WORKING FROM HOME AFTER COVID-19: EVIDENCE FROM JOB POSTINGS IN 20 COUNTRIES

LINK TO PAPER; LINK TO DATASET

Pawel Adrjan (Indeed Hiring Lab and Regent’s Park College, Oxford)
Gabriele Ciminelli (OECD)
Alexandre Judes (Indeed Hiring Lab)
Michael Koelle (OECD)
Cyrille Schwellnus (OECD)
Tara Sinclair (United States Department of the Treasury)

The views expressed here are the authors’ personal views and do not necessarily reflect those of Indeed, the OECD, its member countries, the Department of the Treasury, or the U.S. Government.
Is working from home a temporary response to the pandemic or is it a structural change in the labour market?
What do we do?

- Provide novel data on share of remote work
  - From 1.2 billion of job ads on Indeed
  - 20 countries and 55 job categories over 2019m1-2022m9

- Estimate the causal effect of the pandemic
  - Adoption across job categories w/ different telework potential in response to pandemic shocks (diff-in-diff)
  - Distinguish between pandemic easing and tightening
Related remote work literature

- **Surveys**
  - Feasibility (Dingel & Neiman, 2020; Adams-Prassl et al, 2022)
  - Realisations (Bartik et al, 2020; Adams-Prassl et al, 2020)
  - Intentions (Barrero et al., 2021; Criscuolo et al., 2021)

- **Online job ads**
  - Single countries (Hu et al, 2021, *China*; Bamieh and Ziegler, 2022, *Austria*)
DATA
Construction of the remote work dataset

- Data from 20 country-specific **Indeed job sites**
  - Europe, North America, Japan, Australia, New Zealand

- Identify remote work using general and country-specific **keywords** in job title, description or location:
  - “working from home”, “télétravail”, “remoto”, “home office”, “smart working”, ...

- Main variable: **Share of job postings that advertise remote work**
3 STYLIZED FACTS
1/ High persistence of advertised remote work

Advertised telework tripled to circa 9% of all job ads across countries.

Advertised telework did not systematically go down when the pandemic eased.
2/ Adoption correlates with pandemic severity across countries

Increase in share of advertised remote work systematically larger in countries where pandemic mobility restrictions were more pronounced.
Telework correlates with feasibility across occupations

Increase in share of advertised remote work systematically larger in occupations where pre-pandemic feasibility was high
EMPIRICAL STRATEGY
Empirical strategy

Increases/decreases in pandemic severity

\[ y_{i,j,t+k} - y_{i,j,t-1} = \beta_{p,i,j}^{p,k} x_{i,t}^p + \beta_{n,i,j}^{n,k} x_{i,t}^n + \mu_{i,j} + \tau_{i,t} + \text{lagged & interim shocks} + \epsilon_{i,j,t} \]

WFH potential (predetermined)

\[ y_{i,j,t+k} \Rightarrow \text{share of job postings advertising WFH in country } i, \text{ occupation category } j, \text{ time } t+k \]

\[ x_{i,t}^p, x_{i,t}^n \Rightarrow \text{increases (decreases) in pandemic severity (country-level, time varying)} \]

\[ p_j \Rightarrow \text{WFH potential (occupation-level, predetermined)} \]

\[ \mu_{i,j} \Rightarrow \text{country-occupation effects} \]

\[ \tau_{i,t} \Rightarrow \text{country-time effects} \]

Obtain 6-period impulse response functions by plotting estimated \( \hat{\beta}_{p,k}^p \) and \( \hat{\beta}_{n,k}^n \) coefficients and their s.e.
Identification assumption: stable pre-pandemic trends

Notes: The figure plots estimated developments in the difference in share of job postings advertising WFH between occupations with a high and a low WFH potential, defined as those in the upper and lower terciles of the variable measuring WFH potential. Estimates are obtained from the following regression: \( y_{i,j,t} = \alpha + \gamma^t \tau + \delta^t \tau z * d_j + \mu_i + \mu_j + \epsilon_{i,j,t} \), where \( y_{i,j,t} \) denotes the share of advertised WFH in country \( i \), occupation \( j \) at time \( t \), \( \tau \) are time effects, \( \mu_i \) and \( \mu_j \) are country and occupation fixed effects and \( d_j \) is a dummy variable that takes value 1 for occupations with a high WFH potential and 0 for those with low. Shown are the \( \delta \) coefficients.
RESULTS
**Differential effect of a change in pandemic severity on advertised WFH between occupations with high and low WFH potential**

Note: The figure reports impulse response functions showing the cumulative differential effects of a one standard deviation change in pandemic severity on the share of job postings advertising telework in the average occupation with a high telework potential relative to the average occupation with low telework potential (respectively defined as occupations in the upper and lower terciles of the telework potential distribution), over a 6-month window. Panels A and B respectively report effects of an increase and decrease in pandemic severity. Pandemic severity is measured using the Oxford COVID-19 government restrictions index. Y-axes report the magnitude of the estimated effects, while x-axes report the horizon of the response. Blue solid lines denote point estimates, while red dashed lines are 90% confidence bands.
Alternative specifications

- Alternative measures to proxy pandemic severity
- Changes in lag structure
- Treatment of health occupations
- Two-way clustering instead of DK standard errors
- Alternative measures to proxy pandemic severity
- Placebo test
- Separate analysis before and after vaccination campaign
CONCLUSION
Conclusion

- Persistent tripling of online job ads advertising WFH since pandemic
  - WFH surged after increase in pandemic severity, no response after decrease

- Interpretation: Pandemic triggered path dependency
  - Forced experimentation; irreversible investments; network externalities

- **WFH is here to stay**
  - Implications for firms, workers and cities; potential to decrease frictional unemployment
THANK YOU!

LINK TO PAPER; LINK TO DATASET
Annex
Indeed postings vs. official vacancies
Other data

Oxford COVID-19 Government Response Tracker:
• Government restrictions stringency index
• Government response index (includes health mandates)
• COVID-19 mortality

Google COVID-19 Community Mobility Reports:
• Visits to (i) consumer venues (ii) workplaces (iii) transport hubs
• Average mobility index
Main result using Google mobility

Differential effect of a change in pandemic severity on advertised WFH between occupations with high and low WFH potential

Note: The figure reports impulse response functions showing the cumulative differential effects of a one standard deviation change in pandemic severity on the share of job postings advertising telework in the average occupation with a high telework potential relative to the average occupation with low telework potential (respectively defined as occupations in the upper and lower terciles of the telework potential distribution), over a 6-month window. Panels A and B respectively report effects of an increase and decrease in pandemic severity. Pandemic severity is measured using Google mobility data. Y-axes report the magnitude of the estimated effects, while x-axes report the horizon of the response. Blue solid lines denote point estimates, while red dashed lines are 90% confidence bands.
Placebo test: moving the pandemic to 2019

A. Increase in pandemic severity
   A1. Government restrictions
   A2. Google mobility

B. Decrease in pandemic severity
   B1. Government restrictions
   B2. Google mobility
Robustness: lag structure

A. Increase in pandemic severity

A1. Government restrictions

A2. Google mobility

B. Decrease in pandemic severity

B1. Government restrictions

B2. Google mobility

Legend:

- Blue: Baseline
- Dotted black: 4 lags
- Dashed grey: No forward shocks
- Dashed broken grey: Lags dependent variable

% points vs. Months after change in severity
Robustness: standard errors

A. Increase in pandemic severity

A1. Government restrictions

A2. Google mobility

B. Decrease in pandemic severity

B1. Government restrictions

B2. Google mobility

Two-way clustered s.e. Driscoll-Kay s.e.
Robustness: healthcare variables

A. Increase in pandemic severity

A1. Government restrictions

A2. Google mobility

B. Decrease in pandemic severity

B1. Government restrictions

B2. Google mobility

Legend:
- **Baseline**
- **Controlling for health outcomes**
- **Including healthcare occupations**
Robustness: alternative mobility indices

A. Increase in pandemic severity
   A1. Government restrictions
   A2. Google mobility

B. Decrease in pandemic severity
   B1. Government restrictions
   B2. Google mobility

Legend:
- Blue: Baseline
- Dotted: Government response index
- Dashed: Visit to workplaces
- Dotted-dashed: Visit to entertainment venues

Graphs show changes in mobility indices over time.
Robustness: vaccination campaign

A. Before vaccination campaign

A1. Government restrictions

A2. Google mobility

B. After vaccination campaign

B1. Government restrictions

B2. Google mobility
To get an idea of how differently the pandemic impacted telework across countries, we perform a simple back-of-the-envelope calculation, using (i) our occupation-level impulse-response coefficients, (ii) the country-level overall increase in pandemic severity, as well as (iii) country shares of jobs that can be done from home, estimated by Dingel & Neiman (2020):

$$\Delta\text{telework} = \beta^{p,k} \times \left( \sum_{t=1}^{T} x_t^p \right) \times p$$
Table 1. Predicted increase in the share of job postings advertising telework due to the pandemic

<table>
<thead>
<tr>
<th>Country</th>
<th>relative to the U.S.</th>
<th>in absolute value (% points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>0.7</td>
<td>2.9</td>
</tr>
<tr>
<td>U.S.</td>
<td>//</td>
<td>4.1</td>
</tr>
<tr>
<td>Spain</td>
<td>1.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Germany</td>
<td>1.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Sweden</td>
<td>1.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Italy</td>
<td>1.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Poland</td>
<td>1.3</td>
<td>5.4</td>
</tr>
<tr>
<td>U.K.</td>
<td>1.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1.5</td>
<td>6.2</td>
</tr>
<tr>
<td>Austria</td>
<td>1.6</td>
<td>6.4</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.6</td>
<td>6.5</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.6</td>
<td>6.6</td>
</tr>
<tr>
<td>France</td>
<td>1.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2.3</td>
<td>9.5</td>
</tr>
<tr>
<td>Average</td>
<td>1.4</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Note: The table reports the predicted increase in country shares of job postings advertising telework over the March 2020 to September 2022 that was directly due to the pandemic. Values are obtained from the back-of-the-envelope calculation illustrated in Annex B. Values for Australia, Canada, Israel, Japan and New Zealand are not available due to lack of data on country shares of jobs that can be done from home (Dingel & Neiman, 2020).