	Frequency	Percent
Permanent Contract	1,179,755	19.52
Temporary Contract	4,128,177	68.81
Other Contract	700,060	11.67
Female	2,744,176	45.74
Male	3,254,817	54.26
Under 35 y.o.	2,764,718	47.38
35-54 y.o.	2,586,390	43.11
55+ y.o.	647,884	10.8
North	2,842,556	47.38
Center	1,179,794	19.67
South	1,976,643	32.95
Total	5,998,993	100

Note: The other category of contracts includes: para-subordinate, agency, on call, and apprenticeship contracts. All observations are weighted.

Source: Author's elaborations on COB-ICP dataset 2017-2021.

METHODOLOGY

To analyze whether the pandemic of COVID-19 caused an increase in jobs that could be done from home, we estimate the following model:

$$WFH Share_{itc} = \alpha + \beta(Exc_l * post_t) + D_i + D_c + D_l + D_t + D_{st} + \varepsilon_{it}$$

- $WFH Share_{it}$ is the dependent variable that measures the share of WFH hirings in firm i , contract c , and time t defined as a combination of semester and year
- Exc_l is the excess mortality measured in l Local Labor Market due to COVID-19 in the March-May quarter of 2020. The interaction with post indicator allows us to identify the variable shocks that hit LLMs due to differential pandemic intensity at the pandemic outbreak. **The coefficients can be interpreted as the increase in job creation determined by a one-SD increase in excess mortality**
- The coefficient of interest is β that captures the treatment effect of interest. The estimated coefficient pins down firms' labor market responses to the severity of the pandemic in terms of WFH job creation
- $D_i, D_c, D_l, D_t, D_{st}$ are firm, contract type, LLM, period, and (sector by time) Fixed Effects
- The **key assumption for identification** is the **parallel trend assumption verified through the estimation of an event-study specification**. By comparing the post- with the pre-pandemic periods, our study investigates **the changes in the WFH composition of hirings associated with the local intensity of the pandemic and their dynamics**



THE DEPENDENT VARIABLE: FIRMS' WFH JOBS CREATION MEASURE

- An indicator that measures the share of WFH occupations **within each firm and according to the type of contract** (open-ended, fixed-term, other residuals types of contracts). The share of highly teleworkable jobs creation is defined as:

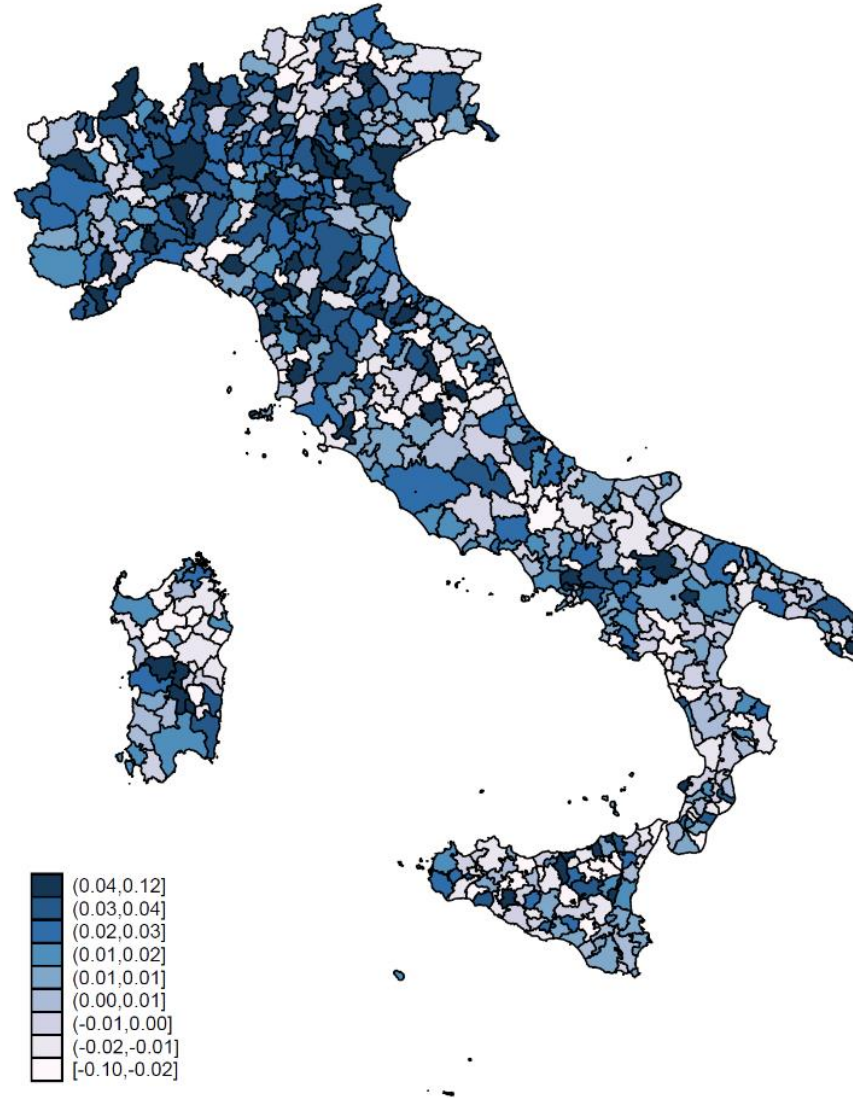
$$WFH\ Share_{itc} = \frac{[\sum_j N_{ijct} * 1[ICP\ Index_j > ICP^{66pct}]]}{N_{it}}$$

- where N_{ijct} is the number of hirings made by firm i , in occupation j (3-digit code), at time t , with the type of contract c ; N_{it} is the total number of hirings made by firm i in time t
- ICP Index is the index built from the ICP survey;
- The firm-level data provided by COB include information about firm location at the municipality level, which was used to build the LLM information to match data on job flows with LLMs' excess mortality



THE SPATIAL DISTRIBUTION OF CHANGES IN WFH HIRING SHARE

Change in the share of WFH hirings across LLM



MAIN RESULTS

Table 3: DiD Estimation

Dependent Variable:	WFH Share by contract type			
	All	Open End	Fixed End	Other
	(1)	(2)	(3)	(4)
<i>Exc. Mortality * Post COVID</i>	.0009*** (.0001)	.002*** (.0004)	.00008 (.0002)	.001 (.0006)
Firm FE	Y	Y	Y	Y
Contract FE	Y	Y	Y	Y
Period FE	Y	Y	Y	Y
LLM FE	Y	Y	Y	Y
Sector-period FE	Y	Y	Y	Y

Note: This table reports DiD estimations of Eq. (3). The dependent variable is the WFH Share for different categories of contracts. All kind of FE and trends are included. Robust standard errors, clustered at the LLM level in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Author's elaborations on COB-ICP dataset 2017-2021.

Figure 3: Event Study Estimation WFH - All Contracts

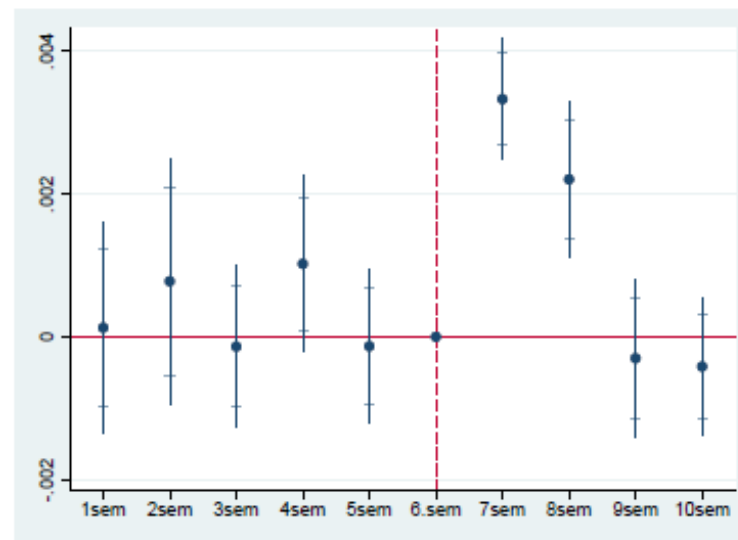
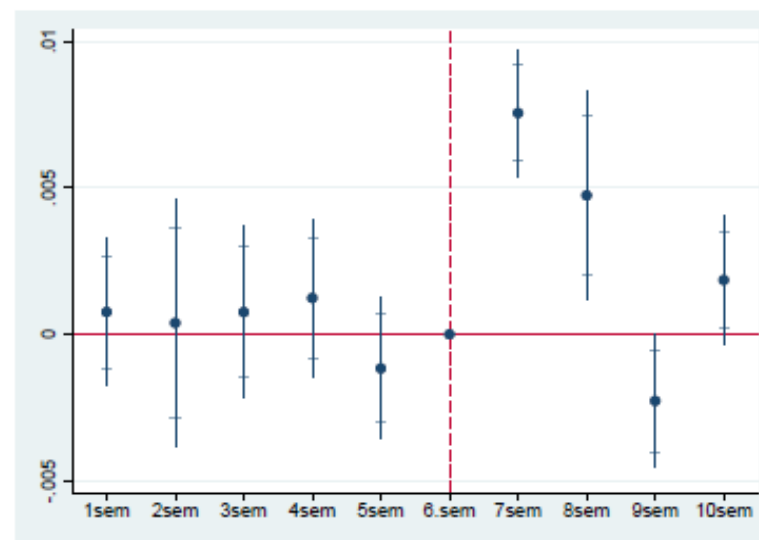


Figure 4: Event Study Estimation WFH - Permanent



EFFECT-HETEROGENEITY ANALYSIS: WORKERS' CHARACTERISTICS

Figure A.2: Event Study Estimation WFH - Male

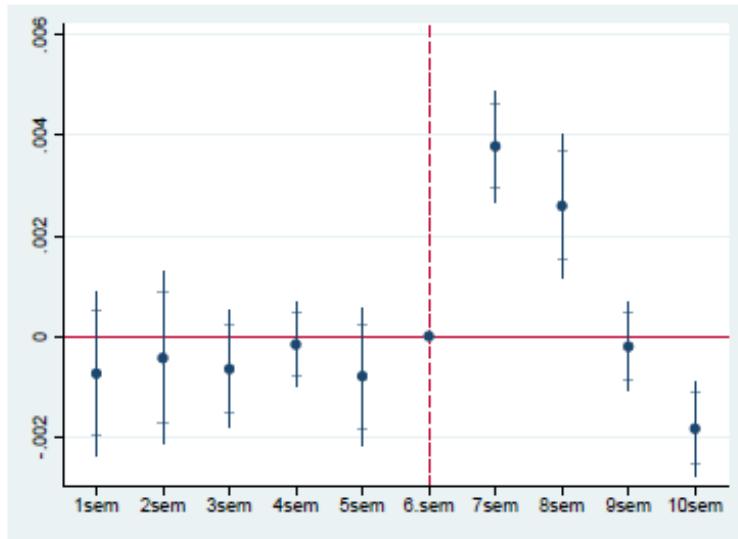
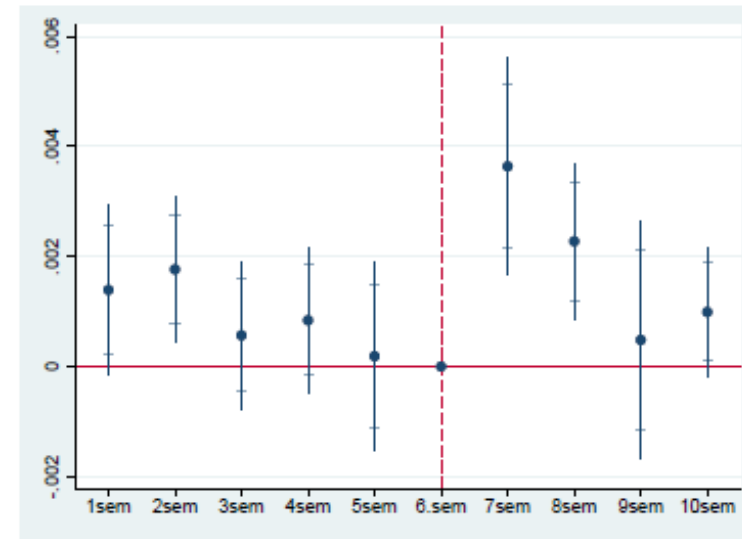


Figure A.3: Event Study Estimation WFH - Female



- Positive and statistically significant increase for male workers, persisting for two semesters following the pandemic outbreak but then significantly decreasing.
- Similar increase in magnitude and persistence for female employees; but the parallel trend assumption is violated. It is possible that the national law on “*lavoro agile*” had a distinct impact on female workers, given their propensity to benefit from WFH
- Re-estimation of the model for women in different age bins: presence of significant differences before the COVID-19 outbreaks is mainly due to young women, those who also show the strongest increase: around 0.4pp → A greater desire for work-home balance originated by those women who are in the age of having young children

EFFECT-HETEROGENEITY ANALYSIS: FIRMS' CHARACTERISTICS

Figure A.13: Event Study Estimation WFH - Manufacturing sector

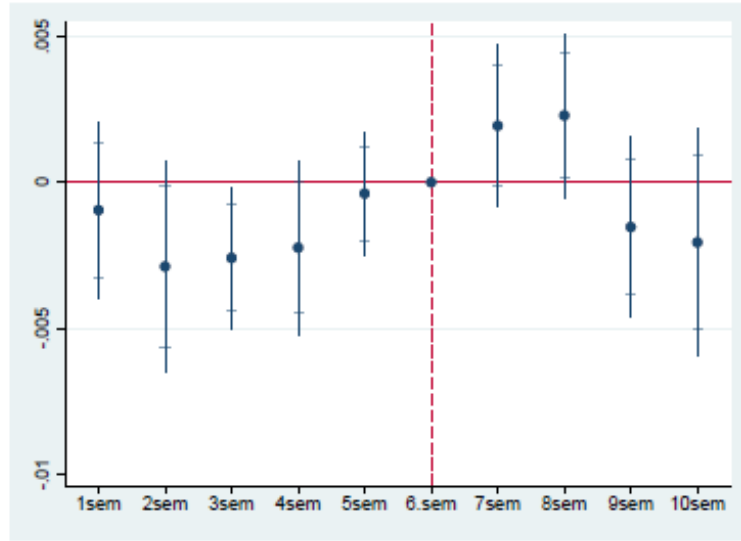


Figure A.14: Event Study Estimation WFH - Service sector

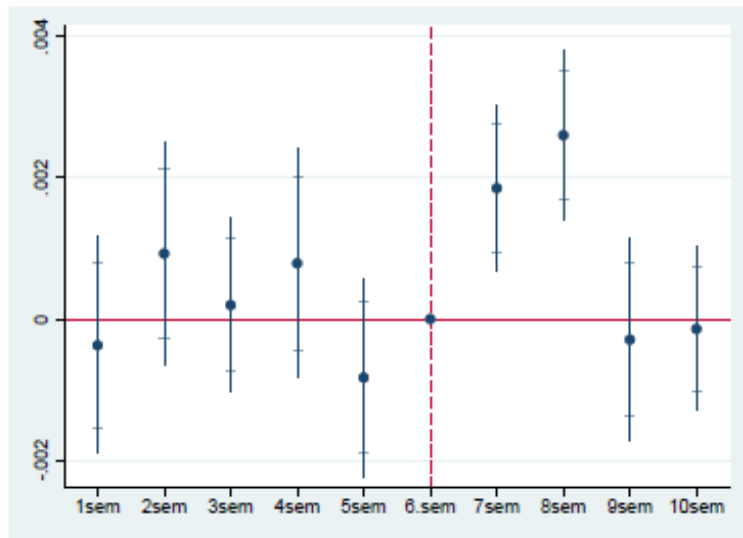


Figure A.15: Event Study Estimation WFH - Small firms (less than 50 employees)

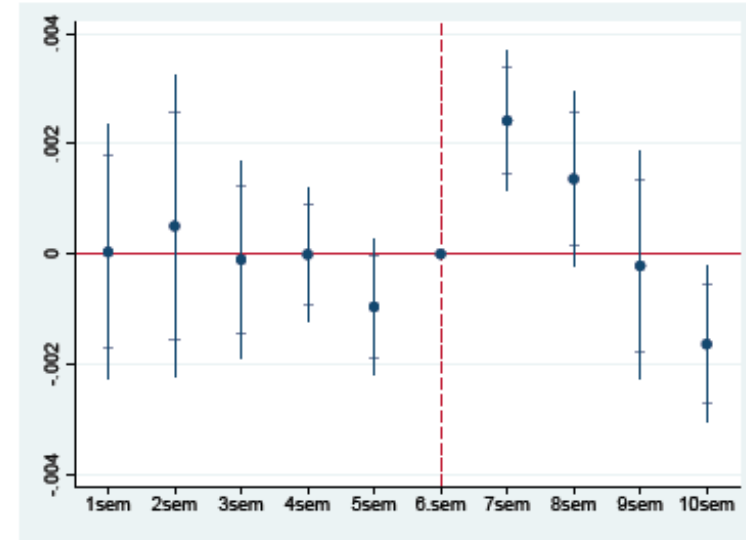
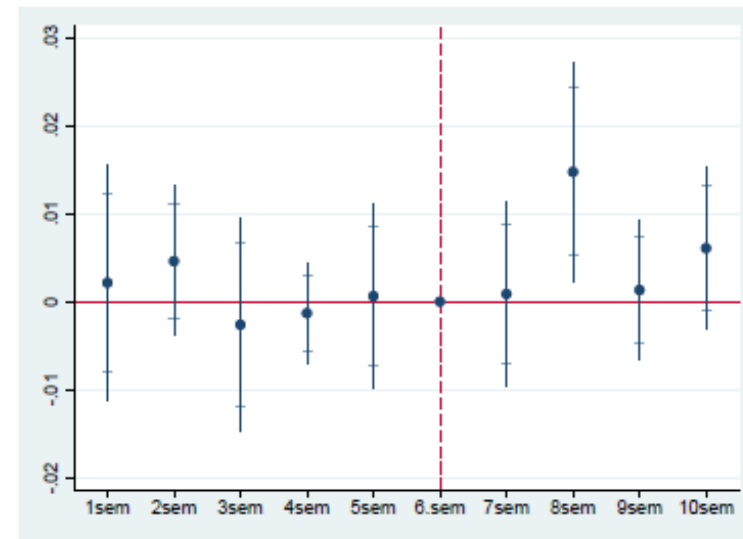


Figure A.17: Event Study Estimation WFH - Large firms (more than 250 employees)



CONCLUSIONS

- This paper sheds light on firms' capacity to adapt their workforce during an unprecedented health shock
- The results demonstrate that comparing two firms in LLMs differing by one-SD in excess mortality, the one in the LLM more heavily affected by COVID-19 experienced on average a 0.1 p.p. larger creation of teleworkable jobs in the post-pandemic period, which rises to 0.2 p.p. when focusing on hirings with open-ended contracts.
- A DID-event-study analysis shows the validity of the common trend assumption and that the stronger impact found on open-ended contracts suggests that the transformation of the workforce may have been structural.
- An effect-heterogeneity analysis shows larger effects on: **females' workers, younger workers, firms located in Northern and partly Southern Italy** (compared to the Center), **larger firms (above 250 employees)** and **in the service sector**
- **POSSIBLE FUTURE RESEARCH:** employ data on wages to assess whether, because of the higher demand, workers in WFH jobs experienced a wage increase





THANKS FOR YOUR ATTENTION

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