Sick of Working from Home?

(short title: Sick of Working from Home?)

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Abstract:

We explore the consequences of the development of home working for wages, hours worked and employee health in the post COVID era. We base our research strategy on a French law passed in 2017 to encourage telework agreements between employers and employees. In the months following the law, many establishments signed telework agreements, and we show that this subsequently led to a much greater development of home working in these establishments after the epidemic shock in 2020. This increase was particularly significant in mid-level occupations, and was followed by a deterioration in the health of the employees concerned, particularly men.

Key words: working from home; health status; teleworking; occupational level;

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Driven by new information technologies, working from home (WFH) and telework have grown considerably in recent years. They proved to be effective instruments of economic resilience during the COVID 19 epidemic. However, their effects on working hours, wages or employee well-being are still being debated. The development of WFH reduces the time spent commuting and the fatigue that goes with it (Aksoy et al., 2023). This leaves more time for sport and exercise, with potentially beneficial effects for health. It can also mean greater freedom in the organization of working hours and a better work-life balance (Angelici and Profeta, 2023). But remote work can also mean more time spent sitting behind screens and less physical activities, increasing the health risks associated with a sedentary lifestyle (Oakman et al., 2020, Wilms et al., 2022). Links with colleagues are weakened, and the resulting social isolation also poses risks, particularly for mental health (Song and Gao, 2020, Wang et al., 2019).

WFH is generally voluntary, and often restricted to certain occupations within firms. In this context, remote workers represent a group of employees that can be fairly unrepresentative of the rest of the firm's employees and it is difficult to evaluate the impact of WFH convincingly simply by comparing within firms those working from home with those working on site. In this article, we propose to circumvent this difficulty by relying on a law passed in France in September 2017 to facilitate the signing of collective agreements on teleworking between employers and employees, with the explicit aim of making it easier to develop WFH in signatory establishments. The effects of the law were felt two years later, in 2020, when the COVID-19 epidemic shock led to a much greater development of WFH in establishments that had already signed an agreement with employees' representatives. Our assessment of the effect of WFH will be based on a comparison of employees in these establishments (our treatment group) and employees in establishments which signed agreements in other areas of labor relations over the same two-year period (our control group), before and after the epidemic shock. The identifying assumption is that, if the 2020 shock had not occurred, the evolution of the treatment group after this date would have remained similar to that of the control group.

Relying on the matching of the Labor Force Surveys conducted between 2013 and 2023 with administrative data on agreements, we were first able to check that there was virtually no difference in the frequency of WFH between the treatment and control groups throughout the 2010s. It is only after the epidemic had hit that we see a significantly faster growth in WFH in the treatment group. We also find that this rise in WFH in the treatment group concerned mid-level employees more than upper-level ones. Mid-level employees (technicians, supervisors, office workers, etc.) rarely had access to WFH before the epidemic shock, and it was for them that the conjunction of a telework agreement and the epidemic shock had the strongest effect. By contrast, we find that WFH remains residual for the lower-level employees, both before and after the epidemic shock, in the treatment group as well as in the control group, in line with the literature on the occupational distribution of the possibility of WFH (Dingel and Neiman, 2020).

The rise in WFH in the treatment group appears to have had little effect on the number of hours worked, with this number evolving exactly in the same way in the treatment and control groups, before and after the 2020 shock. Similarly, the effect on hourly wages appears weak, even though they tend to evolve slightly less favorably for women in the treatment group after the shock, perhaps reflecting the specific difficulties faced by female remote workers in securing occupational promotion. On the other hand, when it comes to health, the effects are weak for women, but significant for men, particularly for those in mid-level jobs, which are also the jobs where the boom in WFH has been most spectacular in the treatment group after the epidemic shock. In particular, we observe a significant rise in the proportion of male mid-level employees with chronic disease in the treatment group compared to the control group after the shock, whereas no such differential trend was discernible before that date.

Overall, the health of mid-level male employees developed in a closely parallel way in the treatment and control groups throughout the 2010s, and it was not until the particularly sharp increase in WFH in the very early 2020s in the treatment group that their health began to deteriorate in this same group.

Taken together, our estimates suggest that for male mid-level employees, a 10 percentage points increase in WFH leads to a decline of about 15% to 20% of a standard deviation in the synthetic health index constructed from the various primary health indicators available in our data, which corresponds to more than half of the health gap that exists on average between upper- and lower-level employees.

Insofar as WFH protected against COVID-19 infections, these estimates likely capture a lower bound for the effect of WFH on pathologies linked to overly sedentary lifestyles.[2] It should be pointed out, however, that the estimated health effects are only marginally stronger when the epidemic months preceding the generalization of COVID-19 vaccination in 2021 are excluded from the analysis, and when we focus on the post-epidemic period when WFH no longer has the function of protecting against infection.

Our article contributes to the burgeoning literature on the consequences of the spread of home working in the post-COVID era (Barrero et al., 2023). A number of local experiments have already shed light on the impact that teleworking can have on productivity and occupational careers, particularly in occupations where individual productivity is easily measured, such as call centers (see e.g., Dutcher, 2012, Bloom et al. 2015, Battiston et al., 2021, Gibbs et al. 2023, Emanuel and Harrington, 2023). We contribute to this literature by relying on a large-scale natural experiment and nationally representative data, which enables us to assess the causal impact of WFH on the outcomes of a broad set of compliers, including all mid-level employees who are willing to work from home, but have only been able to do so thanks to the 2020 epidemic shock. We also contribute to the literature by shedding light on the causal impact of WFH not just on labor market outcomes, but also on employee health, a dimension still largely unexplored by the causal literature.

Our finding that WFH has a depressing effect on the health of male employees is consistent with the literature showing that WFH often coincides with a decline in physical activity, and that men are more exposed to pathologies associated with a sedentary lifestyle, such as diabetes, hypertension or excess

[2]For evidence on the role of WFH against infection, see e.g., Galmiche et al. (2021) or Fisher et al. (2020).

weight.[3] Our results are also reminiscent of the quasi-experimental literature showing that retirement (and the decline in physical activity that often accompanies it) increases mortality and health problems in former employees, particularly men (Fitzpatrick and Moore, 2018, Kuhn et al., 2020, Furuya and Fletcher, 2024).

The article is organized as follows: the first section describes the 2017 law and its context. The second section describes the data used. The third and fourth sections present our graphical and econometric analyses. The fifth section concludes.

1. Institutional Context

In September 2017, the French authorities passed a law designed to facilitate the spread of teleworking in private firms by lowering the cost to employers and employees of adjusting the use of teleworking over time. Prior to this date, an employee could not switch to WFH (or conversely give up WFH), even temporarily, without his or her employment contract being rewritten, as for a new hire. After this date, employers are no longer required to specify the terms of WFH on a case-by-case basis in the employment contracts of the employees concerned. It is sufficient to have signed a collective agreement specifying who is eligible and how teleworking is to be implemented. Once such a collective agreement has been signed, an employee can at any time obtain permission to start working from home (or to modify the conditions of working from home) by simply exchanging e-mails with the employer, without having to negotiate and sign a new employment contract. Whether or not there is a collective agreement, the law stipulates that switching to telecommuting may in no way alter the other terms of the employment contract (remuneration, number of hours, paid leave, etc.).

[3]On the link between the development of WFH and a sedentary lifestyle, see, e.g., Bu et al. (2021), Streeter et al. (2021), Lopez-Valenciano et al. (2021) and Ráthonyi et al. (2021). On the differences between men's and women's exposure to excess weight, diabetes or hypertension, see, e.g., Cutler et al. (2008), Sandberg and Ji (2012), Huebschmann et al. (2019), Connelly et al. (2022), Fontbonne et al. (2023), Werstuck et al. (2022) and Kautzky-Willer et al. (2023).

The existence of a collective agreement facilitates the adjustment of WFH over time, but the existence of an agreement is not in itself a sufficient condition for the effective development of WFH. Even when a collective agreement has been signed, an employee can only work from home if the employer agrees and the employee volunteers. To be more specific, the law stipulates that teleworking cannot be imposed by the employer (an employee's refusal to telework is not grounds for dismissal), except in special cases such as periods of confinements. In the remainder of the paper, we exclude these periods from our analysis.[4] Conversely, an employer is not obliged to accept an employee's request to telework, although s/he must give reasons if s/he refuses. The situation reverts to one without teleworking as soon as either the employee or the employer expresses the wish to do so. Within a company, teleworkers have the same rights and enjoy the same benefits as employees working on site.

The law also specifies the various aspects of telework that telework agreements should address. In particular, an agreement should begin by defining the specific activities and occupations that can be carried out remotely, as well as the eligibility criteria (if any) for employees. The agreement should also specify the places where teleworking can take place, i.e. most often at the employee's home (or second home), but also sometimes in specific shared spaces. The agreement should also specify whether and how the employer covers the costs incurred by implementing the technologies required for teleworking.

About 2,600 telework agreements were signed in 2018 or 2019, just after the law and before the epidemic shock in 2020. In what follows, our main objective is to compare employees in establishments that have signed these agreements with employees in establishments that have signed an agreement in areas other than teleworking, before and after the shock.

2. Data and Variables

[4] There were three periods of national lockdown in France, the first between March 7 and May 11, 2020, the second between October 30 and December 5, 2020, and the last between April 3 and May 3, 2021, or about 4 months in total. Working from home was only mandatory (for those who could) during these specific periods.

We use the French Labour Force Survey (LFS) conducted each year by the French statistical office between 2013 and 2023.[5] The survey provides annual information on the main socio-demographic characteristics of respondents as well as details on their employment status, usual number of hours worked per week, industry, occupation, establishment identification number and monthly wage. The survey also provides information on the proportion of working time respondents spent at home in the 4 weeks preceding the interview (0%, more than 0% but less than 50%, between 50% (included) and 100% (excluded), 100%). Between 2013 and 2020, this information (as well as the information on monthly wage) is collected for one third of the sample. From 2021, this information is collected for one sixth of the sample. Over the 2013-2023 period, the LFS provides us with a total sample of around 350,000 observations representative of the population of private-sector employees, with information on working from home.

When it comes to their health, respondents must specify (i) whether they suffer from a chronic disease (defined as a disease that has lasted or may last for at least 6 months) and (ii) whether they have been limited for at least 6 months by a health problem in the activities people usually do. In addition, respondents provide information on "their general state of health", with 5 response options from "very good" to "very bad". Such self-assessment of health is often used to analyse population health and the validity of this measure of health has been repeatedly demonstrated (e.g., Miilunpalo et al., 1997, Schnittker and Bacak, 2014, Cislaghi and Cislaghi, 2019). This measure of health status captures both variations in physical health and variations in mental health (Caramenti and Castiglioni, 2022).

In addition to the LFS data, we also used the administrative database on collective agreements (so called *D@ccord* database). This database is operated by the Ministry of Labour and lists all agreements between employers and employee representatives.[6] The database covers the period between 2013

[5] The French Continuous Labour Force Surveys (EEC - *Enquêtes Emploi en continu*), 2013 to 2023, are produced by INSEE (*Institut National de la Statistique et des Etudes Economiques*), the French national statistical institute (INSEE, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024).

[6] The Statistical database of firms collective agreements (*Base statistique des accords collectifs d'entreprise,* so called *D@ccord*), 2018-2019, is produced by DARES (*Direction de l'Animation de la Recherche, des Etudes et des Statistiques*), French Ministry of Labour (Ministère du Travail (DARES), 2023).

and 2019. For each agreement, the register provides the date of the agreement, the identifiers of the employers concerned by the agreement[7] as well as the topics covered by the agreement (and in particular if it relates to teleworking). Using establishment identifiers, we were able to match the LFS with this administrative database and to supplement the LFS with information on whether and when respondents' establishments had signed an agreement with workers' representative (and on whether this agreement covered teleworking). Prior to 2018, agreements on teleworking were very rare and not listed as such in the database. They only began to be listed as such (rather than placed in the "other" category) from 2018 onwards.

Working Sample

In what follows, we will focus on the sample of private sector employees observed in LFS between 2013 and 2023 in an establishment that signed at least one agreement with employee representatives in 2018 or 2019, whether or not this agreement covers telework. The aim is to identify the impact of the 2020 epidemic shock on employees in establishments covered by telework agreements, with employees in establishments that have signed agreements in other areas serving as a control group.

As mentioned above, we exclude observations collected during the lock-down periods decided when the first waves of the Covid-19 epidemic hit the country between March 2020 and May 2021, before the adult population was almost entirely vaccinated.[8] In the following, estimated impacts on WFH cannot be attributed to lockdown periods. The total number of observations is N=162 683, with about 73% in the control group and 27% in the treatment group. Figure A1 in Online Appendix A shows that this proportion remained very stable throughout the period under consideration, with no significant variation at the time of the 2020 pandemic shock, in line with the idea that the shock did not trigger any significant reallocation from the control group to the treatment group.

[7] When an agreement is signed by a group of establishments, we use the Financial Links between Enterprises database (*Liaisons financières entre sociétés*, so called *LiFi*), 2013 to 2021, co-produced by INSEE and the French Ministry of Finance, which lists the identifiers of the establishments that make up each group (INSEE & Ministère des Finances (DGFiP), 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022).
[8] On the timing of epidemic waves and vaccination, see, e.g., Costemalle et al. (2021).

In the following, we will first explore whether the probability of WFH has actually risen more sharply in the treatment group after the epidemic shock, and then we will analyse whether this has been accompanied by specific changes in working hours, wages or health status for the employees concerned. To take account of the highly heterogeneous nature of teleworking opportunities, most of our analysis will be carried out by distinguishing between upper-level employees (managers, engineers, executives, etc.), mid-level employees (technicians, foremen, mid-level administrative staff, etc.) and lower-level employees (manual workers, sale assistants, nursery or care assistants, etc.). The upper group represents about 22% of the working sample, the mid group 36% and the lower group 42%.[9]

In Online Appendix A, we provide some additional descriptive statistics comparing our working sample with the representative sample of all private-sector employees (Table A1) and also comparing the treatment and control groups in the two years preceding the 2020 shock (Table A2). It can be seen that there is little difference in WFH or in health status between the two groups. As we shall see below, each of these two variables in fact evolved in a completely parallel way in the two groups throughout the years leading up to the 2020 shock, in line with what will constitute our main identification assumption. Finally, it should be emphasized that the vast majority of establishments (over 99%) in the treatment group have signed several agreements in the two years preceding the 2020 shock, not just one on teleworking. Table A3 in Online Appendix A shows that the themes of agreements other than telework are roughly similar in the treatment and control groups, with however a higher proportion of agreements devoted to working conditions in the treatment group (12.2% of themes addressed in the treatment group against 4.7% in the control group), likely reflecting the fact that the theme of telework is often addressed in conjunction with other aspects of working conditions.

3. Telework Agreements, Pandemic Shock and WFH: Graphical Analysis

[9] Focusing on the three lockdown periods (i.e., the periods where WFH was compulsory for all those for whom it was possible), it is possible to show that these 3 occupational groups can be interpreted as distinguishing between employees according to the degree to which their occupation can be performed remotely (see Online Appendix B).

The signing of a telework agreement is not a sufficient condition for the development of WFH in a firm, but we can speculate that it is a factor that facilitates its development when the need arises. To test this assumption, Figure 1 shows the evolution of the probability of having worked from home in the last 4 weeks separately for employees working in an establishment that signed a telework agreement in the two years following the 2017 law (our treatment group) and for those working in an establishment that signed an agreement during the same two-year period, but without any telework clause (our control group). The analysis is carried out by distinguishing between employees in upper, mid and lower-level occupations.

The figure first reveals that the probability of WFH remained very similar in the treatment and control groups throughout the 2010s. The figure further shows that WFH only began to spread rapidly in the economy in 2020, and that the increase mainly concerned upper- and middle-level employees, with lower-level employees almost never working from home, both before and after the epidemic shock. The figure also reveals that WFH remained at high levels even after vaccination became widespread in 2021, and WFH ceased to be a means of protecting against infection. Finally, for both mid-level and upper-level employees, the figure shows that the spread of WFH after the shock was stronger in the treatment group than in the control group. The pandemic shock in 2020 acted as a successful experiment in WFH in many firms, with consequences all the stronger for the fact that there was an agreement in place to develop WFH without delay or red tape.

To take one step further, Figure A2 in Online Appendix A shows the evolution of the difference in the probability of WFH between employees in the two groups, separately for the three occupational levels, using the 2019 gap as a reference. The figure confirms that there is no trend in these gaps before the 2020 shock and confirms that they only widen when the epidemic hits. Compared with the 2010s, the post-epidemic gap appears to be even more pronounced for mid-level employees than for upper-level employees. Before 2020, many employers were reluctant to allow their mid-level employees to work

for home, and it is especially for this group that the combination of the 2017 law and the pandemic shock has helped to change employers' perceptions and practices.

4. Telework Agreements, Pandemic Shock and Workers' Outcomes: Regression Analysis

The previous graphical analysis suggests that the epidemic shock catalyzed a significantly greater rise in WFH in establishments in the treatment group, particularly in mid-level occupations. In the following sections, we ask whether this particularly rapid expansion of WFH in these establishments and occupations had an impact on the wages, hours worked or health of employees. To explore this issue, we use the same LFS sample as that used for the graphical analysis, namely the 2013-2023 sample of employees working in an establishment in which an agreement was signed with worker representatives in 2018-2019. For each of the outcomes (Y) studied, we estimate the following difference-in-differences (DD) model,

$$(1) \qquad Y_{it} = \alpha T_{it} \times Post_t + \beta T_{it} + X_{it}\theta + \gamma_t + u_{it}$$

where T_{it} is a dummy variable indicating that individual i works on year t in an establishment that has signed a telework agreement in the two years following the 2017 law, $Post_t$ is a dummy variable indicating that the observation year is 2020 or later, γ_t represents year fixed effects and X_{it} is a set of control variables that includes industry dummies, firm size dummies as well as their interactions with $Post_t$. The parameter of interest is α and identification is based on the usual parallel trend assumption, i.e., the assumption that, conditional on control variables, the expectation of unobserved u_{it} evolves in the same way in the treatment group and the control group between before and after the 2020 shock.

4.1. Workforce Composition

Before moving on to comparing the evolution of hours worked, wages or health status in the treatment and control groups, we will begin by using model (1) to compare the evolution of employee characteristics in the two groups before and after the epidemic shock (in terms of gender, age, education, seniority or occupational level). The aim is to test whether the shock has induced differential

changes in the composition of the workforce in the two groups. Such changes could have occurred if the 2020 epidemic shock led some employees in the treatment group to stay in their firms rather than leave them (or led some unemployed people to apply for jobs with the establishments in the treatment group rather than with others).

To shed light on this issue, the first column of Table 1 shows the regression results when the dependent variable is, in turn, (a) a dummy variable indicating that the employee holds a lower-level position, (b) a dummy indicating a mid-level position, (c) a dummy indicating an upper-level position (d) a gender dummy, (e) an age variable, (f) a high-school dropout dummy, (g) a dummy indicating whether the employee lives alone and (h) a dummy indicating whether the employee has 4 or more years of seniority (i.e., was hired before the 2020 shock). For each of these dependent variables, the estimated parameter α is small and not statistically significant at standard levels, in line with the idea that the rise in WFH in establishments in the treatment group did not coincide with any specific changes in the composition of their workforce. In particular, the fact that the share of employees with 4 or more years of seniority was unaffected suggests that the rise of WFH in the treatment group did not particularly encourage existing employees to leave (or stay with) their employer.

To take one step further, the second column of Table 1 replicates the previous analysis, focusing on the subsample of employees with 4 or more years of seniority. Once again, we detect no significant difference in the evolution of employee characteristics between the treatment and control group in the early 2020s, again in line with the idea that the rise in WFH in the treatment group following the 2020 shock had no impact on the propensity of employees in this group to leave (or stay with) their employer.[10] Based on these results, the next question is whether there is any difference in the evolution of wages, hours worked or health status between employees in the two groups after the shock.

[10]We have checked that the diagnosis is similar when this analysis is replicated for employees with 7 years' seniority or more (i.e. hired before 2017 and the vote on the law). Neither their proportion nor their socio-demographic profile changed differentially in the control and treatment groups after 2019 (see Table A4 in Online Appendix A).

4.2. Labor and Health Outcomes

The effect of the expansion of WFH on working hours or wages is not easy to predict ex ante. Insofar as the possibility of WFH responds to an aspiration of employees, firms where this option is more widely available likely attract more applicants and may be ultimately able to offer lower wages. However, we cannot rule out the possibility that WFH may coincide with an increase in productivity, with positive consequences on pay.

To explore these questions, panel A in Table 2 shows the regression results when the dependent variable in model (1) is in turn (a) a variable indicating that the employee has spent at least part of his/her working time at home during the last 4 weeks, (b) a variable indicating that the employee has spent 50% or more of his/her working time at home in the last 4 weeks, (c) a variable indicating the number of hours usually worked per week, (d) the (log of) hourly wage. The model is estimated separately on the upper-level, mid-level and lower-level sub-samples, so as to take into account the considerable differences in exposure to WFH of the main occupational groups. We have also added respondents' gender, age and education (as well as their interactions with $Post_t$) to the list of controls. The results are virtually unchanged if these additional controls are not used.

The results first confirm that the 2020 shock led to a stronger increase in WFH in the treatment group than in the control group, for both mid-level and, to a lesser extent, upper-level employees, while there was no differential trend for lower-level employees. If we focus on mid-level employees, the gap in WFH between the treatment group and the control group increases by about 8.4 percentage points for women and 7.9 percentage points for men. The table also reveals that the increase in the gap in WFH between the treatment and control groups largely reflects an increase in the gap in the probability of having worked 50% or more of the time at home over the last four weeks, particularly for women. The increase in this gap is around 3.8 percentage points for mid-level male employees and 6.5 percentage points for mid-level female employees. This result is all the more striking given that we exclude COVID-related confinement periods from our estimation sample.

As far as working hours are concerned, the results in Table 2 further suggest that the increase in WFH in the treatment group in the early 2020s did not coincide with significant changes in the number of weekly hours worked, apart from a marginally significant increase for female upper-level employees. Similarly, we detect little changes in hourly wages, except again for female upper-level employees, with the wages of those in the treatment group falling slightly relative to those in the control group in the early 2020s. This change in hourly wages may reflect a rebalancing of personal investment in favor of family life, to the detriment of their work life, among those who choose to increase the number of days worked from home.[11]

As we mentioned above, WFH can have effects beyond wages or working hours, and in particular on the health of employees, a dimension that can be positively affected by reduced commuting times or by protection against infectious deceases, but negatively affected by increased sedentary screen time.[12] To explore this issue, panel B in Table 2 shows the regression results when the dependent variable is in turn, (a) a variable indicating that the respondent suffers from a chronic disease, (b) a variable indicating that the respondent's activities have been limited for at least 6 months by a health problem (c) a variable indicating that the employee does not consider himself to be in very good health. For a more synthetic approach, we have also constructed a summary index from these three variables, following the procedure introduced by Anderson (2008). This index corresponds to a (standardized) weighted average of the standardized version of the three primary outcomes (each of these outcomes being first oriented so that a higher value corresponds to better health).

The regression results first reveal that the health of lower and upper-level employees did not evolve differently in the treatment and control groups in the early 2020s, whether we consider the male or female sample. Nor do we detect any differential evolution in the health of mid-level female employees in the treatment and control groups. On the other hand, we detect a significant decline in the health

[11]This negative impact on wages is consistent with Mas and Pallais (2017), who find that female job seekers are willing to accept significantly lower wages to WFH.
[12]On the health risks associated with a sedentary lifestyle see, e.g., O'Brien et al. (2024), Patterson et al. (2018), Proper et al. (2011) and Stamatakis et al. (2019).

of mid-level male in the treatment group compared to the control group. The proportion reporting a chronic disease increased by about 3.8 percentage points in the treatment group compared to the control group, while the proportion reporting limitations in their usual activities increased by 2.4 percentage points and the proportion reporting not very good health increased by 3.9 percentage points.[13] In the end, the synthetic health index of mid-level male employees decreases by about 11 % of a SD in the treatment group compared to the control group. For reference, this impact represents about 30 % of the gap in health index between upper- and lower-level employees.

Insofar as WFH protected against COVID-19 infections, this estimate likely captures a lower bound for the effect of WFH on sedentariness-related pathologies. The last row of Table 2 confirms that the decline in the health index is estimated to be even more marked (i.e. -15.9 % of a SD) for middle-level male employees when the two years preceding the generalization of vaccination at the end of 2021 are excluded from the analysis and when we focus on the period when WFH no longer has the function of protecting against infection. However, the difference between the estimates obtained with and without these two years is not significant at the standard level.[14]

The fact that the health of upper-level employees in the treatment group is much less affected by the epidemic shock than that of mid-level employees in the same group is consistent with the fact that their exposure to WFH (and sedentary screen time) was also less impacted. This also likely reflects that upper-level employees are much more likely to benefit from employment contracts that dot not impose any constraint on the number of hours to be worked each week, or on the times of the week when work must be carried out, which gives them much greater latitude to reconcile work and family life when working from home. From 2021, the LFS provide information on whether or not respondents benefit from such contracts (called *forfait-jour*) and the proportion of such contracts is about 66 % for

[13]We checked that there is no impact on the proportion declaring themselves in neither good nor very good health, i.e., there is essentially a substitution of "good health" responses for "very good health" responses.
[14]Table A5 in the online appendix replicates the whole of Table 2 when the years 2020 and 2021 are removed. It shows that the impacts on the three primary health indicators all appear stronger when the years 2020 and 2021 are removed, although the differences with Table 2 are again not statistically significant.

upper-level employees, compared with only 11 % for mid-level employees (and 6 % for lower-level employees). The homes of upper level employees are also on average more spacious and probably better suited to WFH than those of mid-level employees. According to the French Statistical Office, the proportion of overcrowded housing varies from about 26% for the poorest quartile of the population to 4% for the richest quartile (Arnold et al., 2019).

Within the mid-level group, the overexposure of men to the health risks of WFH may be explained by the fact that men are more exposed to chronic diseases that can be aggravated by increased sitting time, such as diabetes and hypertension, as already mentioned. It is also possible that the extra sitting time induced by WFH is in practice greater for men than for women, not least because of the unequal sharing of domestic tasks, particularly in the mid-level group.[15]

Taken together, our previous results suggest that a 7.9 percentage points increase in WFH for mid-level male employees causes a decline in their health index of about 11 % of a SD. As discussed above, this causal interpretation assumes that the gap in health status between treated and control mid-level male employees would have remained constant in the absence of the 2020 shock to WFH. To test the credibility of this parallel trend assumption, Figure 2 shows the evolution of the difference in health index between treated and control mid-level male employees, year by year, over the 2013-2023 period (with 2019 taken as the reference year). The figure confirms that the health gap remained very stable throughout the years preceding the shock. It only began to decline gradually at the time of the shock, just as the gap in WFH itself was beginning to widen, in line with our identifying assumption.[16] Figure A4 in Online Appendix A reproduces this graphical analysis for each of the three primary health

[15]According to the latest French Time Use Survey (and focusing on private sector employees), women spend on average 1 hour and 44 minutes more each day on domestic tasks than men within the mid-level employee group, a gender gap 40% larger than that observed within the upper-level employee group, which stands at 1 hour and 13 minutes (see Brousse, 2015). The most highly skilled women subcontract more domestic tasks to service employees.

[16]Figure A3 in Online Appendix A further shows the evolution of the health index over the period 2013-2023 separately for the treatment and control groups and suggests that the estimated negative health effect on mid-level male employees derives from a decline in the health of the treatment group and not from an increase in the health of the treatment group.

outcomes, reaching similar conclusions for each. Figure A5 in the same appendix further replicates Figure 2 for lower-level male employees and for higher-level male employees. For these two occupational groups, the health gap between the treatment and control groups remains stable throughout the period under consideration.

4.3. A Triple Difference Approach

The difference-in-differences approach developed in the previous section assumes that, for each of the three types of occupations, the health status of employees in the treatment group would have evolved in the same way as that of employees in the control group, had there been no pandemic shock in 2020. To take one step further, it is possible to develop a triple difference (DDD) approach, based on the assumption that the *differences* in health status between the different types of occupations would have evolved in the same way in the treated group and the control group, had there been no shock in 2020.[17]

To be more specific, Table 3 focuses on the joint sample of mid-level and lower-level employees and shows the results of regressing the main outcomes of interest on the three-way interaction between the post-2019 dummy and the dummies indicating employees' treatment status and occupational level, controlling for the same variables as in model (1) and for their interactions with a mid-level dummy. In this set-up, for each of the outcomes studied, the coefficient captures how the gap between mid-level and lower-level employees has evolved after 2019 in the treatment group compared with the evolution in the control group.

The table first confirms that the epidemic shock coincided with a significantly stronger increase in the WFH gap between mid-level and lower-level employees in the treatment group, whether we consider the female or the male sample. Consistent with previous DD analysis, this increase in the WFH gap did not coincide with a significant change in the gap in hourly wages or hours worked, but coincided with

[17]The DD approach controls for time-invariant differences in the control and treatment groups while the DDD approach further controls for time-variant differences between the two groups, assuming that time-variations are similar for lower-level and mid-level occupations (as would be the case if, for example, firms in the treatment group had responded to the 2020 shock by providing on average more – or less – information about the epidemic to all their employees).

a significant reduction in the health gap between mid-level and lower-level male employees in treatment establishments. Compared to control establishments, the health gap decreased by about -13.6% of a SD in treated establishments. This triple-difference (DDD) estimate is even more marked (-17.7% of a SD) when the 2020-2021 period preceding the generalization of vaccination is excluded, in line with the DD results.[18] In the end, our DDD approach suggests that that an increase in WFH of about 7 percentage points for mid-level male employees causes a decline in their health index between -13% and -18% of a SD.

To test the robustness of these results, we replicated this DDD analysis focusing on the sub-sample of employees with four or more years of seniority (i.e., hired before 2020). As we saw above, neither the employment share nor the socio-demographic characteristics of this group of more senior employees changed differentially in the treated and control establishments after the 2020 shock, but the question arises as to whether they were indeed affected by the decline in health status previously highlighted, particularly among men. The last column of Table 3 shows that the answer is affirmative: the estimated impacts on male health appear even more significant when the analysis is restricted to employees who were already present at the time of shock. The impact on the proportion suffering from chronic disease is estimated at 6.9 percentage points, while the impact on the proportion limited in their usual activities is estimated at 5.3 percentage points and the impact on the proportion who do not declare themselves to be in very good health is 5.9 percentage points. In the end, the estimated impact on the health index is about -19.9% of a SD. The estimated impact on this synthetic outcome is again even more significant when the two years preceding vaccination are removed from the sample (-25.8% of a SD), in line with the DD results. The decline in the (relative) health status of mid-level male employees in the treatment group does indeed reflect a decline in the health status of the group of employees already present at the time of the epidemic shock.

[18]Table A6 in the online appendix replicates the whole of Table 3 when the years 2020 and 2021 are removed. Impacts on exposure to chronic disease or on limitations in usual activities again appear stronger when the years 2020 and 2021 are removed, although the differences with Table 3 are not statistically significant.

To complete our empirical analysis, Table A7 in Online Appendix A explores whether the main effects on men vary according to their area of residence (conurbation with more or less than 20,000 inhabitants), their family situation (living alone/not alone) or their age group (age 40 or more/less than 40). Employees living in the least urban areas are those with the longest commuting distances (Chaumeron and Lécroart, 2023) and for whom WFH is a priori of most interest. The table confirms that the first-stage effect on WFH was greater for employees living in the least urban areas. The estimated triple-difference effect is 11.1 percentage points in conurbations with fewer than 20,000 inhabitants, compared with only 3.4 percentage points in conurbations with more than 20,000 inhabitants. The table shows that it is also in the least urban areas that the impact on health tends to be the strongest (-19.1% vs -9.1% of a SD, the latter effect not being statistically significant), consistent with the assumption that it is indeed the rise in WFH that determines health problems. Our heterogeneity analysis further shows that the effect on health tends to be weaker for employees living alone than for others, while the effect on WFH is even stronger for employees living alone as for others. People living alone are the most exposed to mental health problems linked to social isolation, but this does not seem to be the channel through which WFH affects employees' health. Finally, the effect on health tends to be even more negative for employees aged 40 or over than for those under 40, in line with the fact that older employees are more exposed to health problems associated with a sedentary lifestyle (such as hypertension or diabetes).

5. Conclusion

The pandemic shock of 2020 prompted an unexpected and successful experiment with WFH in many firms. In this article, we show that this led to a particularly strong post-pandemic development of WFH in firms where WFH had already been the subject of a collective agreement (our treatment group). We also show that the post-pandemic increase in WFH in the treatment group mainly concerns mid-level occupations and not at all lower-level ones.

By further comparing mid-level and lower-level employees, we find that the rise in WFH for mid-level male employees in the treatment group is not accompanied by a significant change in their wages or hours worked, but coincides with a significant deterioration in their health. This trend is consistent with the public health literature, which has long highlighted the association between WFH, screen time and health problems. Unlike upper-level employees, mid-level workers rarely have the freedom to choose their own working hours, which also likely limits the benefits of WFH, particularly in terms of reconciling work and family life. The fact that men are more exposed to health problems induced by WFH is consistent with the fact that men are generally overexposed to health problems induced by a sedentary lifestyle, such as hypertension or diabetes. Our results are also in line with the literature showing that the transition to retirement is accompanied by greater health problems for men than for women.

Driven by new technologies, the rise of WFH is a trend that is unlikely to be reversed any time soon. There is much debate today about the impact this development is likely to have on productivity, particularly in occupations where face-to-face interactions in the workplace play a role that is still largely unknown. Beyond these questions, our work invites us to open up another important debate, that of policies likely to mitigate the potentially harmful impact on public health of the spread of overly sedentary lifestyles.

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Figure 1. *The Rise in Work from Home, by Occupational Group and Treatment Status.*

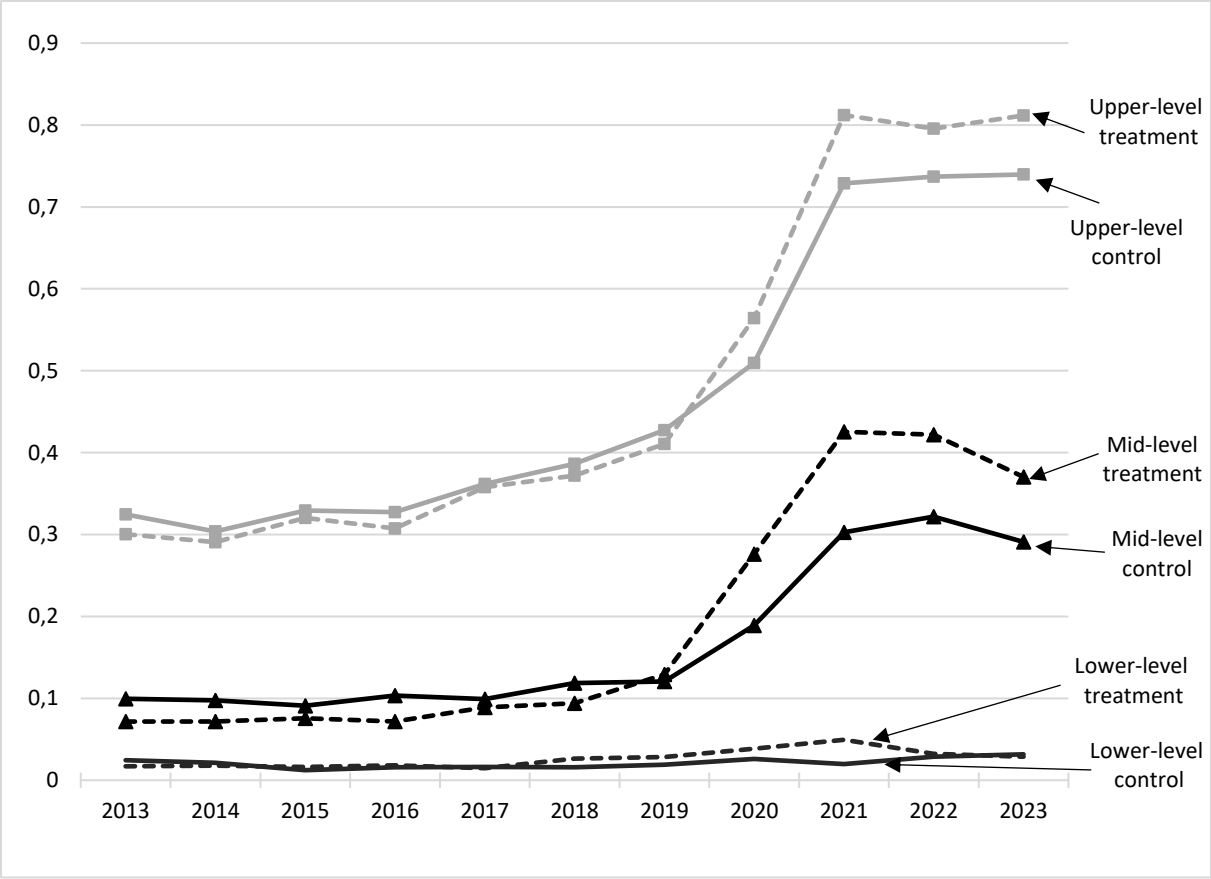
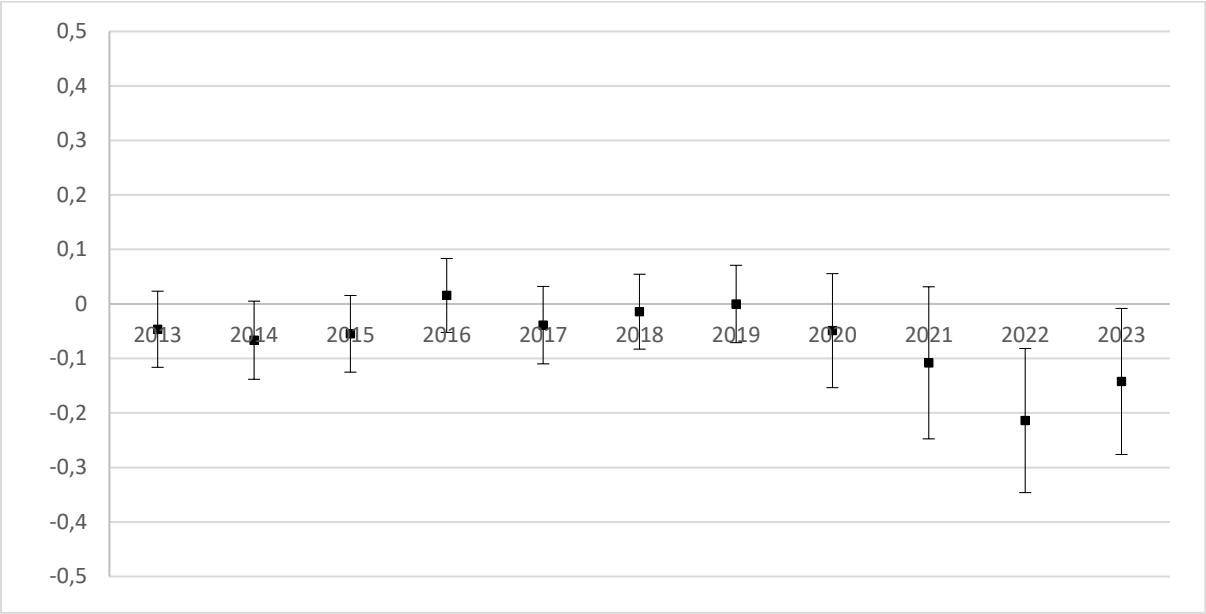


Figure 2. *Evolution of the Difference in Health Status between Mid-Level Male Employees in the Treatment and Control Groups.*



Note: The figure refers to the same working sample as Table 1, restricted to male mid-level employees. For each year, the figure shows the estimated difference in health index between treatment and control groups. Vertical bars represent 95% confidence intervals. Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Table 1. *Changes in the Composition of the Workforce in the Treatment Group Compared with the Control Group: A Double Difference Analysis.*

	All (1)	Subsample Seniority ≥4 years (2)
Lower-level occupation	0.000 (0.012)	-0.008 (0.015)
Mid-level occupation	-0.011 (0.012)	0.006 (0.015)
Upper-level occupation	0.011 (0.009)	0.001 (0.011)
Women	0.008 (0.008)	0.006 (0.010)
Age (in years)	-0.104 (0.222)	-0.327 (0.220)
High-school dropout	0.007 (0.009)	0.008 (0.011)
Single	0.004 (0.008)	0.000 (0.008)
Seniority≥4 years	-0.012 (0.009)	-
Nb Obs.	162 683	113 306

Note: The table refers to the sample of private sector employees in an establishment that signed at least one collective agreement with employee representatives in 2018 or 2019 (excluding observations made during the national lockdown periods). Column (1) refers to the full sample and column (2) to the subsample of employees with 4 or more years of seniority in their firm. Each row corresponds to a specific dependent variable, and for each variable the table reports the regression coefficient corresponding (in model (1)) to the treatment variable, i.e., the variable interacting the dummy indicating that the year of observation is 2020 or later and the dummy indicating that the employee is in the treatment group. The dependent variable is, in turn, a dummy indicating a lower-level occupation (row 1), a mid-level occupation (row 2), an upper-level occupation (row 3), a dummy indicating respondent's gender (row 4), the age of the respondent (row 5), a dummy indicating that s/he is a high school dropout (row 6), a dummy indicating that s/he lives alone (row 7) and a dummy indicating that the respondent has 4 years or more of seniority with his/her firm (row 8, first column only). Standard errors (in parentheses) are clustered at the firm level. Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Table 2. *Treatment Effects on Health and Labor Outcomes: A Double-Difference Analysis*.

	Female			Male		
	Lower	Mid	Upper	Lower	Mid	Upper
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: WFH, hours worked and wages						
WFH	0.003	0.084**	0.020	0.013*	0.079**	0.074**
	(0.011)	(0.021)	(0.021)	(0.008)	(0.018)	(0.019)
WFH≥50%	*-0.007*	*0.065***	*0.035**	*0.001*	*0.038***	*0.047***
	(0.006)	*(0.015)*	*(0.021)*	*(0.003)*	*(0.011)*	*(0.018)*
Working hours	-0.616	-0.262	0.678*	0.031	0.257	-0.026
	(0.390)	(0.219)	(0.375)	(0.236)	(0.254)	(0.318)
Hourly wage	0.004	-0.020	-0.029*	-0.015	0.013	-0.011
(ln)	(0.016)	(0.013)	(0.017)	(0.014)	(0.014)	(0.013)
Panel B: Health status						
Chronic	0.034	0.010	-0.006	-0.013	0.038**	-0.008
disease	(0.022)	(0.017)	(0.019)	(0.016)	(0.018)	(0.014)
Limitation	0.011	-0.009	-0.009	-0.006	0.024*	-0.006
	(0.019)	(0.014)	(0.013)	(0.011)	(0.014)	(0.010)
Not very good	-0.006	-0.001	-0.005	-0.006	0.039*	0.019
health	(0.022)	(0.019)	(0.025)	(0.017)	(0.020)	(0.019)
Health index	-0.039	0.004	0.022	0.026	-0.110**	-0.005
	(0.054)	(0.042)	(0.045)	(0.035)	(0.043)	(0.033)
Health index	-0.092	0.016	-0.003	0.018	-0.159**	0.011
(w/o 2020-21)	(0.065)	(0.055)	(0.055)	(0.048)	(0.060)	(0.043)
Nb. obs.	28 164	29 305	12 668	40 655	28 456	23 435

Note: the table refers to the same sample as Table 1. The first three columns refer to the female sample and the last three columns to the male sample. For each of the two samples, the first column refers to the subsample of lower-level employees, the second column to mid-level employees and the third column to upper-level employees. Each row corresponds to a specific dependent variable. For each dependent variable and each column, the table reports the regression coefficient corresponding (in model (1)) to the treatment variable, namely the variable interacting (a) the dummy indicating that the year of observation is 2020 or later and (b) the dummy indicating that the employee is in the treatment group. In panel A, the dependent variable is in turn (1) a variable indicating the employee has spent some of his/her working time at home in the previous 4 weeks, (2) a variable indicating that the employee has spent 50% or more of his/her working time at home in the previous 4 weeks, (3) a variable indicating the number of hours usually worked per week, (4) the (log of) hourly wage. In panel B, the dependent variable is in turn (1) a variable indicating that the respondent suffers from a chronic disease, (2) a variable indicating that the respondent's activities have been limited for at least six months by a health problem (3) a variable indicating that the employee does not consider himself to be in very good health, (4) the (standardized) synthetic health index. The last row replicates the analysis of the health index after removing the years 2020 and 2021 from the working sample. Standard errors (in parentheses) are clustered at the firm level. ** denotes p-value≤5% and * denotes p-value≤10%.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Table 3. *Treatment Effects on Health and Labor: A Triple-Difference Analysis*.

	Female		Male	
	All	Seniority≥4 y.	All	Seniority≥4 y.
	(1)	(2)	(3)	(4)
Panel A: WFH, hours worked and wages				
WFH	0.080**	0.078**	0.065**	0.073**
	(0.023)	(0.027)	(0.019)	(0.022)
WFH≥50%	*0.073***	*0.068***	*0.037***	*0.028***
	(0.016)	*(0.019)*	*(0.011)*	*(0.013)*
Working hours	0.358	0.259	0.220	0.066
	(0.443)	(0.564)	(0.340)	(0.383)
Hourly wage	-0.023	-0.021	0.028	0.022
	(0.021)	(0.025)	(0.020)	(0.023)
Panel B: Health status				
Chronic disease	-0.024	-0.070**	0.052**	0.069**
	(0.027)	(0.035)	(0.025)	(0.032)
Limitation	-0.019	-0.037	0.030*	0.053**
	(0.023)	(0.032)	(0.018)	(0.024)
Not in very good heath	0.004	0.015	0.044*	0.059*
	(0.029)	(0.033)	(0.026)	(0.031)
Health index	0.044	0.096	-0.136**	-0.199**
	(0.068)	(0.085)	(0.056)	(0.070)
Health index (w/o 2020-2021)	0.109	0.145	-0.177**	-0.258**
	(0.083)	(0.108)	(0.078)	(0.097)
Nb. Obs	57 469	38 050	69 111	47 186

Note: The table refers to the same sample as Table 1, restricted to lower and middle-level employees. The two first columns refer to the female sample and the two last columns refer to the male sample. Column (1) and column (3) use all observations, while columns (2) and (4) are restricted to employees with 4 or more years of seniority in their firm. Each row corresponds to a specific dependent variable. For each dependent variable and each column, the table reports the regression coefficient corresponding to the treatment variable, i.e., the variable interacting (a) the dummy indicating that the year of observation is 2020 or later, (b) the dummy indicating that the employee is in the treatment group and (c) the dummy indicating that the employee holds a mid-level job. The definition of dependent variables is the same as for table 2. Also, the regression model includes the same control variables as model (1) as well as their interactions with the dummy indicating that the employee holds a mid-level job (triple difference model). Standard errors (in parentheses) are clustered at the firm level. ** denotes p-value≤5% and * denotes p-value≤10%.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.