

# MANAGEMENT AND REMOTE WORK

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The views expressed herein are those of the authors and do not necessarily reflect those of the Bank of Italy.

# MOTIVATION

- ▶ Increased remote work following COVID-19 with persistence in new normal
- ▶ Existing assets in the firm complementing remote work can:
  1. Facilitate adoption
  2. Explain persistence
- ▶ What are complementary assets to remote work?
  1. Physical: IT infrastructure [Barrero, Bloom, and Davis, 2021] broadband fibre [Boeri, Crescenzi, and Rigo, 2022]
  2. Organizational?

Management practices: remote work may be easier when the firm has mechanisms in place to help set goals, measure outcomes, and reward employees accordingly.

## THIS PAPER

1. **Question:** We examine whether management practices explain the takeup, intensity and persistence of remote work in firms
2. **Data:** Annual Firm survey of the Bank of Italy: management practices (2019), remote work (2019-2022).
3. **Estimation:** We estimate extensive and intensive margin relationships between management and remote work (2022). To correct for selection affecting the intensive margin estimate, we instrument using local COVID-19 restrictions (late 2020) [Conteduca and Borin, 2022]
4. **Results:** Better management is associated with higher remote work.
  - ▶ **Extensive margin:** 1 SD increase in the management score is associated with 6.1percentage point increase in the probability of remote work at the firm.
  - ▶ **Intensive margin:** 1 SD increase in the management score is associated with 2.91 percentage point increase in the average share of employees working remotely on a given day for firms that have remote work.

# DATA

Annual firm survey of the Bank of Italy (2019-2022):

1. Management score (2019) following [Bloom, Brynjolfsson, Foster, Jarmin, Patnaik, Saporta-Eksten, and Van Reenen, 2019]
2. Consistent measure of remote work 2019 (retrospective), 2020, 2021 and 2022.
3. Sample size: 3000 firms in the survey with remote work, MOPS score for about 1800. Balanced panel with both measures: **1053** firms.
4. Controls for other drivers of WFH: size, skill, IT.
5. Performance outcomes: sales growth, labor productivity

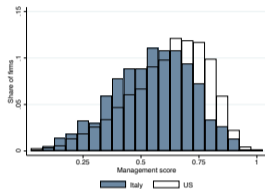
## BANK OF ITALY: MOPS MODULE

8 question module on 3 dimensions of management (monitoring, targets & incentives) derived from the US MOPS measuring management practices in firms in 2019.

| Business practices  |                                 |
|---|---------------------------------|
| We are interested in the main business practices used by your firm <b>in 2019</b> . Business practices are defined here as the conduct and practices adopted in the management of the production process for your firm's goods and/or services.   |                                 |
| When your firm encountered a problem in the production of its goods and/or services, what happened?<br><i>(e.g. when a quality defect was detected in your products and/or services)</i> .....  | <input type="text"/> <b>PM1</b> |
| <ol style="list-style-type: none"><li>1 It was solved but no further measures were taken</li><li>2 It was solved and further measures were taken to prevent it from happening again</li><li>3 It was solved, further measures were taken to prevent it from happening again, and a continuous improvement process was launched to prevent such problems from occurring in the future</li><li>4 No measures were taken</li><li>5 No such problem ever occurred during production</li></ol> |                                 |

Complete responses: at least 5 of the 8 questions following the skip pattern. Overall MOPS score computed as the unweighted average of all questions, normalized to have mean zero and standard deviation one. Low scores indicating lower use of structured management practices.

# VALIDATION OF MANAGEMENT MEASURE FOR ITALY



Note: Italy vs US MOPS score distribution.

42.8% in Italy (vs. 27% in the US) percent of firms adopt less than half the practices. One standard deviation change in the management score associated with 10% higher level of labour productivity (vs. 26.2% in the US).

|                        | Log (Output/Emp)    |                     | Profit/Sales       | EBITDA/Assets       |
|------------------------|---------------------|---------------------|--------------------|---------------------|
|                        | (1)                 | (2)                 | (3)                | (4)                 |
| Management             | 0.095***<br>(0.018) | 0.031**<br>(0.013)  | 0.883**<br>(0.417) | 14.863**<br>(6.812) |
| Log(Capital/Emp)       |                     | 0.040***<br>(0.014) | 0.392<br>(0.416)   | -9.169<br>(7.716)   |
| Log(Emp)               |                     | 0.015<br>(0.014)    | 0.548**<br>(0.264) | -7.421**<br>(3.604) |
| Log(Material/Emp)      |                     | 0.442***<br>(0.039) | 0.058<br>(0.790)   | 13.426<br>(8.562)   |
| Skill (% white collar) |                     | 0.005***<br>(0.002) | -0.020<br>(0.016)  | -0.320<br>(0.291)   |
| Observations           | 1808                | 1701                | 1690               | 1701                |

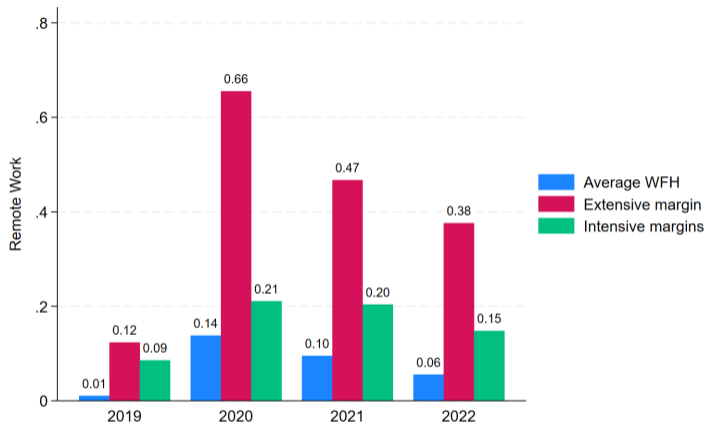
Output is measured by revenue (1000 EUR), employment by headcount of employees. EBITDA is constructed from 2020 INVIND variables. Capital is measured at the book value and the share of white collar workers is taken from the 2018 INVIND survey. EBITDA is measured as value added minus labor costs. The scale of the dependent variable in Columns (3) and (4) is multiplied by 100 for readability. All regressions include 3-digit industry fixed effects, and standard errors are clustered at the 3-digit industry level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# REMOTE WORK QUESTION

The identically worded question was asked for 2019 (retrospectively), 2020, 2021, 2022:

| Remote working  |  |                           |                           |
|---|--|---------------------------|---------------------------|
| ?   | What was the average share of staff working remotely on a given day... | ...in 2019?               | ...in 2020?               |
| Total staff .....   | (%)  | <input type="text"/> SW1A | <input type="text"/> SW1B |
| Considering only top and middle management and white-collar workers .....   | (%)  | <input type="text"/> SW2A | <input type="text"/> SW2B |
| <p>If, for example, in a firm with 100 employees, 20 employees worked in a location other than the company's office every day (this includes 'agile working', 'smart working', teleworking and remote working), please indicate that, on average, 20 per cent of staff worked remotely on a given day, regardless of the fact that remote work was used by all employees on a rotating basis, by only a subset of employees, or by the very same individuals every day.</p> |  |                           |                           |

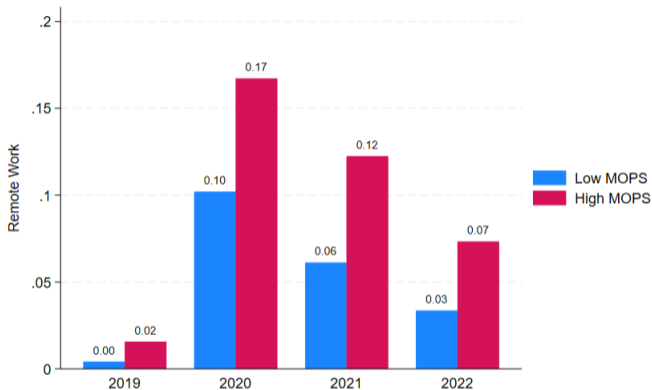
## WFH TREND IN ITALY (2019-2022)



Note: Average remote work in 2022, defined as the response to the question “What share of your employees worked remotely on a given day?” average, extensive and intensive margins for the balanced sample of 1053 firms which answer the management module (2019) and the remote work question for all years (2019-2022).



## WFH: Low vs High MOPS



Note: Average remote work in 2022, defined as the response to the question “What share of your employees worked remotely on a given day?” split by management score below (blue) and above (red) mean of the standardized score, for the balanced sample of 1053 firms which answer the management module (2019) and the remote work question for all years (2019-2022).

# WFH AND MOPS: EXTENSIVE VS INTENSIVE MARGINS



Note: Average remote work in 2022, defined as the response to the question “What share of your employees worked remotely on a given day?” for extensive (left) and intensive (right) margins split by management score below (blue) and above (red) mean of the standardized score, for the balanced sample of 1053 firms which answer the management module (2019) and the remote work question for all years (2019-2022).

## MANAGEMENT & WFH: EXTENSIVE MARGIN

We estimate:

$$\mathbb{1}_{WFH>0} = \alpha_0 + \alpha_1 \text{Manag}_i + \alpha_3' X_i + S_i + \epsilon_i$$

- ▶  $\mathbb{1}_{WFH>0}$  takes value 1 if the firm has positive remote work in 2022.
- ▶  $\text{Manag}_i$  is the management score (2019)
- ▶  $X_i$  are 2019 controls: log employment, advanced technologies in 2019 skill (share of white collar workers from 2018 social security data) and  $\mathbb{1}_{WFH>0}$  in 2019
- ▶  $S_i$  Macro-sectoral fixed effects (e.g. Food and beverages)

# MANAGEMENT AND EXTENSIVE MARGIN WFH

|                             | (1)                 | (2)                  | (3)                  | (4)                  | (5)                  |
|-----------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Management                  | 0.139***<br>(0.013) | 0.0854***<br>(0.013) | 0.0709***<br>(0.012) | 0.0661***<br>(0.012) | 0.0619***<br>(0.014) |
| Log(Employment)             |                     | 0.126***<br>(0.010)  | 0.0994***<br>(0.010) | 0.0886***<br>(0.011) | 0.0896***<br>(0.011) |
| Advanced technologies       |                     |                      | 0.128***<br>(0.029)  | 0.117***<br>(0.029)  | 0.115***<br>(0.027)  |
| Skill (share white collar)  |                     |                      | 0.601***<br>(0.047)  | 0.544***<br>(0.049)  | 0.560***<br>(0.051)  |
| $\mathbb{1}_{WFH>0}$ (2019) |                     |                      |                      | 0.194***<br>(0.038)  | 0.193***<br>(0.041)  |
| Macro-sector FE             |                     |                      |                      |                      | Yes                  |
| Observations                | 1053                | 1053                 | 1013                 | 1013                 | 1009                 |

Note: The dependent variable is the extensive margin of remote work in 2022, defined as the response to the question “What share of your employees worked remotely on a given day?” Employment is based on headcount, measured in 2019. Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# MANAGEMENT AND INTENSITY OF REMOTE WORK (OLS)

|                             | (1)               | (2)                | (3)                  | (4)                  | (5)                  |
|-----------------------------|-------------------|--------------------|----------------------|----------------------|----------------------|
| Management                  | 0.0153<br>(0.014) | 0.0115<br>(0.015)  | 0.0128<br>(0.014)    | 0.00976<br>(0.014)   | 0.0119<br>(0.011)    |
| Log(Employment)             |                   | 0.00715<br>(0.008) | -0.00174<br>(0.007)  | -0.00714<br>(0.007)  | -0.00841<br>(0.007)  |
| Advanced technologies       |                   |                    | 0.0606***<br>(0.017) | 0.0556***<br>(0.017) | 0.0519***<br>(0.020) |
| Skill (share white collar)  |                   |                    | 0.328***<br>(0.038)  | 0.298***<br>(0.038)  | 0.247***<br>(0.039)  |
| $\mathbb{1}_{WFH>0}$ (2019) |                   |                    |                      | 0.0704***<br>(0.025) | 0.0721***<br>(0.023) |
| Macro-sector FE             |                   |                    |                      |                      | Yes                  |
| Observations                | 396               | 396                | 385                  | 385                  | 385                  |

Note: The dependent variable is the intensive margin of remote work in 2022, defined as the response to the question “What share of your employees worked remotely on a given day?” Employment is based on headcount; measured in 2019 . Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# MANAGEMENT AND INTENSITY OF REMOTE WORK

We estimate the relationship between management and remote work intensity using a Heckman selection model [Heckman, 1979]:

Selection Equation:

$$\mathbb{1}_{WFH>0} = \alpha_0 + \alpha_1 \text{Manag}_i + \alpha'_3 X_i + \text{Stringency} + S_i + \epsilon_i \quad (1)$$

Second stage: For the firms with  $\mathbb{1}_{WFH>0} = 1$

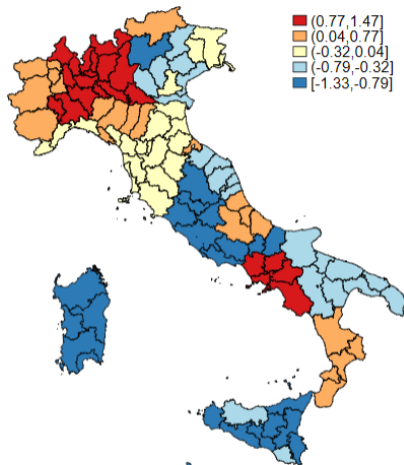
$$\%WFH = \alpha_0 + \alpha_1 \text{Manag}_i + \alpha'_3 X_i + \lambda' X_i + S_i + \epsilon_i \quad (2)$$

where  $\lambda' X_i$  is the Inverse Mill's Ratio.

Instrument: *Stringency* of COVID-19 restrictions at the province-level in Italy in 2020.

Identifying assumption: *Stringency* in 2020 affects the takeup of remote work in 2022 but not the intensity.

## STRINGENCY OF COVID-19 RESTRICTIONS



Note: Stringency index (2020) from Conteduca and Borin [2022] used for Heckman selection: average stringency index in 2020 in deviation from the mean. The index varies at province level.

# INTENSIVE MARGIN EFFECT

|                            | Heckman              |                      |   |
|----------------------------|----------------------|----------------------|---|
|                            | OLS                  | Main (2nd stage)     | Selection (1st stage)<br>marginal effects |
| Management                 | 0.0119<br>(0.014)    | 0.0291**<br>(0.013)  | 0.0541***<br>(0.014)                      |
| Log(Employment)            | -0.00841<br>(0.007)  | 0.00800<br>(0.010)   | 0.0925***<br>(0.010)                      |
| Skill (share white collar) | 0.247***<br>(0.039)  | 0.368***<br>(0.061)  | 0.505***<br>(0.044)                       |
| Advanced technologies      | 0.0519***<br>(0.018) | 0.0815***<br>(0.023) | 0.0967***<br>(0.025)                      |
| $1_{WFH>0}$ (2019)         | 0.0721***<br>(0.025) | 0.109***<br>(0.028)  | 0.219***<br>(0.042)                       |
| Stringency                 |                      |                      | 0.0309**<br>(0.015)                       |
| Inverse Mills ratio        |                      | 0.130***             |   |
| Observations               | 385                  | 385                  | 1013                                      |

Note: The dependent variable uses the response to the question “What share of your employees worked remotely on a given day?”. Employment is based on headcount, measured in 2019. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. All columns include macro sector fixed effects. Stringency uses the normalized index averaged for 2020 from Conteduca and Borin [2022]. Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



# CONCLUSION

- ▶ We examine the relationship between management practices and remote work for a panel of more than 1000 Italian firms (2019-2022)
- ▶ The overall trend of remote work in Italy varies by management
- ▶ Contribution of management to remote work in the new normal:
  1. **Extensive margin:** 1 SD increase in the management score is associated with 6.19 percentage point increase in the probability of remote work at the firm.
  2. **Intensive margin:** 1 SD increase in the management score is associated with 2.91 percentage point increase in the average share of employees working remotely on a given day.

Next steps: Complementarity between management and remote work for performance

THANK YOU

BACKUP

## REFERENCES

- José María Barrero, Nicholas Bloom, and Steven J Davis. Why working from home will stick. Technical report, National Bureau of Economic Research, 2021.
- Nicholas Bloom, Erik Brynjolfsson, Lucia Foster, Ron Jarmin, Megha Patnaik, Itay Saporta-Eksten, and John Van Reenen. What drives differences in management practices? *American Economic Review*, 109(5):1648–83, 2019.
- Filippo Boeri, Riccardo Crescenzi, and Davide Rigo. Work-from-home and firms’ resilience: Evidence from the covid-19 pandemic. 2022.
- Francesco Paolo Conteduca and Alessandro Borin. A new dataset for local and national covid-19-related restrictions in italy. *Italian Economic Journal*, 8(2):435–470, 2022.
- James J Heckman. Sample selection bias as a specification error. *Econometrica: Journal of the econometric society*, pages 153–161, 1979.

## ABSTRACT

We examine whether management practices facilitate the take up and drive persistence of remote work in Italy. We begin with documenting the trends of remote work in Italy, and how this varies with management scores. We find that firms with more structured practices disproportionately increased the use of remote work during the pandemic and maintained higher uses after it. This is mostly driven by the extensive margin, that is, by the fact that remote work is used or not in the firm. Using the intensity of lockdown during the waves of COVID-19 as an instrument for the extensive margin, we show that accounting for selection matters to explain the relationship between management practices and the intensive margin, that is, the percentage of work conducted remotely, conditional on having at least some.

# REMOTE WORK IN ITALY

| Country | Type        | Data        | Measure                 | 2019        | 2020         | Increase |
|---------|-------------|-------------|-------------------------|-------------|--------------|----------|
| Italy   | Firms       | INVIND      | Average % staff in RW   | <b>1.1%</b> | <b>14.4%</b> | 13.1X    |
| Italy   | Individuals | ILFS        | % +ve WFH in past month | 1.4%        | 14.4%        | 10.29X   |
| US      | Individuals | ATUS & SWAA | WFH % of paid days      | 7.2%        | 61.5%        | 8.54X    |

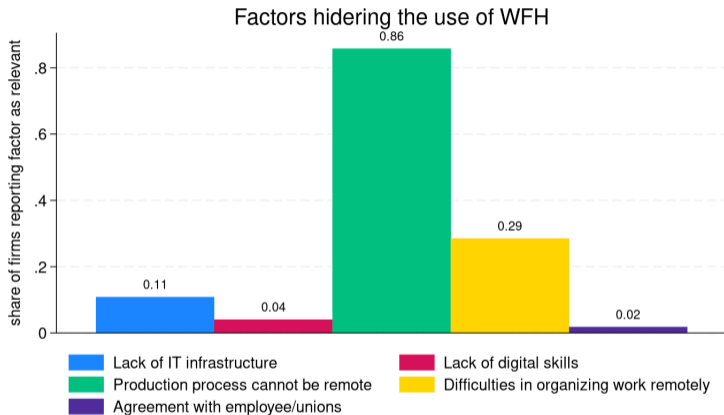
1. Similar also to  $\approx 12\%$  in 2020 in Italy from employer insurance data [Boeri et al., 2022]
2. GSWA 2021 vs 2023: Italy has initially increased up to levels similar to European countries, but has reverted to lower levels in the new normal.

# WFH BARRIERS

| How relevant were the following factors in hindering the use of remote working?  |                      |             |
|--|----------------------|-------------|
| <b>A</b> Lacking or inadequate technological infrastructure (e.g. computers, cloud, etc...)  | <input type="text"/> | <b>SW4A</b> |
| <b>B</b> Lacking or inadequate digital skills on the part of staff   | <input type="text"/> | <b>SW4B</b> |
| <b>C</b> Many tasks cannot be carried out remotely for technical reasons (e.g. because the production process requires the physical presence of workers)       | <input type="text"/> | <b>SW4C</b> |
| <b>D</b> Difficulties in organizing work remotely (e.g. in monitoring the tasks being performed and/or in organizing work based on a target-oriented approach) | <input type="text"/> | <b>SW4D</b> |
| <b>E</b> Difficulties in reaching an agreement with employees/trade unions   | <input type="text"/> | <b>SW4E</b> |
| <b>Legend:</b> 1 = not at all relevant; 2 = not very relevant; 3 = somewhat relevant; 4 = very relevant  |                      |             |

For each question we create a dummy equal 1 if firms replay either 3 or 4 (somewhat relevant or very relevant).

## 30% FIRMS REPORT ORGANIZATIONAL DIFFICULTIES IN WFH



Note: The graph tabulates whether a firm classified a factor as “Somewhat relevant” or “Very relevant” rather than “Not at all relevant” or “Not very relevant”. Measured in the Bank of Italy’s annual survey in 2021 asking about 2020. [Question](#)



# REMOTE WORKING AND MANAGEMENT IN 2020 - SONDTEL

| Dep var: WFH as % of avg. employment | Overall             |                     | Monitoring          | Targets             | Incentives          |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Management                           | 1.485***<br>(0.432) | 1.375***<br>(0.414) | 1.209***<br>(0.340) | 0.596<br>(0.389)    | 0.869**<br>(0.366)  |
| Log(Employment)                      | 2.919***<br>(0.394) | 2.622***<br>(0.370) | 2.691***<br>(0.373) | 2.853***<br>(0.360) | 2.754***<br>(0.376) |
| Log(Revenue/Employment)              | 2.809***<br>(0.568) | 2.533***<br>(0.523) | 2.563***<br>(0.524) | 2.598***<br>(0.537) | 2.521***<br>(0.523) |
| $\mathbb{1}_{Exporter}$              | 0.147<br>(0.739)    | 0.329<br>(0.722)    | 0.236<br>(0.730)    | 0.421<br>(0.742)    | 0.522<br>(0.743)    |
| $\mathbb{1}_{Profits>0}$             | -0.472<br>(0.701)   | -0.257<br>(0.675)   | -0.134<br>(0.683)   | -0.0145<br>(0.679)  | -0.261<br>(0.685)   |
| Advanced technologies                | 1.842**<br>(0.740)  | 1.714**<br>(0.741)  | 1.925***<br>(0.725) | 2.080***<br>(0.730) | 1.949**<br>(0.770)  |
| Skill (% white-collar)               | 0.163***<br>(0.024) | 0.152***<br>(0.023) | 0.153***<br>(0.023) | 0.153***<br>(0.023) | 0.152***<br>(0.023) |
| % Remote work (2019)                 |                     | 0.395***<br>(0.056) | 0.391***<br>(0.056) | 0.396***<br>(0.055) | 0.401***<br>(0.057) |
| Observations                         | 1500                | 1495                | 1493                | 1491                | 1491                |

Note: The dependent variable is the percentage of employees at the firm working remotely in 2020.  $\mathbb{1}_{LD}$  takes value 1 if the firm answers the 2020 INVIND survey after 22<sup>nd</sup> March. Employment and Revenue is in 2019.  $\mathbb{1}_{Exporter}$  is 1 if firm reports positive export sales in 2019,  $\mathbb{1}_{Profits>0}$  is 1 if firm reports strong or modest profits in 2019. Advanced technologies dummy (cloud computing, big data, or artificial intelligence). Sectors are 3-digit Nace rev. 2 classification. Provinces refer to NUTS3 Eurostat classification. Interview type controls (phone or email). Standard errors clustered at the 3-digit industry level.

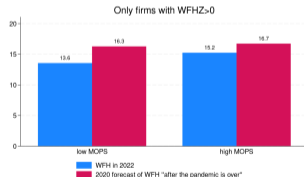
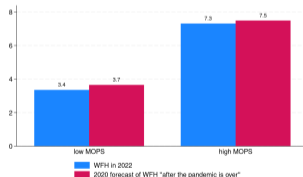
# WFH FORECAST AND MOPS

Firms were also asked in 2021 what they expected the long-term level of WFH to be:

Once the pandemic is over, what do you think the share of total staff working remotely will be? .... (%)

SW3

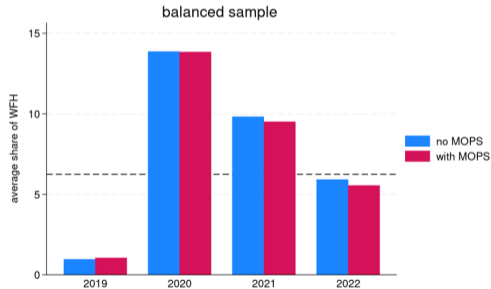
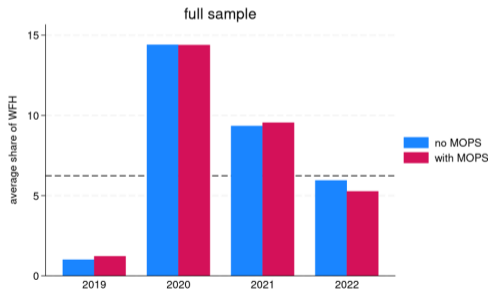
The average of this forecast (5.8%) closely matches the actual 2022 WFH average (5.5%) for the balanced panel. Better-managed firms already anticipated higher long-term levels of remote work, forecasting mean WFH post-pandemic at 7.49% (above average MOPS score) vs. 3.65% (below average MOPS score).



Notes: WFH forecast and MOPS score for the balanced panel. Left panel includes firms which responded zero for the WFH forecast whereas Right panel is restricted to the firms which responded with positive WFH forecasts.

# NON-MISSING MOPS NOT CORR WITH WFH

The distribution of WFH is the same across firms for which we have MOPS and for which we have no MOPS, both in the full sample and in the balanced sample.



# MANAGEMENT AND EXTENSIVE MARGIN WFH IN 2020

|                             | (1)                 | (2)                  | (3)                  | (4)                  | (5)                  |
|-----------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Management                  | 0.134***<br>(0.014) | 0.0908***<br>(0.014) | 0.0878***<br>(0.014) | 0.0852***<br>(0.014) | 0.0758***<br>(0.014) |
| Log(Employment)             |                     | 0.102***<br>(0.010)  | 0.0858***<br>(0.011) | 0.0800***<br>(0.011) | 0.0803***<br>(0.011) |
| Advanced technologies       |                     |                      | 0.0149<br>(0.029)    | 0.00889<br>(0.029)   | 0.00466<br>(0.029)   |
| Skill (share white collar)  |                     |                      | 0.504***<br>(0.047)  | 0.473***<br>(0.048)  | 0.534***<br>(0.054)  |
| $\mathbb{1}_{WFH>0}$ (2019) |                     |                      |                      | 0.104***<br>(0.031)  | 0.0948**<br>(0.043)  |
| Macro-sector FE             |                     |                      |                      |                      | Yes                  |
| Observations                | 1053                | 1053                 | 1013                 | 1013                 | 1013                 |

Note: The dependent variable is the extensive margin of remote work in 2020, defined as the response to the question “What share of your employees worked remotely on a given day?” Employment is based on headcount, measured in 2019. Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# MANAGEMENT AND EXTENSIVE MARGIN WFH IN 2021

|                             | (1)                 | (2)                  | (3)                  | (4)                  | (5)                  |
|-----------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Management                  | 0.149***<br>(0.014) | 0.0929***<br>(0.014) | 0.0854***<br>(0.013) | 0.0824***<br>(0.013) | 0.0737***<br>(0.014) |
| Log(Employment)             |                     | 0.132***<br>(0.011)  | 0.110***<br>(0.011)  | 0.104***<br>(0.012)  | 0.105***<br>(0.011)  |
| Advanced technologies       |                     |                      | 0.0588**<br>(0.030)  | 0.0519*<br>(0.030)   | 0.0477*<br>(0.028)   |
| Skill (share white collar)  |                     |                      | 0.626***<br>(0.049)  | 0.591***<br>(0.051)  | 0.605***<br>(0.053)  |
| $\mathbb{1}_{WFH>0}$ (2019) |                     |                      |                      | 0.120***<br>(0.040)  | 0.108**<br>(0.043)   |
| Macro-sector FE             |                     |                      |                      |                      | Yes                  |
| Observations                | 1053                | 1053                 | 1013                 | 1013                 | 1013                 |

Note: The dependent variable is the extensive margin of remote work in 2021, defined as the response to the question “What share of your employees worked remotely on a given day?” Employment is based on headcount, measured in 2019. Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# EXTENSIVE MARGIN AND SUB-COMPONENTS OF MOPS (2022)

|                             | (Overall)            | (Monitoring)         | (Target)            | (Incentives)         |
|-----------------------------|----------------------|----------------------|---------------------|----------------------|
| Management                  | 0.0619***<br>(0.014) | 0.0562***<br>(0.013) | 0.0323**<br>(0.013) | 0.0380***<br>(0.013) |
| Log(Employment)             | 0.0896***<br>(0.011) | 0.0925***<br>(0.011) | 0.100***<br>(0.010) | 0.0956***<br>(0.011) |
| Advanced technologies       | 0.115***<br>(0.027)  | 0.121***<br>(0.027)  | 0.129***<br>(0.027) | 0.126***<br>(0.027)  |
| Skill (share white collar)  | 0.560***<br>(0.051)  | 0.566***<br>(0.052)  | 0.564***<br>(0.052) | 0.559***<br>(0.052)  |
| $\mathbb{1}_{WFH>0}$ (2019) | 0.193***<br>(0.041)  | 0.194***<br>(0.041)  | 0.197***<br>(0.042) | 0.204***<br>(0.042)  |
| Macro-sector FE             | Yes                  | Yes                  | Yes                 | Yes                  |
| Observations                | 1013                 | 1011                 | 1010                | 1012                 |

Note: The dependent variable is the extensive margin of remote work in 2021, defined as the response to the question “What share of your employees worked remotely on a given day?” Employment is based on headcount, measured in 2019. Advanced technologies is an indicator variable that takes value one if the firm uses at least one of the following: cloud computing, big data, or artificial intelligence. Share of white-collar workers is sourced from social security data and measured in 2018 (the most recent available year). Robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# WFH, MOPS AND PRODUCTIVITY

TABLE: dependent variable labor productivity

|                        | (1)                   | (2)                   | (3)                   | (4)                   |
|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                        | log_lp                | log_lp                | log_lp                | log_lp                |
| Management             | 0.0604**<br>(0.029)   | 0.0699**<br>(0.033)   | 0.0622**<br>(0.029)   | 0.0750**<br>(0.030)   |
| Dummy WFH>0            | 0.116<br>(0.071)      | 0.122*<br>(0.074)     |                       |                       |
| MOPS * dummyWFH        |                       | -0.0326<br>(0.064)    |                       |                       |
| Share of WFH           |                       |                       | 0.578*<br>(0.339)     | 0.677*<br>(0.361)     |
| MOPS * WFH             |                       |                       |                       | -0.257<br>(0.220)     |
| Log(Employment)        | -0.0181<br>(0.026)    | -0.0167<br>(0.027)    | -0.0119<br>(0.026)    | -0.0114<br>(0.026)    |
| Advanced technologies  | 0.0529<br>(0.059)     | 0.0535<br>(0.059)     | 0.0436<br>(0.060)     | 0.0434<br>(0.060)     |
| Skill (% white collar) | 0.00905***<br>(0.002) | 0.00903***<br>(0.002) | 0.00885***<br>(0.002) | 0.00882***<br>(0.002) |
| <i>N</i>               | 1013                  | 1013                  | 1013                  | 1013                  |
| <i>R</i> <sup>2</sup>  | 0.427                 | 0.427                 | 0.429                 | 0.430                 |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$