Remote Work and the Corporate Hierarchy*

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Abstract

Using population-wide Finnish administrative data covering approximately 1.15 million worker-year observations, we link a registry-based measure of working from home (WFH) to matched employer-employee records and examine how the allocation of workplace flexibility across organizational layers relates to firms and workers. We document three main findings. First, in job-to-job transitions, managers moving into remote jobs earn approximately 3% less than comparable movers who do not. Second, firms with greater WFH penetration among managers exhibit higher managerial retention, stronger profitability, and higher productivity. Third, the positive association between managerial WFH and firm performance is stronger in organizations where reduced physical interaction is less likely to disrupt monitoring and supervision, namely those with fewer junior employees, a more educated workforce, and fewer workers per manager. Our results suggest that the value and consequences of WFH depend on where it is allocated within the firm and on the organizational structure in which it is implemented.

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"There are different kinds of jobs. Five days in the office for everybody is not going to happen again."

— James Gorman, then CEO of Morgan Stanley, January 2023

1. Introduction

Firms compete for workers through both monetary compensation and non-pecuniary job attributes. The persistence of remote work after the COVID-19 pandemic has made workplace flexibility an important dimension of this competition (Barrero, Bloom, and Davis, 2023; Aksoy et al., 2025). Providing this amenity, however, changes the organization of production and can impair coordination, weaken monitoring, and limit knowledge transmission. Whether remote work creates value for firms thus depends on the value employees place on flexibility, its effects on worker productivity, recruitment, and retention, and the organizational costs of providing it.

In this paper, we examine the economic value of remote work for both workers and firms. For workers, the benefits of remote work are relatively straightforward. Working from home reduces commuting costs and can ease the constraints imposed by household responsibilities, and recruitment experiments show that many workers are willing to forgo part of their compensation in exchange for the opportunity to work remotely (Mas and Pallais, 2017). From the firm's perspective, however, the implications are less clear. Remote work may reduce employee turnover (Bloom, Han, and Liang, 2024) and expand the geographic pool of talent from which firms can recruit (Duchin and Sosyura, 2025). These potential gains must nevertheless be weighed against the organizational costs associated with reduced face-to-face interactions, as remote work can make collaboration networks more fragmented (Yang et al., 2022) and disrupt feedback and learning, particularly among less experienced employees (Emanuel, Harrington, and Pallais, 2026).

We exploit population-wide Finnish administrative records linking workers' tax returns, employment histories, and earnings to employers' financial statements, allowing us to examine both how remote work is reflected in employee compensation and how its adoption relates to firm profitability and productivity. Finland provides a particularly suitable setting for this analysis, given its high prevalence of remote work and the substantial variation in adoption across firms and over time (Gill, Hensvik, and Skans, 2025). Our data cover the period 2018–2024 and include approximately 1.15 million worker-year observations and 49,000 firm-year observations, spanning the transition from

limited remote work before the COVID-19 pandemic to its widespread adoption after it. A distinctive feature of our data is that we measure remote work adoption at the individual level using employees' tax returns rather than inferring it from occupational characteristics, job postings, or firm-level policies. Following Caliendo, Monte, and Rossi-Hansberg (2015), we also use detailed occupational codes to distinguish managers, middle-level employees, and lower-level employees, allowing us to study how the economic consequences of remote work vary across organizational layers.

Estimating the wage effects of remote work requires accounting for selection on both sides of the employment relationship. Workers choosing remote jobs may differ in their skills, career prospects, and preferences for flexibility, while firms offering remote work may differ in productivity and compensation policies. As a result, observed wage differentials may reflect positive or negative selection, in addition to the compensating differential associated with remote work itself. To address these concerns, we exploit job-to-job transitions, comparing workers who leave the same employer in the same year but move to jobs that differ in remote work adoption, following the logic of matched-mover designs (Card, Heining, and Kline, 2013). Our event-study design traces earnings before and after these transitions, controlling for persistent worker heterogeneity and firm-specific wage conditions through worker, origin-firm-by-year, and destination-firm-by-year fixed effects. To make the comparison even tighter, we also restrict the analysis to job moves within the same occupation and to occupations in which tasks can be performed remotely.

Managers who move into remote employment earn approximately 3% less than comparable job movers in the first year following the transition, with the negative differential persisting in subsequent years. By contrast, we find little evidence of systematic earnings adjustments among middle-layer employees, and the apparent earnings premium for lower-level employees in the unrestricted sample largely disappears when we compare more similar job transitions, consistent with recent evidence from France showing that the observed wage premium associated with remote work largely reflects worker selection (Li, Sauvagnat, and Schmitz, 2026). Taken together, our findings suggest that average wage differentials conceal substantial heterogeneity across organizational layers, with evidence of a wage discount for remote work emerging only among managers.

This managerial wage discount does not, by itself, reveal that managers accept lower pay in exchange for workplace flexibility, because it could also arise if managers who move into remote jobs end up in less productive matches with less surplus to share. To assess this latter possibility, we

continue by examining the firm performance consequences of remote work.

Our first firm-level finding is that overall remote work adoption is not significantly associated with profitability. This finding is noteworthy given concerns that the widespread adoption of remote work could undermine coordination and monitoring, ultimately impairing firm performance. However, the absence of a significant aggregate relation conceals substantial heterogeneity across organizational layers. When we distinguish remote work adoption among managers, middle-layer employees, and lower-level employees, we find a positive and statistically significant relation between managerial remote work and profitability, while the estimates for the other two groups remain statistically indistinguishable from zero. The magnitude of the managerial coefficient is stable across specifications. A 10-percentage-point increase in the share of managers working remotely is associated with an increase in ROA of approximately 0.16 percentage points, equivalent to about 3.3 percent of the sample median ROA. Moreover, the positive relation holds across firms of different sizes, suggesting that the result is not driven by large employers. To address concerns about the endogenous adoption of remote work, we follow an instrumental variable approach similar to that of Gupta, Gupta, and Simintzi (2026), exploiting differences in the pre-pandemic composition of the managerial workforce. Specifically, we instrument managerial remote work adoption combining the pre-pandemic occupational composition of a firm's managerial workforce with leave-one-out occupation-level changes in remote-work adoption driven by the COVID-19 pandemic. The IV estimates are also positive, consistent with the relation between managerial remote work and firm profitability documented in the OLS regressions.

The positive association between managerial remote work and profitability raises the question of what drives this relation. Managerial tasks may be well suited to remote execution, and decisions made by a relatively small number of managers can have substantial implications for firm performance. Yet managers also play an important role in coordinating production and supervising employees, making the consequences of their physical absence less straightforward. To explore the potential mechanisms underlying our findings, we examine whether managerial remote work is associated with higher firm productivity and employee retention. We find that a 10-percentage-point increase in managerial remote work is associated with approximately 0.23% higher value added per employee. At the sample median of approximately €75,000 in value added per employee, this corresponds to about €170 per employee. Since value added is measured before deducting labor compensation, this finding suggests

that the positive association with profitability extends beyond savings on managerial compensation. We also find that managers who work remotely are more likely to remain with the same employer, with the retention gains being stronger for managers with children and for managers with longer commutes, for whom remote work is plausibly most valuable. Taken together, these findings suggest that allowing managerial remote work may help firms avoid the costs associated with losing valuable managers and disrupting established employment relationships, providing one possible explanation for the positive relation between managerial remote work and firm profitability.

The organizational costs of managerial remote work are unlikely to be uniform across firms. The physical presence of managers may be particularly valuable when employees require frequent supervision, informal guidance, and on-the-job training, and when a given manager is responsible for a larger number of employees. By contrast, firms employing a more experienced and skilled workforce may be better positioned to accommodate managerial flexibility without disrupting production. Consistent with this reasoning, we find that the positive association between managerial remote work and profitability tends to be stronger in firms with fewer junior employees, a more educated workforce, and fewer lower-level employees per manager. These patterns suggest that the benefits of managerial remote work depend on the extent to which production relies on direct supervision and the transmission of knowledge within the firm.

Finally, combining the firm-level analyses with the worker-level results allows us to revisit the interpretation of the managerial wage discount. If remote work reduced the productivity of managerial jobs, lower wages could simply reflect less valuable matches. The firm-level evidence points the other way: managerial remote work is associated with higher value added per employee, a measure that is not mechanically affected by savings on managers' pay. Because workers typically share in the surplus their jobs generate, higher productivity should, if anything, raise managers' wages (Card, Cardoso, Heining, and Kline, 2018; Lamadon, Mogstad, and Setzler, 2022). The fact that managers who move into remote jobs nevertheless earn less implies that they value remote work by at least the amount of the wage decline, provided the firm-level relation is informative about the productivity of the jobs they move into. We therefore interpret the wage decline of approximately 3% as a conservative lower bound on managers' valuation of remote work.[1] For middle- and lower-layer employees, by contrast,

[1] Beyond the productivity effect, the bound is conservative for two reasons. First, when workers share in match surplus, they also retain part of the value created by an amenity they enjoy, so wages fall by less than its full value. Second, because our measure captures only high-intensity remote work, the comparison group includes hybrid workers who also enjoy some flexibility.

both wage and firm-level estimates are close to zero, so our evidence cannot separate a small valuation from offsetting productivity and surplus-sharing effects.

Our analysis contributes to the literature in four respects. First, we examine how workplace flexibility is reflected in compensation, accounting for worker selection and differences across organizational layers. Recruitment experiments and evidence on job offers and choices show that many workers are willing to forgo pay for remote work (Mas and Pallais, 2017; Cullen, Pakzad-Hurson, and Perez-Truglia, 2025), while Li, Sauvagnat, and Schmitz (2026) document that the observed remote work wage premium in France largely reflects pre-existing differences between workers. We extend this evidence by following earnings around job transitions and distinguishing the adjustments across organizational layers. A negative earnings differential emerges among managers, whereas the apparent premium among lower-layer employees attenuates as we compare more similar transitions. These findings help reconcile the value workers attach to flexibility with the positive observed wage premiums while suggesting that the extent to which flexibility is reflected in pay differs across organizational layers.

Second, we contribute to research on remote work and firm performance. Studies of individual employers document the productivity consequences of alternative working arrangements (Bloom, Liang, Roberts, and Ying, 2015; Choudhury, Foroughi, and Larson, 2021; Angelici and Profeta, 2024), while recent work extends the analysis to broader populations of firms (Boeri, Crescenzi, and Rigo, 2025; Kwan, Matthies, and Yuskavage, 2025). We add to this literature by distinguishing managerial remote work adoption and relating it to both profitability and labor productivity. Our findings also complement Duchin and Sosyura (2025), who document weaker performance among firms led by geographically distant CEOs before the pandemic. We examine a broader managerial workforce during the transition to widespread remote work, when remote arrangements became an established option in many occupations rather than a relatively uncommon accommodation (Barrero, Bloom, and Davis, 2023; Aksoy et al., 2025). This setting provides evidence on managerial flexibility in an organizational environment that is substantially different from that of pre-pandemic remote leadership.

Third, our findings speak to the role of hierarchical layers and proximity in the organization of production. Research on face-to-face communication, collaboration networks, and coworker learning shows how physical distance can affect information flows and human-capital development (Battiston, Blanes i Vidal, and Kirchmaier, 2021; Yang et al., 2022; Emanuel, Harrington, and Pallais, 2026). In

theories of knowledge hierarchies, the cost of communication between layers shapes how production is organized (Garicano, 2000; Bloom, Garicano, Sadun, and Van Reenen, 2014; Garicano and Rossi-Hansberg, 2015). Viewing remote work as an increase in this cost, we examine how the relation between managerial remote work and profitability varies with the firm's supervisory demands. The more favorable estimates in firms with fewer junior employees, a more educated workforce, and fewer lower-level employees per manager are consistent with lower supervisory demands helping firms accommodate managerial flexibility. These patterns suggest that the financial benefits of remote management may depend on how strongly day-to-day production relies on direct supervision and informal knowledge transfer.

Finally, by combining managerial wage estimates with firm-level evidence on productivity, we can interpret the managerial earnings discount as a conservative lower bound on managers' valuation of remote work, rather than as a move into less productive matches. The same combination also speaks to the long-standing debate on whether managerial perquisites reflect excess or efficient compensation (Jensen and Meckling, 1976; Yermack, 2006; Rajan and Wulf, 2006). Unlike the corporate jets studied by Yermack (2006), which are not offset in pay and are associated with weaker shareholder returns, managerial remote work is reflected in lower wages and is not associated with weaker firm performance.

2. Data

2.1 Data Sources and Remote Work Measure

We use administrative data from Statistics Finland linking workers to their employers over the period 2018–2024. The data combine individual tax records, employment histories, earnings, demographic and occupational information, and firm financial statements through anonymized worker and firm identifiers. A key feature of the data is the availability of detailed occupational codes for each worker. We use these codes to characterize employees' positions within the organization and distinguish three broad organizational layers: managers, middle-layer employees, and lower-layer employees. This procedure follows a simplified version of the method used by Caliendo, Monte, and Rossi-Hansberg (2015) to identify layers within organizations.[2] A layer is a group of employees who

[2]In recent work, Hvide and Nielsen (2026) use occupational codes to identify managers below the top in Norway.

have similar knowledge levels and wages and who perform tasks at a similar level of authority. Layers are hierarchical in that the typical worker in a higher layer earns more.[3]

Our information on remote work uptake originates from tax reports and is therefore measured at the individual-year level between 2018 and 2023. We obtain the information from Statistics Finland, which in turn receives it from the Finnish Tax Administration (FTA). Contrary to several other Western countries, Finnish taxpayers can access and modify their tax reports free of charge either in person or online via the MyTax service, available on the website of the FTA. These services are easily and readily available to Finnish taxpayers. For example, during the calendar year 2023, there were 33.5 million logins to the MyTax service.[4] While the FTA provides Finnish taxpayers with pre-completed tax returns, taxpayers can easily modify these documents online, for example by claiming additional deductions. In 2023, 1.5 million individual taxpayers made changes to their pre-completed tax returns.[5]

For each year included in our sample period, including those before the COVID-19 pandemic, these deductions include a specific "home office deduction." Figure A1 reports a screenshot from the MyTax service, showing how taxpayers are actively prompted to select the fraction of days they worked from home in order to claim the corresponding home office deduction. Specifically, if taxpayers work from their own home, they can deduct their expenses in one of two ways. 98.5% of taxpayers claiming a home office deduction for fiscal year 2023 opt for a formula-based home office deduction. In other words, taxpayers can select whether they worked from home for more than 50% of all their working days in the calendar year, for no more than 50% of their working days, or just for the production of occasional secondary income. The three options are associated with different amounts of home office deductions (respectively €940, €470, and €235).[6] A small minority (1.5%) of taxpayers claiming a home office deduction opt to use their actual expenses incurred while working from home.

Importantly, the home office deduction is included among a broader category of expenses for the

[3]The layers reflect the first digit of the occupational codes used by Statistics Finland. The codes are guided by a hierarchical classification system known as International Standard Classification of Occupations, created by the International Labour Organization. The scale includes managers (occupational code 1), professionals (2), technicians and associate professionals (3), clerical and support workers (4), service and sales workers (5), skilled agricultural/forestry/fishery workers (6), craft and related trades workers (7), plant and machine operators/assemblers (8), and elementary occupations (9). We exclude armed forces (occupational code 0) and aggregate one-digit occupational codes 2 through 3 and 4 through 9.

[4]See https://web.archive.org/web/20240612182525/https://www.vero.fi/en/About-us/finnish-tax-administration/finnish-tax-administrations-year/positive-customer-experience/.

[5]For reference, as of 2023, Finland had a total population of approximately 5.6 million individuals, of which 2.4 million were employed (see https://stat.fi/en/publication/clmfzjgqssf4i0bw615katggs).

[6]Small changes in the exact euro amounts occur during our sample period. Euro amounts in this section refer to fiscal year 2023. For additional details as of July 2024, see https://web.archive.org/web/20240717140434/https://www.vero.fi/en/individuals/deductions/expenses-for-the-production-of-income/home-office-deduction/.

production of income, which covers all costs incurred from the generation of wage income. All wage income earners in Finland automatically receive a €750 deduction for the production of income. Thus, taxpayers who report expenses for the production of income only gain additional monetary benefit if these expenses exceed the €750 threshold. In other words, taxpayers who work from home for no more than 50% of their working days (or only for the production of occasional secondary income), and who have no other large expenses for the production of income (e.g., computers, data connections, tools, training expenses), have no financial incentives to claim the formula-based home office deduction. On the contrary, taxpayers who report working from home for more than 50% of their working days benefit by a net amount equal to their marginal tax rate multiplied by €190 (=€940-€750), regardless of whether they had additional expenses for the production of income.[7] Consistent with these economic incentives, approximately 85% of taxpayers claiming a formula-based home office deduction in 2023 declare that they work from home for more than 50% of all their working days. For these reasons, our operational definition of remote work is whether someone reports "more than 50% of work days working from home."[8] Reassuringly, this 50% cutoff represents a long-standing, well-established threshold for the definition of high-intensity telecommuting (e.g., Gajendran and Harrison, 2007). For simplicity, throughout the paper, we refer to this high-intensity telecommuting classification as "remote work" or "work from home."

While the measure is self-reported, Finland is a high-trust country, and tax evasion remains a limited phenomenon. For example, a 2025 survey reveals that 93% of Finns think paying taxes is an important civic duty, and 85% believe that tax evasion is always wrong (Verohallinto, 2025). Moreover, the economic incentive to misreport is relatively small (less than €10 per month after taxes even for taxpayers with the highest marginal tax rate). The Internet Appendix reports extensive validation tests of our measure of remote work.

Most other worker-level data come from ready-made modules provided by Statistics Finland. We observe annual worker-level measures of wages, occupations, demographic characteristics, family background, and education. We also build on Dingel and Neiman (2020) and include a country-specific measure of teleworkability for occupations identified at the 2-digit major-group level.

[7] Expenses for the production of income are subtracted from one's income before the calculation of tax. In other words, these expenses reduce the amount of income subject to tax, which indirectly reduces the total amount of tax.

[8] To take into account reporting incentives, we also classify as working from home those who claim a home office deduction using actual expenses when these expenses exceed the highest formula-based threshold set by the FTA for that fiscal year.

Firm-level measures are obtained directly from Statistics Finland and are available through 2024. We only include private firms, and exclude firm-years and sectors flagged by Statistics Finland as having unreliable data.[9]

2.2 Sample and Descriptive Statistics

Panel A of Table 1 reports worker-level summary statistics for the sample used in the individual-level analyses. The final sample contains 1,146,540 worker-year observations. Average annual wage income amounts to €48,622, although the distribution is substantially dispersed, with a standard deviation of €23,671 and an interquartile range between €34,020 and €55,434. The average worker is 42 years old, 41.8% of the sample is female, 46.4% are married, and 40.7% hold a university degree.

The layer composition of the workforce shows that 3.6% of employees belong to the upper layer, 44.9% to the middle layer, and 51.5% to the lower layer. The average teleworkability score is 0.40, with substantial heterogeneity across occupations. The median teleworkability score of 0.32 further suggests that many occupations in the sample remain only partially compatible with remote work arrangements.

Approximately 10% of worker-year observations are classified as high-intensity remote work, indicating that remote work remains concentrated among a relatively limited subset of employees in the sample. Figure 1 further illustrates the evolution of remote work over time, showing a sharp increase during the COVID-19 pandemic followed by a gradual normalization in subsequent years, with upper and middle-layer workers having higher rates of remote work than lower-layer workers.

Overall, the descriptive statistics indicate that remote work adoption is unevenly distributed across workers, occupations, and time, motivating our analysis of how the relation between remote work and economic outcomes varies across organizational layers.

Panel B of Table 1 reports firm-level summary statistics for the sample used in the firm-level analyses. The sample consists of firm-year observations covering the period from 2019 to 2024. The descriptive statistics indicate substantial heterogeneity across firms in terms of size, profitability, leverage, and remote work adoption.

The distribution of remote work across firms also varies substantially by organizational layer.

[9]The excluded sectors include primary production, financial intermediation, public administration and defence, public education units, activities of organizations, extra-territorial organizations and bodies, unknown and empty industries, and activities of holding companies.

While remote work adoption increased markedly during and after the COVID-19 pandemic, Figure 1 suggests that the intensity of adoption differed systematically across the hierarchy, with upper- and middle-layer occupations displaying persistently higher levels of remote work than lower-layer occupations. The firm-level statistics therefore reinforce the worker-level evidence that remote work is unevenly distributed across organizations and occupational ranks. This heterogeneity motivates the subsequent empirical analysis examining whether remote work adoption across hierarchical layers is associated with differences in firm performance.

3. Methodology

This section describes the empirical strategies used to examine how remote work relates to worker compensation and firm performance. We first present the worker-level design, which exploits job-to-job transitions to compare earnings trajectories around moves into remote jobs. We then turn to the firm-level analysis, where we relate remote work adoption to subsequent firm outcomes using panel regressions and an instrumental-variable approach.

3.1 Worker-Level Methodology

Our identification strategy leverages job-to-job transitions and granular fixed effects to compare similar workers who do and do not move into high-intensity WFH jobs. Our sample consists of all workers in Finland who work for two employers between 2018 and 2023, and who did not work remotely with their origin employer.[10]

We implement this strategy through an event-study specification:

$$\ln(y_{i,c,t}) = \sum_{\tau \neq -1} \beta_\tau \cdot \mathbb{1}(t - T_{i,c} = \tau) \cdot \mathbb{1}(GainWFH_i = 1) + \gamma X_{i,t} + \delta_i + \theta_{c,t} + \eta_{j_1,t} + \zeta_{j_2,t} + \varepsilon_{i,c,t}, \quad (1)$$

where the dependent variable is the annual wage and salary earnings of worker i in year t and $T_{i,c}$ is the year in which worker i switches from employer j_1 to employer j_2, so that $t - T_{i,c} = \tau$ indexes event time relative to the move, with $\tau = -1$ omitted as the reference period. $\mathbb{1}(t - T_{i,c} = \tau)$ indicates event

[10] Our sample restriction is in the spirit of Card, Heining, and Kline (2013), who require workers to have held the preceding job for two or more years, and the new job for two or more years in their mover event study. We believe our sample restriction cleanly identifies the effect of a job switch on outcomes, since expected wage growth depends entirely on the change in destination effects associated with the worker's job transition.

time, with c indexing the cohort of workers who change employer in a given year. $\mathbb{1}(GainWFH = 1)$ equals one if worker i moves into a high-intensity WFH job, and zero otherwise. $X_{i,t}$ are worker-level control variables such as age and its square.

The coefficients β_τ trace the differential earnings trajectory of workers who move into high-WFH jobs relative to comparable movers who do not, normalized to the year before the move. Note that the cohort-by-year fixed effects ($\theta_{c,t}$) mechanically absorb event time because τ is a linear function of t within each cohort. Thus, the identification of β_τ comes entirely from the interaction with $\mathbb{1}(GainWFH = 1)$, that is, from the differential trajectory of WFH-gainers relative to non-WFH movers within the same cohort-year. The identifying assumption is that, absent the transition into a high-WFH job, WFH gainers and non-WFH movers within the same comparison cells would have followed parallel earnings trajectories.

We make extensive use of fixed effects. δ_i are worker fixed effects that absorb time-invariant worker heterogeneity. $\theta_{c,t}$ are job-change-cohort $\times$ year fixed effects that flexibly control for cohort-specific time paths. $\eta_{j_1,t}$ are origin-firm-by-year fixed effects (j_1 denotes the worker's origin employer), absorbing common wage premia and local labor market conditions among workers leaving the same firm in the same year. Finally, $\zeta_{j_2,t}$ are destination-firm-by-year fixed effects (j_2 denotes the worker's destination employer), which absorb most of the wage premium specific to the destination firm.

Since we are particularly interested in the allocation of remote work across the organizational hierarchy, we also augment Equation (1) to identify how the wage changes associated with switching to remote jobs vary across layers. We classify each worker's origin occupation into one of three hierarchical layers — upper (managers), middle, and lower — and interact event time with both layer indicators and the $GainWFH$ indicator. Taking the upper layer as the omitted baseline, our specification is:

$$\begin{aligned}
\ln(y_{i,c,t}) = & \sum_{\tau \neq -1} \beta_\tau \cdot \mathbb{1}(t - T_{i,c} = \tau) \cdot \mathbb{1}(\text{GainWFH}_i = 1) + \\
& + \sum_{\ell \in \{M,L\}} \sum_{\tau \neq -1} \beta_\tau^\ell \cdot \mathbb{1}(t - T_{i,c} = \tau) \cdot \mathbb{1}(\text{Layer}_i = \ell) + \\
& + \sum_{\ell \in \{M,L\}} \sum_{\tau \neq -1} \beta_\tau^{\ell W} \cdot \mathbb{1}(t - T_{i,c} = \tau) \cdot \mathbb{1}(\text{Layer}_i = \ell) \cdot \mathbb{1}(\text{GainWFH}_i = 1) + \\
& + \gamma X_{i,t} + \delta_i + \theta_{c,t} + \eta_{j_1,t} + \zeta_{j_2,t} + \varepsilon_{i,c,t},
\end{aligned} \tag{2}$$

where $\text{Layer}_i \in \{U, M, L\}$ denotes the worker's origin-occupation layer (upper, middle, or lower), with the upper layer omitted as the baseline. Our objects of interest are the dynamic wage effects of moving into a high-WFH job within each layer. For upper-layer workers, this effect is given directly by β_τ. For middle- and lower-layer workers, the corresponding effect is given by the sum $\beta_\tau + \beta_\tau^{\ell W}$, where $\beta_\tau^{\ell W}$ captures the differential wage effect of gaining WFH for layer $\ell \in \{M, L\}$ relative to the upper layer.[11]

3.2 Firm-Level Methodology

We begin by estimating a baseline firm-level specification that relates firm performance to lagged remote work adoption at the firm level, without distinguishing across organizational layers:

$$ROA_{j,t} = \beta_1 WFH_{j,t-1} + \theta X_{j,t-1} + \gamma_{s,t} + \delta_j + \varepsilon_{j,t}, \tag{3}$$

where j indexes firms and t indexes years. The dependent variable is return on assets, defined as net income divided by the book value of total assets following Duchin and Sosyura (2025). The variable $WFH_{j,t-1}$ measures the share of employees in firm j classified as working from home for more than 50% of their working days in year $t-1$ in the previous year.[12] The vector $X_{j,t-1}$ includes lagged firm-level controls. $\gamma_{s,t}$ and δ_j denote industry-by-year and firm fixed effects, respectively. The industry-by-year fixed effects absorb shocks common to all firms in the same industry in a given year (e.g., industry-wide demand, technology, or pandemic-related disruptions), so that identification comes from within-industry-year differences across firms. The firm fixed effects absorb time-invariant firm heterogeneity, such as persistent differences in business model, location, or management quality. The control variables include a startup indicator (Gupta, Gupta, and Simintzi, 2026), lagged ROA, lagged leverage, lagged log assets, and the lagged number of employees. Leverage is defined as total liabilities divided by total assets.[13]

We then extend the analysis by decomposing firm-level remote work adoption across organizational layers. This allows us to examine whether the association between remote work and

[11] The coefficients β_τ^ℓ are not of direct interest. They flexibly absorb layer-specific event-time earnings trajectories common to WFH-gainers and non-gainers.

[12] To mitigate the influence of outliers and potential data errors, we exclude firm-year observations for which ROA falls below the 0.1^{st} percentile or exceeds the 99.9^{th} percentile.

[13] Given the short time dimension of the panel, firm fixed effects leave comparatively limited within-firm variation for estimation. We therefore report both a parsimonious specification and a specification including the full set of time-varying controls (deHaan, 2021).

firm performance differs across organizational layers. Our primary layer-specific specification relates firm performance to lagged remote work adoption in the upper, middle, and lower layers of the firm:

$$ROA_{j,t} = \beta_1 WFH^{upper}_{j,t-1} + \beta_2 WFH^{middle}_{j,t-1} + \beta_3 WFH^{lower}_{j,t-1} + \theta X_{j,t-1} + \gamma_{s,t} + \delta_j + \varepsilon_{j,t}, \tag{4}$$

where $WFH^{upper}_{j,t-1}$, $WFH^{middle}_{j,t-1}$, and $WFH^{lower}_{j,t-1}$ measure remote work adoption in the upper, middle, and lower layers of firm j, respectively.

Naturally, firms that allow certain employees to work from home may be systematically different from firms that do not. This endogeneity of remote work adoption is a well-known issue in the growing literature on remote work (e.g. Kwan, Matthies, Townsend, and Xu, 2025; Kwan, Matthies, and Yuskavage, 2025; Gupta, Gupta, and Simintzi, 2026). The fact that the sharp increase in remote work coincides with the onset of the COVID-19 pandemic further complicates the identification of causal effects.

To partially address this concern, we use an instrumental variables strategy based on firms' pre-pandemic occupational composition interacted with occupation-level changes in remote work during the onset of the pandemic. Specifically, for organizational layer ℓ, we construct an instrument $Z^{\ell}_{j,2019,2020}$ that combines firm j's pre-pandemic occupational composition in layer ℓ with leave-one-out occupation-level changes in remote work adoption from 2019 to 2020.[14] Our instrument therefore exploits the fact that firms with a larger pre-pandemic employment share in occupations that became more remote work intensive during the pandemic were more exposed to the remote work shock. We use granular five-digit occupational codes, and the leave-one-out construction excludes firm j when calculating occupation-level changes in remote work. To instrument managerial remote-work adoption, we estimate the following first-stage equation:

$$WFH^{upper}_{j,t-1} = \pi_1 Z^{upper}_{j,2019,2020} \times Post_{t-1} + \theta' X_{j,t-1} + \gamma'_{s,t} + \delta'_j + u'_{j,t-1}, \tag{5}$$

where $Post_{t-1}$ is an indicator equal to one for years in which the lagged remote work measure refers to 2020 or later, and zero otherwise. Because the specification includes firm and industry-by-year fixed effects, identification comes from differential post-pandemic exposure to occupations with greater remote work potential, conditional on time-invariant firm heterogeneity, aggregate industry-level year

[14] We require firms to have all three occupational layers in 2019 in order to enter our IV sample.

shocks, and lagged firm characteristics.

The corresponding second-stage equation is then:

$$ROA_{j,t} = \zeta_1 \widehat{WFH}^{upper}_{j,t-1} + \theta X_{j,t-1} + \gamma_{s,t} + \delta_j + \varepsilon_{j,t}. \quad (6)$$

The exclusion restriction is that, conditional on firm fixed effects, industry-by-year fixed effects, and lagged firm-level controls, the interaction between a firm's pre-pandemic occupational composition and leave-one-out occupation-level changes in remote work affects subsequent firm performance only through its effect on the firm's own adoption of remote work in the corresponding organizational layer. In other words, the instruments should not affect $ROA_{j,t}$ through other channels, such as occupation-specific demand shocks, changes in technology adoption unrelated to remote work, or differential exposure to pandemic-era disruptions, except insofar as these channels operate through remote work adoption. The leave-one-out construction helps address mechanical reflection concerns by ensuring that the occupation-level remote work shock used to instrument firm j's remote work adoption is not driven by firm j's own change in remote work.

A potential concern is that occupations experiencing larger increases in remote work during the pandemic may also have been differentially exposed to other shocks, such as changes in demand, digitalization, or broader technological transformations. While these concerns are generally common to IV analyses of WFH across other settings, we nonetheless do not view our IV results as fully resolving the intrinsic endogeneity of remote-work adoption but rather as providing support for our firm-level results and our lower-bound argument.

4. Remote Work and Worker Compensation

This section examines how remote work is reflected in worker compensation. We first use job-to-job transitions to assess how observed wage differences evolve as we compare increasingly similar movers, allowing us to consider the role of selection into remote jobs. We then examine whether the wage effects of remote work differ across organizational layers.

4.1 Selection and the Wage Effects of Remote Work

We begin by asking whether the wage differential associated with remote work survives once we compare increasingly similar job transitions. Equation (1) provides the basis for this exercise, and Figure 2 plots the corresponding event-study estimates across progressively tighter comparison sets: unrestricted movers, movers who remain within the same three-digit occupation, movers within the same occupation and in highly teleworkable jobs, and finally the same restricted sample with additional occupation-by-year and region-by-year fixed effects. Because job changes typically occur partway through the calendar year, the coefficient at $\tau = 0$ may reflect earnings from both the origin and destination jobs. We therefore focus on $\tau = 1$ as our preferred post-move benchmark.

The initial pattern resembles the positive remote-work wage differential documented in administrative data (Li, Sauvagnat, and Schmitz, 2026). In the least restrictive specification, workers who transition into remote jobs earn approximately 1.3% more at $\tau = 1$. This premium, however, becomes progressively smaller as we make the comparison more demanding. Restricting attention to workers who remain within the same three-digit occupation reduces the estimated gain, and imposing the additional teleworkability restriction and richer fixed effects attenuates it further. In our most demanding specification, the wage effect at $\tau = 1$ is small and statistically indistinguishable from zero.

The pattern is informative because the apparent wage premium is strongest precisely when the comparison groups are least similar. As we restrict the analysis to more comparable job transitions, much of the positive differential disappears. This attenuation is consistent with selection accounting for an important part of the wage premium observed in less restrictive comparisons: workers who move into remote jobs appear to differ systematically from other movers in ways that are only partially absorbed by worker and firm fixed effects.

4.2 Wage Effects Across Organizational Layers

The pooled estimates may nevertheless conceal important differences across workers. We therefore ask whether the wage effects of remote work vary across organizational layers using Equation (2). Figure 3 reports the corresponding layer-specific event-study estimates, applying the same sequence of increasingly demanding comparisons.

The clearest pattern emerges among managers. In our most demanding specification, managers

who move into remote jobs earn approximately 3% less at $\tau = 1$. This estimate compares managers who move within the same three-digit occupation, work in highly teleworkable occupations, and are evaluated under our richest fixed-effects specification. The negative differential persists at subsequent horizons, while pre-treatment coefficients are generally small and statistically insignificant in the more demanding specifications.

The same pattern does not appear elsewhere in the organization. For middle-layer employees, the estimated wage effect is close to zero throughout the post-move period in the most demanding specification. Lower-layer workers display positive wage effects in less restrictive comparisons, but these estimates attenuate substantially as the comparison set becomes tighter and are no longer systematically different from zero in the more demanding specifications. Thus, the persistent post-move wage decline is specific to managers.

Taken together, the layer-specific estimates sharpen the interpretation of the pooled results. The positive wage effects observed among lower-layer workers weaken as selection is progressively constrained, whereas the negative managerial differential remains. The approximately 3% decline in managerial wages is therefore the most robust layer-specific result. Its interpretation, however, is not immediate. A lower wage may reflect a willingness to trade compensation for workplace flexibility, but it may also arise if managers who move into remote jobs enter less productive matches with less surplus to share. To answer this question and, more broadly, to understand how remote work affects firms, the next section examines the relation between remote work adoption and firm performance.

5. Remote Work and Firm Profitability

We begin with the aggregate relation between firm-wide remote work and ROA, and then distinguish remote work across organizational layers. We next explore some of the mechanisms that may help explain the relation between remote work and firm performance, focusing on firm productivity and employee retention. We also examine whether the association between managerial remote work and profitability varies with firms' supervisory needs and workforce characteristics. Finally, we address concerns about the endogenous adoption of remote work.

5.1 Firm-Wide Remote Work and Profitability

Remote work can affect firm profitability through several, potentially offsetting, channels. It may improve retention and expand firms' ability to attract talent, but reduced physical presence may also impair coordination, monitoring, and information transmission. Whether greater reliance on remote work is associated with better or worse firm performance is therefore ultimately an empirical question.

Table 2 reports estimates from Equation (3), relating lagged firm-wide remote work adoption to subsequent return on assets. Across specifications, the estimated coefficient on overall remote work is positive but statistically indistinguishable from zero. Thus, when remote work is measured at the firm level without regard to where it is adopted, we find no systematic relation with profitability.

This aggregate null is consistent with recent evidence that the effects of remote work can vary substantially across firms (e.g., Boeri, Crescenzi, and Rigo, 2025; Gupta, Gupta, and Simintzi, 2026). A firm-wide measure, however, does not reveal where remote work is concentrated within the organization. This distinction may matter if the costs and benefits of remote work depend on employees' roles and responsibilities. This naturally raises the question of whether the relation between remote work and profitability differs depending on the organizational layer in which remote work is adopted.

5.2 Remote Work Across Organizational Layers

To examine whether the location of remote work within the organization matters for firm profitability, we estimate Equation (4), allowing remote work adoption to vary across managers, middle-layer employees, and lower-level employees. Table 3 reveals a clear difference across organizational layers. Managerial remote work is positively and significantly associated with subsequent ROA across specifications, whereas the coefficients for middle- and lower-layer remote work are small and statistically indistinguishable from zero. The aggregate null documented in the previous section therefore masks a positive relation concentrated among managers, consistent with our earlier conjecture that the implications of remote work depend on where within the organization it is adopted.

Importantly, the managerial estimate changes little as we introduce additional controls and fixed effects. To put its magnitude in perspective, a 10-percentage-point increase in the share of managers working remotely is associated with an increase in ROA of approximately 0.16 percentage points.

Relative to the sample median ROA, this corresponds to an increase of about 3.3%. While this is a modest increase in profitability, the more important implication is that greater managerial remote work is not associated with a deterioration in firm performance; if anything, the relation is moderately positive.

One concern is that the managerial result may reflect differences in firm size. On the one hand, larger firms employ more managers, tend to have more developed organizational structures, and may be better equipped to accommodate remote work. On the other hand, managerial responsibilities are typically more concentrated in smaller firms, where the physical absence of a manager may therefore be more consequential. Managerial remote-work arrangements may also be more directly shaped by managers themselves in smaller organizations. To assess whether the main result is concentrated at either end of the firm-size distribution, we repeat the analysis separately for small and medium-to-large firms, using the €10 million turnover threshold in the European Union definition of small firms. Table 4 shows that the positive association between managerial remote work and ROA is present in both groups. The estimates are similar in magnitude across the two samples, suggesting that the main result is not confined to either small or larger firms.

The profitability result also helps us revisit the interpretation of the managerial wage decline documented in Section 4. If remote managers moved into systematically less productive matches, we would expect this to be reflected in firm-side measures of production. We therefore examine firm productivity, measured as value added per employee, which is calculated before labor compensation is deducted. Table 5 shows a positive and statistically significant association between managerial remote work and value added per employee. A 10-percentage-point increase in managerial remote work is associated with approximately 0.23% higher value added per employee, corresponding to about €170 at the sample median of roughly €75,000. The magnitude is modest, but importantly, there is no indication that greater managerial remote work is associated with lower firm productivity.

This evidence sharpens the interpretation of the managerial wage discount. Managers who move into remote jobs earn approximately 3% less, while firms with greater managerial remote work exhibit neither lower profitability nor lower productivity; if anything, both measures move in the opposite direction. The wage decline therefore does not appear to simply reflect managers moving into less productive matches with less surplus to share.

5.3 Managerial Remote Work and Employee Retention

The absence of a performance penalty from managerial remote work raises the question of why firms may be able to offer this flexibility without sacrificing value. One possible explanation is that the value of flexibility is reflected not in managers' day-to-day performance, but rather in their willingness to remain with the firm. For managers who place a high value on working remotely, requiring full-time presence may make outside opportunities relatively more attractive, whereas allowing some degree of remote work may strengthen their attachment to the current employer. In this sense, the relevant benefit to the firm need not come from managers being more productive away from the office, but from preserving valuable managerial relationships that might otherwise be lost. This interpretation is consistent with recent experimental evidence showing that hybrid work can improve employee retention without damaging performance (Bloom, Han, and Liang, 2024).

Figure 4 provides evidence consistent with this interpretation. Managers who work remotely are more likely to remain with the same employer in the following year, but the association varies substantially across managers. It is particularly pronounced among managers with children and those facing longer commutes. Both characteristics increase the potential value of workplace flexibility, as remote work can ease the constraints associated with family responsibilities and reduce the time and cost of commuting.

The association is also stronger among junior managers, defined as those aged 35 or under. This pattern is consistent with recent evidence that younger workers tend to place a higher value on remote-work flexibility (Dias da Silva and Weissler, 2025). Younger managers are also generally at a stage of their careers characterized by greater external mobility, which may make their decision to remain with the current employer more responsive to workplace amenities. Taken together, the heterogeneity in Figure 4 suggests that the retention association is stronger among groups for whom flexibility is plausibly more valuable.

These patterns help interpret the firm-performance results. Our reading is not that managers become more productive simply because they work away from the office. Rather, the modest gains in profitability and productivity may reflect the value of avoiding a more costly alternative: requiring managers to work fully on site when they place a high value on flexibility. By allowing managers to work from home for a substantial share of their working days, firms may be better able to retain those who place a high value on flexibility, thereby preserving firm-specific human capital and avoiding the

disruption associated with managerial turnover.

5.4 Organizational Heterogeneity in Managerial Remote Work

The benefits of managerial flexibility are unlikely to be uniform across firms. Managers not only perform their own tasks, but also coordinate production, supervise employees, and facilitate the transmission of knowledge within the organization. Because these activities often rely on physical proximity and face-to-face interaction (Battiston, Blanes i Vidal, and Kirchmaier, 2021; Yang et al., 2022; Emanuel, Harrington, and Pallais, 2026), the relation between managerial remote work and firm performance is likely to depend on how strongly the organization relies on managers for day-to-day supervision and knowledge transmission.

Figure 5 examines this idea along three dimensions of organizational structure. The first is the share of junior employees. The positive association between managerial remote work and profitability is stronger in firms with fewer junior workers. This pattern is consistent with the idea that the value of managerial presence rises when employees are less experienced and therefore rely more heavily on supervision, feedback, and informal learning from more senior colleagues (Emanuel, Harrington, and Pallais, 2026). In firms with a more experienced workforce, by contrast, day-to-day production may depend less on continuous managerial oversight, making remote work easier to accommodate without disrupting performance.

A similar logic applies to workforce education. The association between managerial remote work and profitability is stronger in firms with a more educated workforce. More educated employees are likely to perform tasks that require greater autonomy and discretion, and may therefore depend less on direct managerial supervision in their daily activities. In these settings, the physical presence of managers may be less central to the execution of routine tasks, allowing firms to offer greater managerial flexibility without materially weakening coordination.

Finally, the relation is also more favorable when the number of lower-level employees per manager is lower. A larger worker-to-manager ratio increases the span of control of each manager and potentially raises the amount of coordination, monitoring, and problem solving that must be provided across a larger group of employees. When fewer lower-level employees report to each manager, these demands are less intensive, reducing the potential organizational cost of managerial absence. Taken together, the three patterns point in the same direction: managerial remote work appears easier to

accommodate when the organization relies less heavily on managers for continuous supervision, coordination, and knowledge transmission.

This interpretation is also consistent with theories of knowledge hierarchies, in which communication costs across organizational layers shape the organization of production (Garicano, 2000; Bloom, Garicano, Sadun, and Van Reenen, 2014). The evidence therefore points to an organizational trade-off: remote work can provide a valuable form of flexibility for managers, but the extent to which firms can offer it without impairing performance depends on the demands placed on managers by the workforce they supervise.

5.5 Addressing Endogenous Adoption

The evidence so far points to a robust positive association between managerial remote work and firm performance, but causality remains a concern. Firms that permit managers to work remotely may differ systematically from those that do not. Better-managed firms, for instance, may be both more willing to offer workplace flexibility and more capable of doing so without disrupting production. In addition, remote-work policies may themselves respond to firm-specific conditions that also shape subsequent performance.

To mitigate these concerns, we exploit variation in firms' pre-pandemic exposure to occupations that experienced different shifts toward remote work during the onset of the pandemic. Following an approach similar to Gupta, Gupta, and Simintzi (2026), we construct an instrument that combines the pre-pandemic occupational composition of the firm's managerial workforce with leave-one-out occupation-level changes in remote-work adoption between 2019 and 2020. The instrument therefore isolates variation in managerial remote work that is predicted by the firm's pre-existing occupational structure and by the differential shift toward remote work across occupations, rather than by contemporaneous firm-level decisions. We acknowledge that this approach does not fully eliminate identification concerns. In particular, the same pre-pandemic occupational structure that predicts managerial remote-work adoption may also expose firms differently to other pandemic-induced changes that are themselves capable of affecting firm performance, including shifts in demand, technology, or the organization of production. We therefore do not interpret the IV estimates as fully resolving the endogeneity of remote-work adoption. Rather, they provide complementary evidence that helps corroborate the main finding that greater managerial remote work is not associated with a

deterioration in firm performance.

Table 6 provides the IV estimates. The instrument is strongly related to managerial remote-work adoption, alleviating concerns about weak identification. More importantly, exploiting this alternative source of variation does not overturn the pattern documented in the OLS analysis. Although the IV point estimates are considerably larger than their OLS counterparts, a similar increase in magnitude when moving from OLS to IV is documented by Gupta, Gupta, and Simintzi (2026), who exploit related variation in pre-pandemic occupational exposure to remote work.[15] The IV estimates thus reinforce the qualitative pattern emerging from the baseline analysis, providing no indication that greater managerial remote work weakens firm performance and instead pointing to a modestly positive relation with profitability.

6. Conclusion

This paper examines the value of remote work from the perspectives of both workers and firms using population-wide Finnish administrative data covering more than 1.1 million worker-year observations and approximately 49,000 firm-year observations. On the worker side, a simple comparison initially reveals a positive wage differential associated with remote jobs. This differential, however, largely disappears as we compare increasingly similar job transitions, pointing to an important role for selection into remote work. The pooled result also masks substantial heterogeneity across organizational layers. Managers who move into remote jobs experience a wage decline of approximately 3%, whereas comparable declines do not emerge among middle- or lower-layer employees.

The firm-level evidence helps interpret this managerial wage differential. Firm-wide remote work is not systematically related to profitability, but distinguishing where remote work is adopted within the organization reveals a positive association concentrated among managers. Firms with greater managerial remote work exhibit modestly higher profitability and value added per employee, indicating that managerial flexibility does not come at the expense of firm performance. Managerial remote work is also associated with greater retention, particularly among managers for whom workplace flexibility is plausibly more valuable, such as those with children or longer commutes. The

[15] Larger IV than OLS estimates can arise, for example, when the endogenous regressor is measured with error or when the instrument identifies a local effect for firms whose adoption responds more strongly to the underlying source of variation (Jiang, 2017).

retention evidence suggests an alternative to the view that managers become more productive simply because they work away from the office. The value of managerial remote work may instead lie in the flexibility it provides, helping firms preserve valuable employment relationships without an apparent loss in performance.

This flexibility, however, may entail organizational costs when managers' physical presence is important for supervision, coordination, and knowledge transmission. Consistent with this trade-off, the association between managerial remote work and profitability is more favorable in firms with fewer junior employees, a more educated workforce, and fewer lower-level employees per manager. These patterns are consistent with managerial remote work being easier to accommodate when production relies less heavily on continuous managerial oversight and face-to-face interaction. An instrumental-variable strategy based on firms' pre-pandemic occupational structure yields estimates pointing in the same direction as the baseline analysis. We interpret this evidence as complementary rather than definitive, since the same occupational structure may also expose firms differently to other pandemic-induced changes that affect performance.

Taken together, our results suggest that the economic consequences of remote work depend not simply on how much remote work a firm adopts, but on where within the organization it is adopted and on the organizational environment in which it is implemented. The findings thus highlight the interaction between workplace flexibility and organizational structure as a central element in understanding the consequences of remote work for workers and firms.

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Figure 1: Remote Work Adoption by Occupational Layer Over Time.
This figure shows the yearly fraction of remote workers within a given layer. For each year, the measure is constructed by first computing firm-layer averages and then taking the mean of these firm-layer averages across firms.

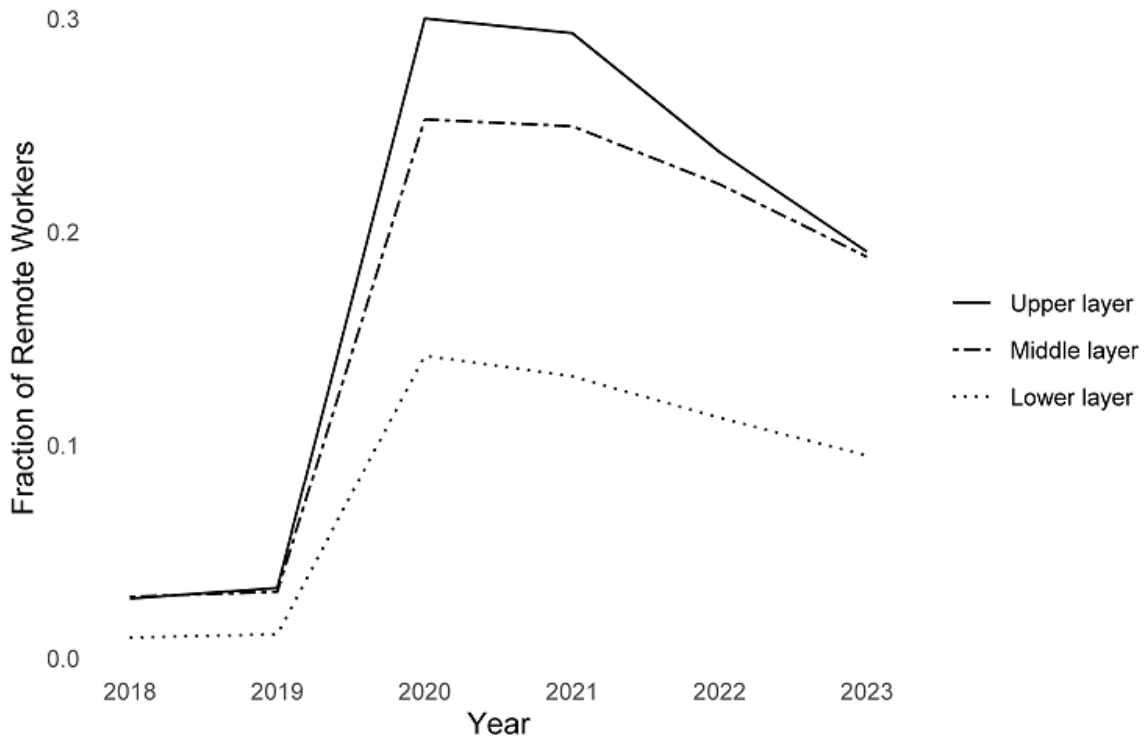


Figure 2: Wages When Moving Into Remote Jobs - All.
This figure shows β coefficients based on Equation (1). In the first figure, we do not exclude any job move. In the second figure, we exclude job moves where the 3-digit destination occupation does not match the origin occupation. In the third figure, we also exclude jobs with $Teleworkability < 0.3$. In the fourth figure, we include additional fixed effects. 95% confidence intervals are based on standard errors that are two-way clustered at the individual and origin-firm level.

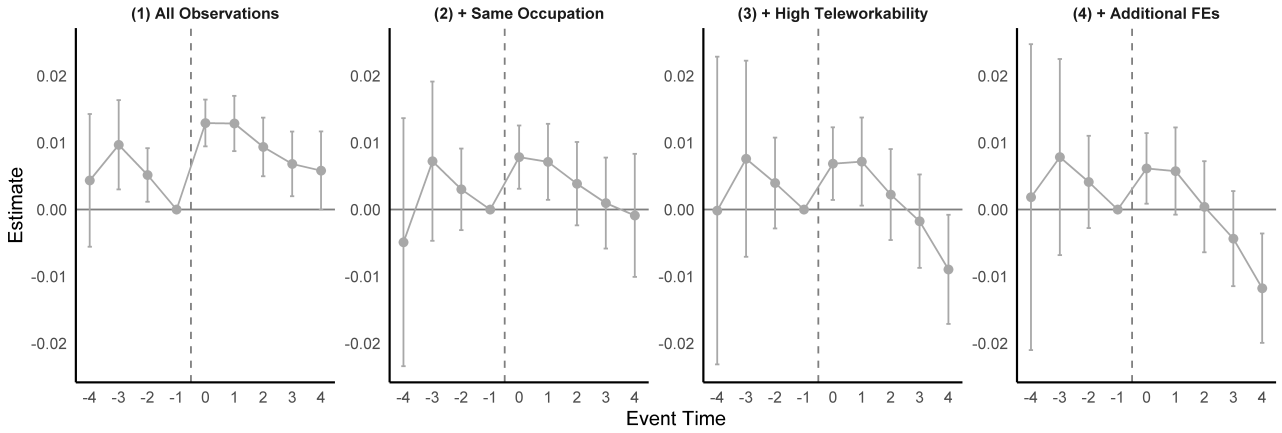
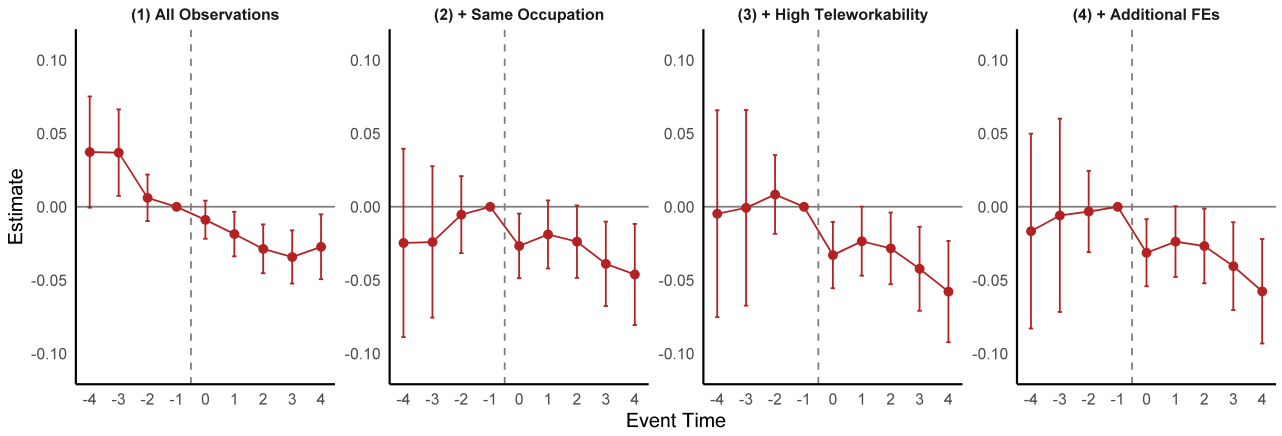
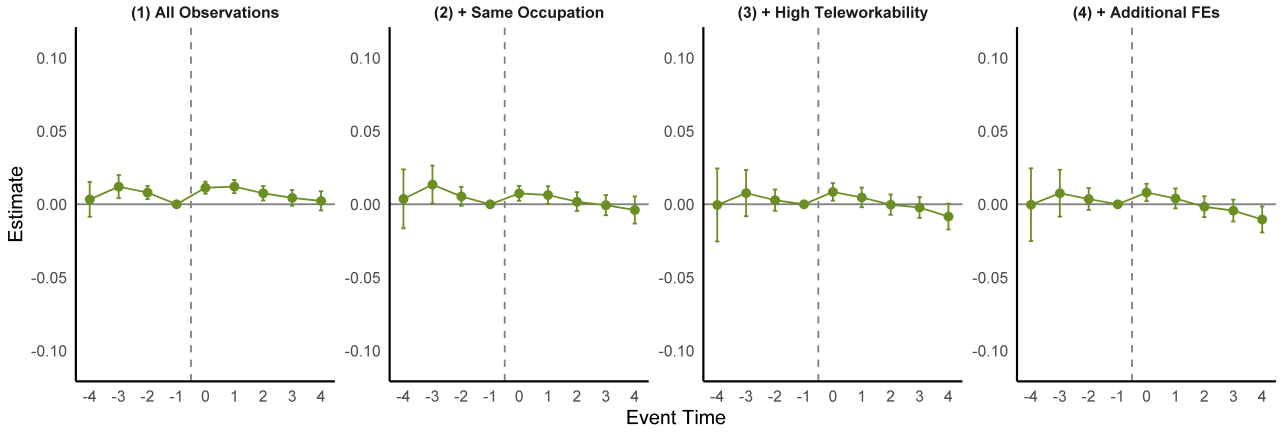


Figure 3: Wages When Moving Into Remote Jobs - By Layer.
This figure shows the dynamic wage effects of moving into a high-WFH job within each layer, based on Equation (2). In the first figure, we do not exclude any job move. In the second figure, we exclude job moves where the 3-digit destination occupation does not match the origin occupation. In the third figure, we also exclude jobs with *Teleworkability* < 0.3. In the fourth figure, we include additional fixed effects. 95% confidence intervals are based on standard errors that are two-way clustered at the individual and origin-firm level.

Panel A: Upper Layer.



Panel B: Middle Layer.



Panel C: Lower Layer.

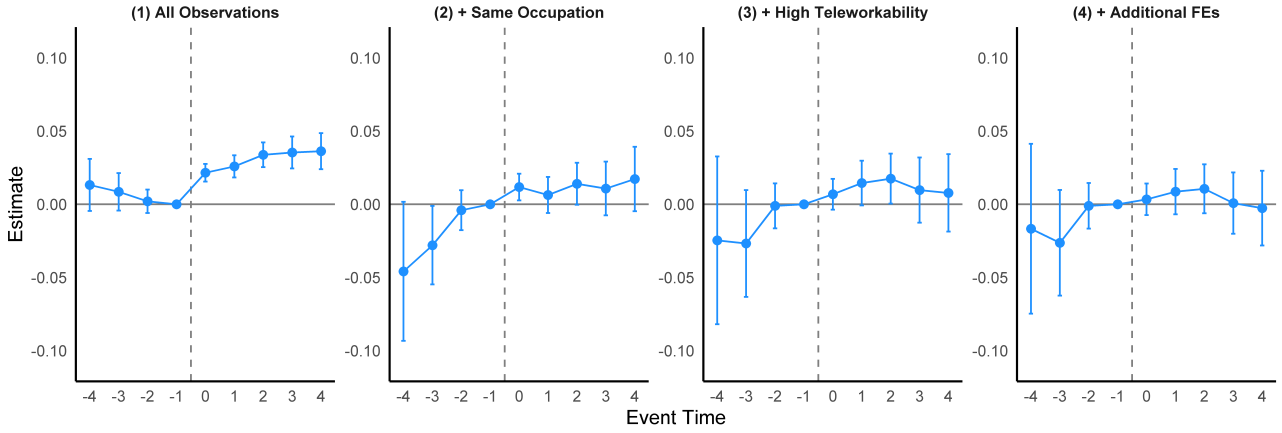


Figure 4: Managerial Retention and Working from Home.
This figure plots coefficient estimates from OLS regressions of employee retention on working from home. The dependent variable is an indicator equal to one if the employee remains employed at the same firm in the following year, and zero otherwise. The main independent variable is $WFH_{i,j,t}$, an indicator equal to one if individual i in firm j works from home in year t. Each regression also includes indicators for middle-layer and lower-layer employees and their interactions with $WFH_{i,j,t}$, so that the plotted coefficient on $WFH_{i,j,t}$ is the effect for managers (upper layer). Each estimate comes from its own regression, estimated on the corresponding sample. The first reported estimate examines all managers. The next two examine junior (aged 35 or under) and non-junior managers. The next two examine managers with children in the household and managers without children in the household. The last two examine managers with commutes longer than 10 kilometers and other managers. Working from home is measured in 2018–2022 and retention in 2019–2023. All regressions include individual, firm, and year fixed effects. Bars show 95% confidence intervals based on standard errors clustered at the firm level.

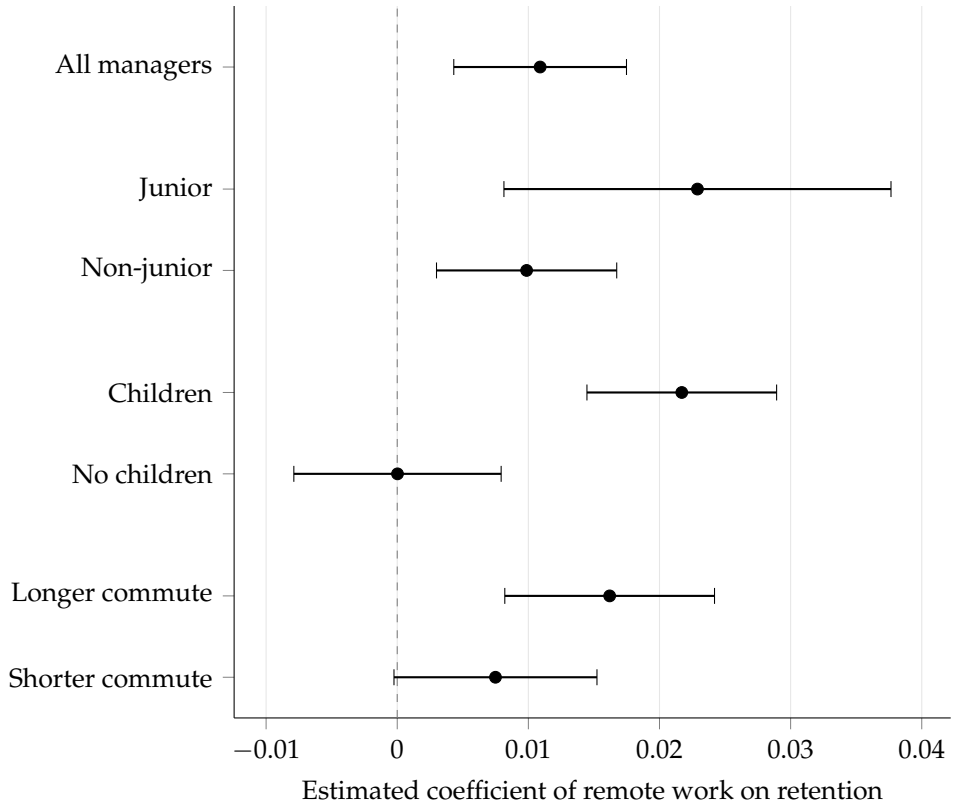


Figure 5: Managerial Remote Work and Firm Performance: Heterogeneity.
This figure plots coefficient estimates from three separate OLS regressions, one for each moderator. In each regression, ROA is regressed on the remote work of upper layer, middle layer, and of lower layer employees, an indicator equal to one if the moderator is above its sample median, and the interaction of this indicator with managerial remote work. For each moderator, circles show the coefficient on managerial remote work, which is the effect in firms below the median, whereas squares show the sum of this coefficient and the interaction coefficient, which is the effect in firms above the median. The first moderator is *Junior share*, defined as the share of employees aged 35 or under. The second moderator is *Workforce education*, defined as the average educational level of all employees within the firm. The third moderator is *Worker-to-manager ratio*, defined as the number of lower-layer employees divided by the number of upper-layer employees. The three regressions include firm, year × industry, and year × region fixed effects. All regressors are lagged by one year. Bars show 95% confidence intervals based on standard errors clustered at the firm level.

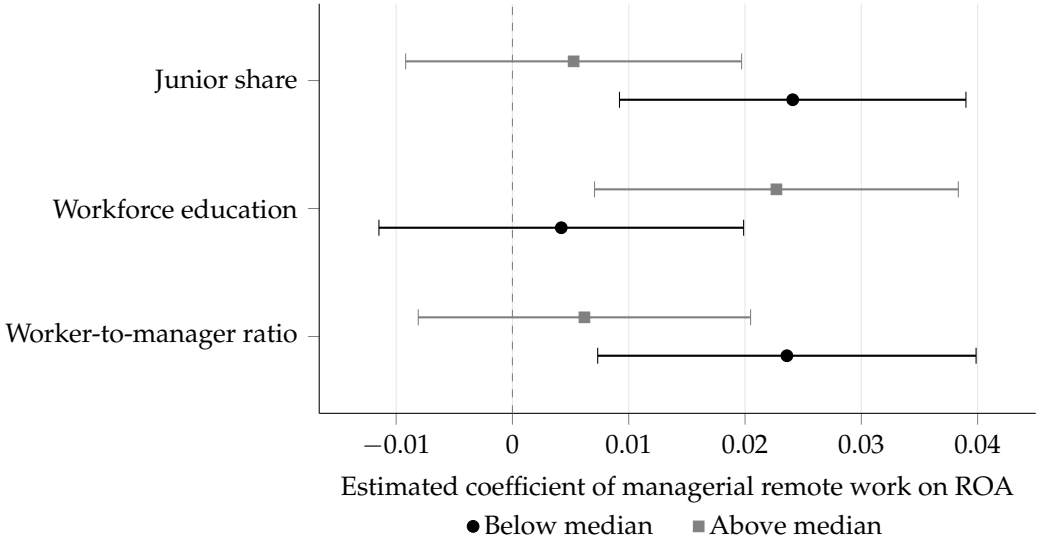


Table 1: Summary Statistics.
This table reports summary statistics. Panel A reports summary statistics at the worker-year level for our worker-level analyses. *Wage* is a register-based measure of individual wage and salary income. *WFH* is our measure of high-intensity telecommuting described in Section 2. The three worker-level layer classifications refer to the origin jobs. *Married* is an indicator variable equal to one if the individual is legally married or in a registered partnership, and zero otherwise. *University* equals one if the employee has completed a university degree, and zero otherwise. *Teleworkability* is a Finland-specific measure of teleworkability based on Dingel and Neiman (2020), measured at the 2-digit occupational code level. Panel B reports summary statistics at the firm-year level. *ROA* equals net income scaled by total assets. *Leverage* equals total liabilities scaled by total assets. *Startup* is an indicator variable equal to one for firms in their first ten years of operation, and zero otherwise. *Junior share* is defined as the share of employees aged 35 or under. *Workforce education* is defined as the average educational level of all employees within the firm (levels follow the national classification, which is aligned with the Unesco 2011 International Standard Classification of Education). *Worker-to-manager ratio* is defined as the number of lower-layer employees divided by the number of upper-layer employees.

Panel A: Worker-Level Summary Statistics

Variable	N	Mean	SD	P25	P50	P75
Wage (€)	1,146,540	48,622	23,671	34,020	42,300	55,434
WFH	1,146,540	0.100	0.300	0.000	0.000	0.000
Upper layer	1,146,540	0.036	0.186	0.000	0.000	0.000
Middle layer	1,146,540	0.449	0.497	0.000	0.000	1.000
Lower layer	1,146,540	0.515	0.500	0.000	1.000	1.000
Age	1,146,540	42.21	10.85	33.00	42.00	51.00
Female	1,146,540	0.418	0.493	0.000	0.000	1.000
Married	1,146,540	0.464	0.499	0.000	0.000	1.000
University	1,146,540	0.407	0.491	0.000	0.000	1.000
Teleworkability	1,146,540	0.402	0.395	0.030	0.320	0.800

Panel B: Firm-Level Summary Statistics

Variable	N	Mean	SD	P25	P50	P75
No. of employees (all layers)	49,108	97.56	340.08	13.00	28.00	67.00
No. of employees (upper layer)	49,108	3.87	14.34	1.00	2.00	3.00
No. of employees (middle layer)	49,108	37.62	145.28	3.00	9.00	24.00
No. of employees (lower layer)	49,108	56.07	246.85	3.00	11.00	33.00
WFH (all layers)	49,108	0.125	0.193	0.000	0.026	0.167
WFH (upper layer)	49,108	0.180	0.322	0.000	0.000	0.250
WFH (middle layer)	49,108	0.159	0.236	0.000	0.000	0.250
WFH (lower layer)	49,108	0.084	0.212	0.000	0.000	0.020
ROA	49,108	0.028	0.330	-0.013	0.048	0.133
Leverage	49,108	0.635	0.519	0.384	0.589	0.789
ln(Assets)	49,108	15.36	1.63	14.18	15.24	16.47
Startup	49,108	0.268	0.443	0.000	0.000	1.000
ln(Value added per employee)	47,478	11.281	0.680	10.936	11.224	11.580
Junior share	49,108	0.330	0.198	0.192	0.303	0.444
Workforce education	49,097	4.531	0.922	3.761	4.357	5.217
Worker-to-manager ratio	49,108	15.834	39.875	1.667	5.500	15.500

Table 2: Remote Work and Firm Performance.
This table reports the results of OLS regressions based on Equation (3). The sample period is from 2019 to 2024. The unit of observation is a firm-year. All regressors (including control variables) are lagged by one year. Controls include the natural logarithm of employees, ROA, a startup indicator, leverage, and the natural logarithm of assets. Standard errors clustered at the firm level are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ROA		
	(1)	(2)	(3)
WFH (all layers)	0.0194	0.0210	0.0160
	(0.0156)	(0.0154)	(0.0162)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Year × Region FE	No	No	Yes
N	49,108	49,108	49,108
R^2	0.583	0.585	0.585

Table 3: Remote Work Across the Corporate Hierarchy: OLS.
This table reports the results of OLS regressions based on Equation (4). The sample period is from 2019 to 2024. The unit of observation is a firm-year. All regressors are lagged by one year. Controls include the natural logarithm of employees, ROA, a startup indicator, leverage, and the natural logarithm of assets. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ROA		
	(1)	(2)	(3)
WFH (upper layer)	0.0158***	0.0161***	0.0151**
	(0.0059)	(0.0058)	(0.0059)
WFH (middle layer)	-0.0006	-0.0011	-0.0017
	(0.0133)	(0.0134)	(0.0134)
WFH (lower layer)	-0.0035	-0.0034	-0.0041
	(0.0106)	(0.0106)	(0.0106)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Year × Region FE	No	No	Yes
N	49,108	49,108	49,108
R^2	0.583	0.585	0.585

Table 4: Remote Work Across the Corporate Hierarchy: Analysis By Turnover.
This table reports the results of OLS regressions based on Equation (4). The sample period is from 2019 to 2024. The unit of observation is a firm-year. Panel A (B) restricts the sample to firms that in the previous year had a turnover not exceeding (exceeding) €10m, the small-firm turnover threshold specified by the European Union. All regressors are lagged by one year. Controls include the natural logarithm of employees, ROA, a startup indicator, leverage, and the natural logarithm of assets. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Turnover $\leq$ €10m

	Dependent Variable: ROA		
	(1)	(2)	(3)
WFH (upper layer)	0.0170**	0.0174**	0.0159**
	(0.0081)	(0.0080)	(0.0081)
WFH (middle layer)	-0.0012	-0.0027	-0.0009
	(0.0176)	(0.0177)	(0.0177)
WFH (lower layer)	-0.0043	-0.0027	-0.0045
	(0.0141)	(0.0142)	(0.0140)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year $\times$ Industry FE	Yes	Yes	Yes
Year $\times$ Region FE	No	No	Yes
N	29,700	29,700	29,700
R^2	0.612	0.615	0.604

Panel B: Turnover $>$ €10m

	Dependent Variable: ROA		
	(1)	(2)	(3)
WFH (upper layer)	0.0177**	0.0159**	0.0179**
	(0.0079)	(0.0079)	(0.0080)
WFH (middle layer)	0.0188	0.0201	0.0194
	(0.0173)	(0.0170)	(0.0177)
WFH (lower layer)	-0.0083	-0.0132	-0.0085
	(0.0126)	(0.0128)	(0.0126)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year $\times$ Industry FE	Yes	Yes	Yes
Year $\times$ Region FE	No	No	Yes
N	18,228	18,228	18,228
R^2	0.587	0.592	0.590

Table 5: Remote Work and Labor Productivity.
This table reports the results of OLS regressions. The sample period is from 2019 to 2024. The unit of observation is a firm-year. All regressors (including control variables) are lagged by one year. Controls include the natural logarithm of employees, ROA, a startup indicator, leverage, and the natural logarithm of assets. Standard errors clustered at the firm level are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ln(Value added per employee)		
	(1)	(2)	(3)
WFH (upper layer)	0.0229**	0.0226**	0.0224**
	(0.0093)	(0.0093)	(0.0094)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Year × Region FE	No	No	Yes
N	47,478	47,478	47,478
R^2	0.789	0.790	0.790

Table 6: Remote Work Across the Corporate Hierarchy: IV.
This table reports the results of IV regressions. The sample period is from 2019 to 2024, and only firms with all three occupational layers in fiscal year 2019 are included. The unit of observation is a firm-year. All regressors are lagged by one year. Controls include the natural logarithm of employees, ROA, a startup indicator, leverage, and the natural logarithm of assets. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: First Stage

	Dependent Variable: WFH (upper layer)		
	(1)	(2)	(3)
$Z^{upper}_{j,2019,2020} \times Post$	0.5228***	0.5244***	0.4623***
	(0.0444)	(0.0443)	(0.0443)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Year × Region FE	No	No	Yes
N	34,141	34,141	34,141
R^2	0.616	0.617	0.622
F-statistic (homoskedastic)	331	333	257
F-statistic (clustered)	139	140	109

Panel B: Second Stage

	Dependent Variable: ROA		
	(1)	(2)	(3)
WFH (upper layer)	0.1247*	0.1060*	0.1292*
	(0.0650)	(0.0632)	(0.0743)
Controls	No	Yes	No
Firm FE	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Year × Region FE	No	No	Yes
N	34,141	34,141	34,141
R^2	0.519	0.522	0.522

Internet Appendix

to

"Remote Work and the Corporate Hierarchy"

Emanuele Bajo Aleksi Pitkäjärvi Matteo Vacca

Validation Tests of the Remote Work Measure

Our information on remote work uptake originates from tax reports (see Figure A1) and is therefore observed at the individual-year level. We operationalize our definition of remote work to identify self-reported high-intensity telecommuting (e.g., Gajendran and Harrison, 2007), as described in Section 2. Throughout the paper, we refer to such high-intensity telecommuting simply as "remote work."

Below, we assess the validity of our remote work measure by examining its evolution over time, comparing it with survey-based evidence, and benchmarking it against other commonly used indicators of remote work.

Time Series

In Figure A2, we use our data to show how the number of employees who work from home evolves over time. Remote work among employees in Finland was a rather limited organizational phenomenon up to the COVID-19 pandemic. The uptake of remote work then spiked in 2020, when Finland implemented a number of policies to increase social distancing. Accordingly, major news outlets in Finland (including the national public broadcasting company) ran numerous stories, starting in spring 2021 (i.e., for fiscal year 2020), reminding readers of the existence of the home office deduction.[1] As the situation normalized over the following years, the number of individuals working from home in Finland gradually decreased. While remote work levels in Finland remain higher than in most other Western countries, the pattern described above is broadly consistent with the one observed across Europe (see, e.g., Jerbashian and Vilalta-Bufí, 2025).

Occupational Teleworkability

We validate our measure of remote work against the gold-standard measure of occupational teleworkability developed by Dingel and Neiman (2020). Importantly, the replication package of Dingel and Neiman (2020) allows us to build a Finland-specific measure of teleworkability for occupations identified at the major group (2-digit) level.[2] For example, occupations such as

[1] See, for example, the following articles (in Finnish): https://yle.fi/a/3-11726745, https://yle.fi/a/3-11882960, and https://www.mtvuutiset.fi/artikkeli/tarkeat-paivamaarat-lahestyvat-muista-nama-verovinkit-asiantuntija-vaantaa-myos-rautalangasta-tata-merkitsee-tyohuonevahennys-euroissa/8130980.

[2] The replication package was retrieved from https://github.com/jdingel/DingelNeiman-workathome and compiled in March 2026.

"information and communications technology professionals" have a teleworkability equal to one, whereas occupations such as "cleaners and helpers" have a teleworkability equal to zero. As shown in Figure A3, our data indicate that individuals in professions with higher teleworkability are substantially more likely to work from home (Pearson correlation of 0.89).[3]

Survey Evidence

Next, we compare our results with survey evidence. Statistics Finland administers two main surveys that measure conditions in the local labor market. The annual Labour Force Survey (*Työvoimatutkimus*, or LFS) has, since 2021, asked a remote work question to employed individuals aged 15–74, including the self-employed. In addition, the Quality of Work Life Survey (*Työolot*, or QWLS), which is conducted at intervals of around five years, recorded the share of remote work among wage income earners aged 18–67 for the reference year 2023.

We use the QWLS as our reference point because it allows us to map our remote work measure more closely to the survey answers. There are three main reasons for this choice. First, the remote work question in the QWLS refers to the entire previous calendar year, aligning with the tax return period we observe (whereas the LFS generally covers only the four weeks preceding the interview). Second, the QWLS provides more detailed frequency categories than the LFS, allowing us to better align our definition of threshold-based remote work. Third, the focus of this paper is on employees, whereas the prevalence of remote work is much higher among the self-employed (Aksoy et al., 2026).

Figure A4 reports the results of this comparison. Using tax reports, we find that 14.5% of full-time employees in Finland worked from home for more than 50% of all their working days in 2023. Our data map quite closely with the QWLS data for the same reference year. In fact, 16% of employees in the QWLS claimed to be working remotely for around 3/4 of the time or more, with an additional 6% declaring a share of remote work around 1/2 of the time. A bounds approach places the QWLS-implied prevalence between 16% and 22%, with a mid-point of 19%. Our tax-based estimate sits somewhat below this figure. This difference is consistent with three features of the institutional setting. First, employees who incur no out-of-pocket costs for remote work (e.g., because a parent or the employer pays for accommodation or work-related utilities) are not allowed to claim the deduction.[4] Second, the

[3] In Figure A3, we use 2020 data to match the real-time measures discussed in Dingel and Neiman (2020). Results are similar for other post-COVID years.

[4] For example, in 2024, about one-quarter of full-time employed young adults aged 18–34 in Finland lived with their parents. For more details, see https://ec.europa.eu/eurostat/databrowser/view/ilc_lvps09/default/table?lang=

QWLS is hours-based whereas our measure is days-based: depending on the taxpayers' interpretation of partial remote working days, the hours-based categories can substantially diverge from the days-based 50% threshold. Third, near-threshold claiming frictions (e.g., risk aversion, audit salience, and high tax morale) likely attenuate marginal claims relative to survey self-reports.

Industry

Next, we examine the shift to remote work across industries. Specifically, we compute the average change in our remote work measure across firms within each two-digit industry code from the pre- to the post-pandemic period, rank industries by this change and report the results in Table A1.[5] The resulting industry patterns are largely consistent with prior research (e.g., Dingel and Neiman, 2020). Labor-intensive industries experience the smallest increases in remote work, while knowledge-based industries experience the largest increases.

Commuting Distance

We also examine how the decision to work from home varies with commuting distance. Since a large literature in urban economics shows that commuting choices vary depending on urban spatial structure (e.g., Bento, Cropper, Mobarak, and Vinha, 2005; Redding and Turner, 2015), we examine how commuting distance affects the decision to work from home in the Finnish capital region, which consists of four municipalities and counts a population of about 1.3 million (with a median and average commuting distance of approximately 5-7 kilometers). Figure A5 confirms the basic stylized fact that shorter commuting distances are generally associated with a lower prevalence of remote work (Aksoy et al., 2022).

Gender

We further confirm the validity of our remote work measure by verifying the existence of a well-documented gender gap in remote work. Data from the US show that women work from home slightly more than men (Barrero, Bloom, and Davis, 2023). The QWLS confirms the existence of a similar gap in Finland. We confirm this basic stylized fact using our measure of remote work. Figure A6 plots the

en.

[5]We use two-digit industry codes. These industry codes are based on the Finnish TOL 2008 classification, which complies with NACE Rev. 2 on the 1 to 4-digit levels.

fraction of male and female employees working from home, showing the existence of a gender gap starting from 2020 onward.

Parenthood

Barrero, Bloom, and Davis (2023) find that the presence of children at home is strongly associated with increased working from home, with estimated effects ranging from 1.6 to 5.5 percentage points. Figure A7 confirms that this stylized fact also holds in our data.

Figure A1: Source of Information on Remote Work Uptake.
This screenshot shows how taxpayers can claim their home office deduction via the MyTax service, available on the website of the Finnish Tax Administration. Taxpayers in Finland can access and modify their tax reports free of charge either in person or online.

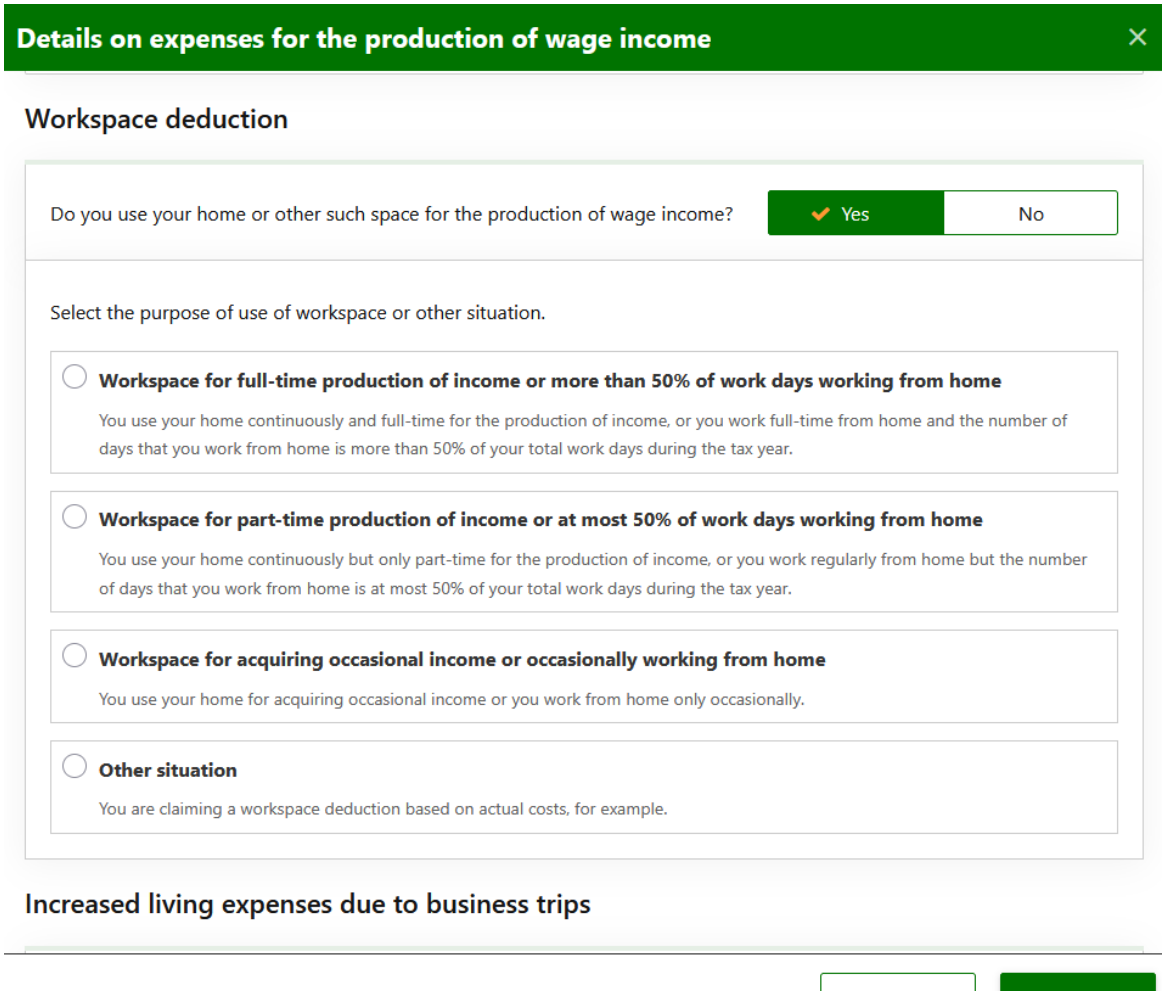


Figure A2: Validation Tests of the Remote Work Measure - Time Series.
This figure plots the yearly count of full-time employees who work from home in Finland, between 2018 and 2023. The procedure to identify self-reported high-intensity telecommuting in a given year is described in Section 2.

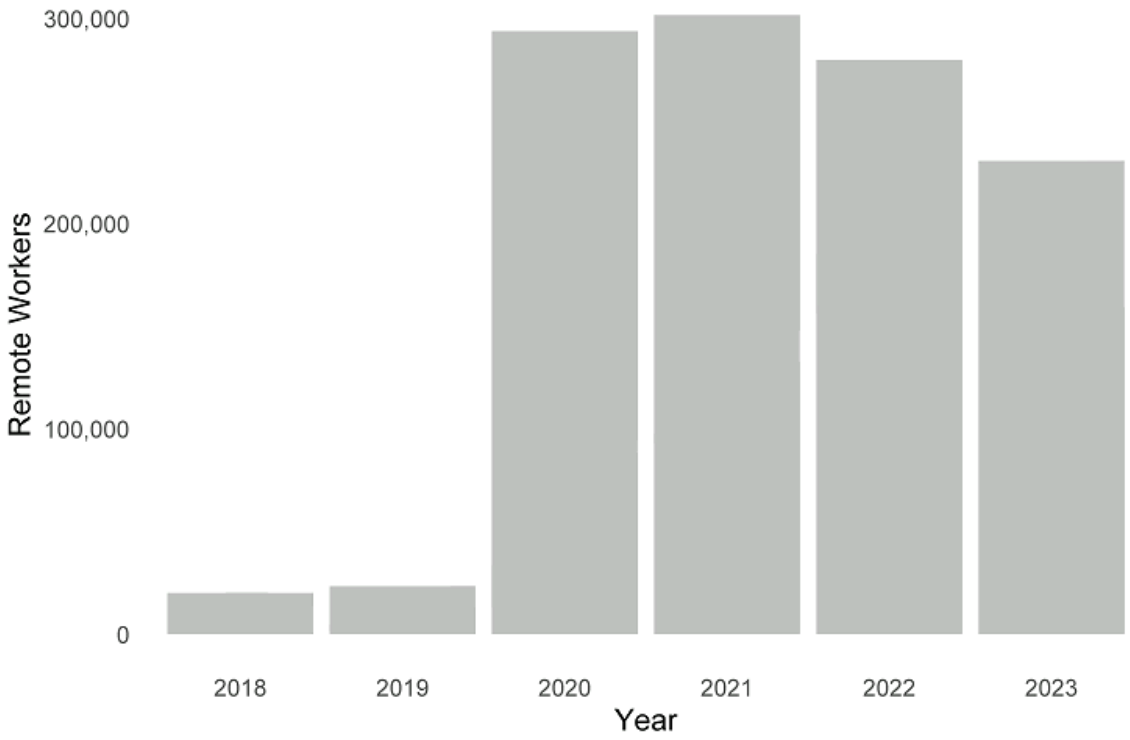


Figure A3: Validation Tests of the Remote Work Measure - Occupational Teleworkability.
This figure plots the frequency of remote work among employees in Finland in 2020 on the y-axis, and the Finland-specific teleworkability for 2-digit occupational codes derived from Dingel and Neiman (2020). Our data and the procedure to identify self-reported high-intensity telecommuting in a given year are described in Section 2.

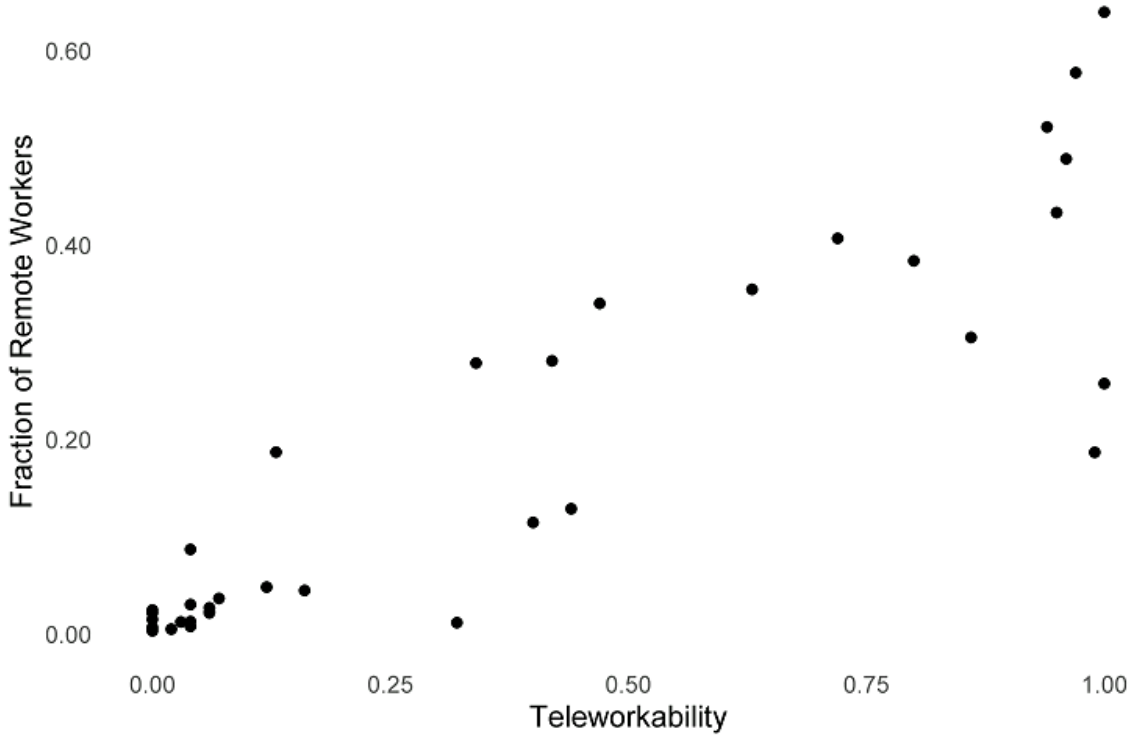


Figure A4: Validation Tests of the Remote Work Measure - Comparison With Survey Data.
This figure plots the frequency of remote work among employees in Finland in 2023. Our data and the procedure to identify self-reported high-intensity telecommuting in a given year are described in Section 2. The survey refers to the Quality of Work Life Survey administered by Statistics Finland.

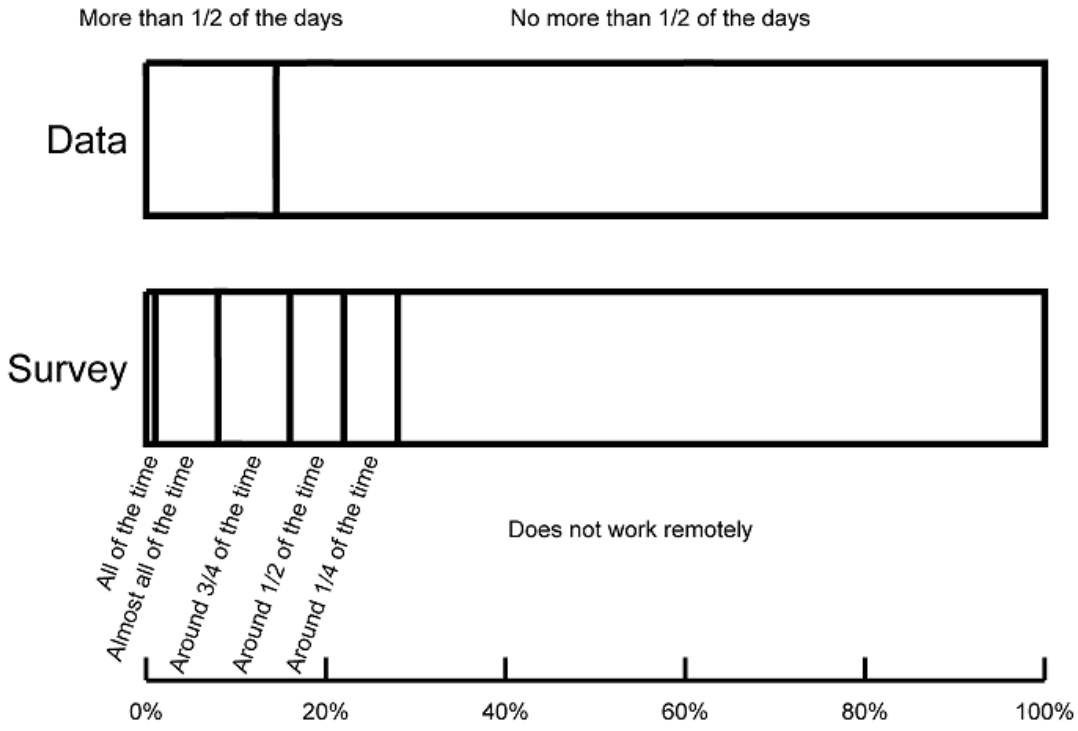


Figure A5: Validation Tests of the Remote Work Measure - Commuting Distance.
This figure shows the average propensity of remote work among full-time employees living and working in the Finnish capital region (Espoo, Helsinki, Kauniainen, and Vantaa) in 2020, as a function of their commuting distance. Each data point represents 10% of the observations. The procedure to identify self-reported high-intensity telecommuting in a given year is described in Section 2.

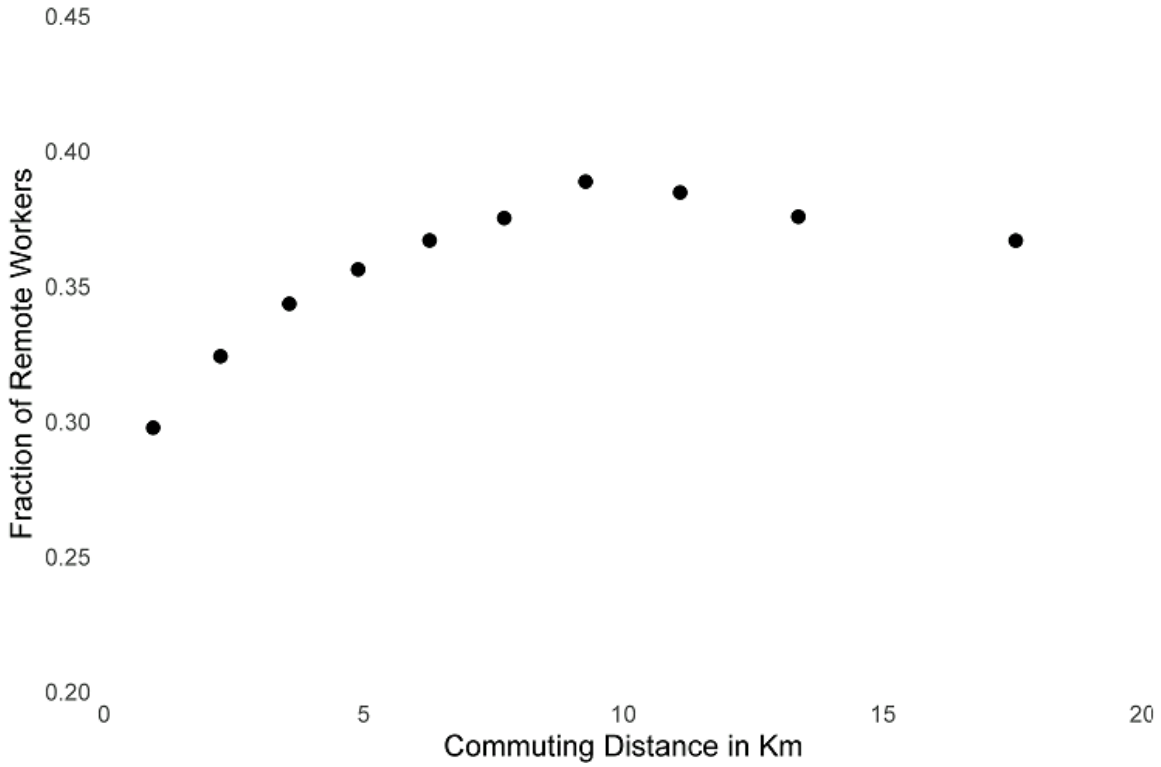


Figure A6: Validation Tests of the Remote Work Measure - Gender.
This figure shows the average propensity of remote work among full-time employees living in Finland between 2018 and 2023 by gender. The procedure to identify self-reported high-intensity telecommuting in a given year is described in Section 2.

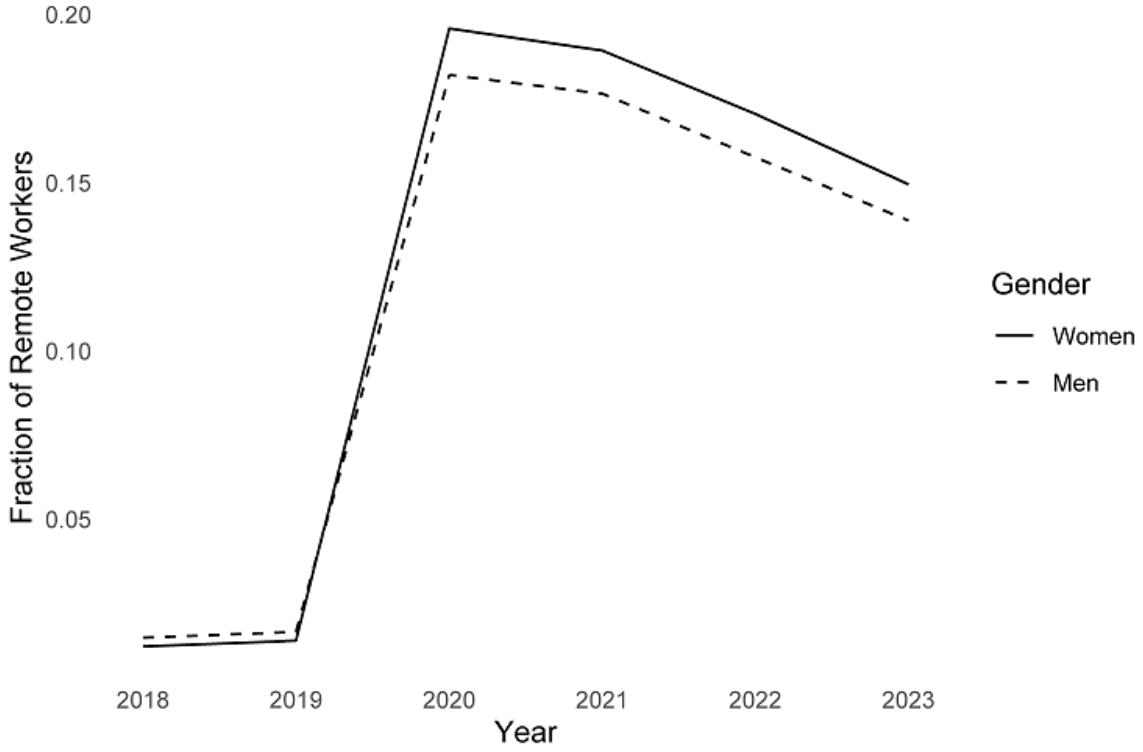


Figure A7: Validation Tests of the Remote Work Measure - Parenthood.
This figure shows the average propensity of remote work among full-time employees living in Finland between 2018 and 2023 by parenthood status (i.e., having underage children in a given calendar year). The procedure to identify self-reported high-intensity telecommuting in a given year is described in Section 2.

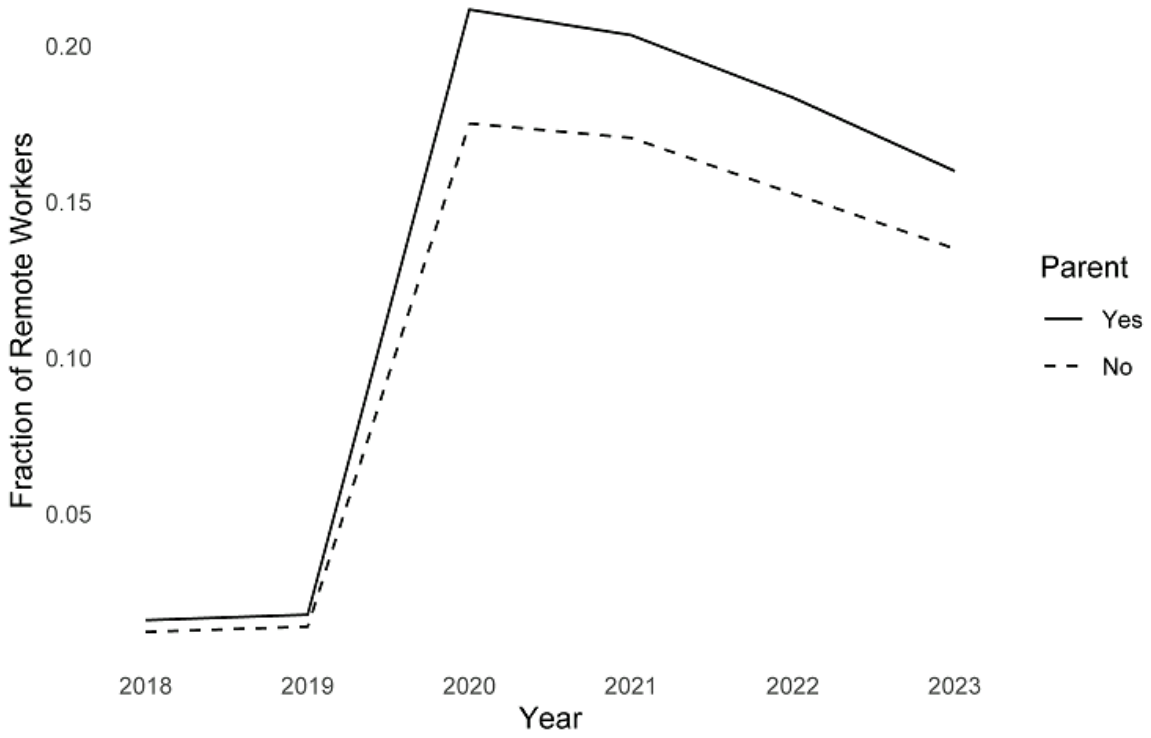


Table A1: Validation Tests of the Remote Work Measure - By Industry.
This table lists industries (two-digit TOL 2008 codes) with the largest and smallest shifts toward remote work from 2018 to 2023. Industries are ordered by the magnitude of the shift, in descending order. Industries with fewer than 1,000 workers in either year are omitted.

Panel A: Industries with Largest Shifts

Code	Industry
61	Telecommunications
66	Activities auxiliary to financial services and insurance activities
62	Computer programming, consultancy and related activities
63	Information service activities
65	Insurance, reinsurance and pension funding, except compulsory social security

Panel B: Industries with Smallest Shifts

Code	Industry
81	Services to buildings and landscape activities
49	Land transport and transport via pipelines
56	Food and beverage service activities
87	Residential care activities
15	Manufacture of leather and related products