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ABSTRACT

Sick of Working from Home?

Driven by new information technologies, working from home has experienced unprecedented growth since the COVID pandemic. We contribute to the debate on the consequences of this development by drawing on a French reform conducted in 2017, with the aim of facilitating telework agreements between employers and employees. We show that the reform was followed by a boom in working from home, particularly in mid-level occupations. On the other hand, employees in lower-level occupations were virtually unaffected. By comparing occupational groups before and after the reform, in firms that have signed telework agreements and in firms that have not, we find that the development of working from home coincides with a significant deterioration in the health status of mid-level employees, particularly men. Wages and number hours worked, on the other hand, remain largely unaffected.

JEL Classification: J81, J53, I19

Keywords: working from home, health status, teleworking, occupational level

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Driven by new information technologies, working from home 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 working from home reduces the time spent commuting and the fatigue that goes with it (Aksoy et al., 2023). 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 (Wilms et al. 2022). Links with colleagues are weakened, and the resulting social isolation also poses risks, particularly for mental health (Wang et al., 2019).

Working from home 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 telework 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 encourage and facilitate the signing of agreements on teleworking between employer and employee, which were then almost non-existent. After this date, remote working and teleworking developed in an unprecedented way in some specific occupations, but not in others. Our assessment of this new organization of work is based on a comparison of the different occupational groups, before and after the wave of telework agreements that followed the law.

Relying on the matching of Labor Force Surveys with administrative data on employer-employee agreements, our analysis first confirms that the wave of telework agreements signed in 2018-2019, just after the 2017 law, materialized in 2020-2023 with a much greater rise in working from home in establishments which signed these agreements than in establishments which signed agreements in other areas of labor relations at the same date (our control group). Our analysis also shows that this agreement-induced rise mainly concerned employees in mid-level and upper-level occupations, but

not those in lower-level occupations. We further show that it concerned mid-level employees much more than upper-level ones, in line with the idea that upper-level employees (managers, executives, engineers, etc.) have much easier access to remote work, including in firms that have not signed telework agreements. We also reveal that telework agreements have above all made it possible to develop arrangements where employees work more than 50% of their working time at home. This result is all the more striking given that we exclude COVID-related confinement periods from our estimation sample.

As regards the impact of telework agreements on working hours, our results indicate that it is generally weak and not statistically significant. Similarly, the effects on hourly wages are small on average, although they tend to be negative for women, perhaps reflecting the specific difficulties faced by female remote workers in securing occupational promotion. On the other hand, when it comes to health, our data reveal that telework agreements coincide with a significant decline in the proportion of mid-level workers who consider themselves to be in very good health as well as with a significant rise in the proportion with chronic diseases or who suffer from physical limitations. This deterioration in health is consistent with the literature highlighting the risks associated with an overly sedentary working life. Such sedentary behavior has long been associated with higher rates of (all-cause) mortality, cardiovascular diseases, increased body mass index and blood pressure (e.g., Proper et al., 2011, Rezende et al., 2016, Stamatakis et al., 2019). The deterioration in employee health observed after the signing of telework agreements is much more marked for men than for women, in line with the fact that men are more exposed to health problems associated with a sedentary lifestyle, such as hypertension or diabetes (e.g., Cutler et al. 2008, Sandberg and Ji, 2012, Kautzky-Willer et al. 2023). As women devote a much greater proportion of their time to household chores and childcare, they are also likely less exposed to the health risks associated with overly sedentary behavior (e.g., Powell and Craig, 2015, Zamberlan et al., 2021).

In the end, under the maintained assumption that the effect of telework agreements on the relative health of the different occupational groups derives essentially from their effect on the relative exposure of these groups to working from home in treated firms, our estimates suggest that working from home has, as such, a strongly negative impact on the health of employees most affected by the agreements, particularly mid-level male employees: in their case, our estimates suggest that a 10 percentage point increase in working from home induces - in the years that follow - an increase of about 5 percentage points in the proportion suffering from chronic disease.

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). Based on a controlled experiment conducted in a Chinese call center, Bloom et al. (2015) show that, in this particular context, volunteer employees who are given the opportunity to work from home become more productive than other volunteers, but are nevertheless promoted less often by their employer. Also, at the end of the experiment, half prefer to return to work on site, citing as the main reason the loneliness and lack of social contacts they suffered while working from home. Using quasi-experimental post-pandemic data from US call centers, Emanuel and Harrington (2023) also find that remote working reduces the chances of individual promotion, but comes to a rather different conclusion from Bloom et al. (2015) when it comes to productivity: not only do the least productive employees tend to choose working from home more often, but working from home accentuates their productivity deficit. Drawing on another controlled experiment in a large Italian company, Angelici and Profeta (2023) show that the possibility of working from home, when combined with the ability to choose one's working hours, is accompanied (in this European context) by both increased productivity and subjective well-being for employees.

We contribute to this literature by relying on a large-scale natural experiment and large nationally representative data, which enables us to assess the causal impact of working from home on the outcomes of a broad set of compliers, i.e. the bulk of all mid-level white collar workers who volunteer to work from home, but to whom employers grant this possibility much less spontaneously than to upper-level white collar employees. We also contribute to the literature by shedding light on the causal impact of working from home not just on labor market outcomes, but also on employee health, a dimension still largely unexplored by the literature on the causal effects of working from home. Many public health studies have already highlighted the association between working from home and a sedentary lifestyle as well as between a sedentary lifestyle and health problems, but, to our knowledge, our article is one of the first to explore the extent in which there is a cause and effect relationship between working at home and health as well as the heterogeneity of this effect across gender groups.

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.

I. Institutional Context

In September 2017, the French authorities passed a law designed to encourage the spread of teleworking in French firms. After this date, employers are no longer required to specify the terms of teleworking 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. Whether or not there is a collective agreement, a simple e-mail agreement between the employer and employee may suffice for the employee to switch to telecommuting, it being understood, however, that switching to telecommuting in no way alters the other terms of the employment contract (remuneration, number of hours, paid leave, etc.).

The law also specifies the general framework within which the agreements must operate.[1] In particular, it 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 will exclude these periods from our analysis.[2] 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. For example, an agreement should as far as possible begin by defining the specific activities and occupations that can be carried out remotely, as well as the eligibility criteria (if any) for employees. For example, the possibility of teleworking may be reserved for employees with a minimum level of experience or working full time. Conversely, apprentices and interns (and, more generally, employees with a need for supervision) may be excluded from the possibility of teleworking. According to a survey by the French Ministry of Labor, most telework agreements include a minimum seniority criterion (on average 3 months minimum, according to the survey) and reserve teleworking for employees working at least the equivalent of 80 % of full time (Pesenti, 2022).

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.[3] Reimbursement of these costs may take the form of a flat-rate

[1] See Article L1222-9, L1222-10 and L1222-11 of the French labor laws.
[2] There were three COVID-related lockdown periods in France: from March 17 to May 10, 2020 (i.e. 1 month and 25 days); from October 30 to December 14, 2020 (i.e. 1 month and 15 days); from April 3 to May 2, 202 (28 days).
[3] According to the survey of the French Ministry of Labor mentioned above, a majority of agreements provide for the provision of equipment (such as laptops) for teleworkers and around half of the agreements provide for compensation for costs incurred by teleworking.

monthly allowance, for example. Finally, an accident occurring at the teleworker's place of work during the course of his or her professional activity is presumed to be an accident at work.

In the following, our ambition is to explore the effects that the signing of these agreements had on the probability of working from home as well as the consequences that this may have had on the working time, wages or health of the different categories of employees.

II. Data and Variables

We use the French Labour Force Survey (LFS) conducted by the French statistical office between 2013 and 2023. The LFS comprises on average about 400,000 individual observations per year, uniformly distributed across the weeks of the year. The survey provides 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 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%).[4] From 2021, we also have information on whether or not respondents have an employment contract that specifies the number of working days per year, but does not impose any constraints on the number of hours to be worked each week or on the times of the week when work must be done (so called *forfait jour* contracts). Finally, the LFS provides us with the identification numbers of respondents' establishments.

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

[4] Between 2013 and 2020, this information (as well as the information on monthly wage) is collected quarterly for one third of the sample. From 2021, this information is collected quarterly for one sixth of the sample.

good" to "very bad".[5] 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).

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. The database covers the period between 2013 and 2019. For each agreement, the register provides the date of the agreement, the identifiers of the employers concerned by the agreement 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. From 2018 onwards, they began to be listed, and in that year, we counted about fifty per month, namely about 1% of all agreements. The following year, their number doubled and they represented 2% of all agreements, a proportion that remained stable thereafter.

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 2018-2019, whether or not this agreement covers telework. The aim is to identify the post-2019 impact of telework agreements on employees in establishments covered by these agreements, with employees in establishments that have signed agreements in other areas serving as a control group. We exclude observations collected during the lock-down periods decided in France during the COVID epidemic. The total number of observations was N=162 683, with 73% in the control group and 27% in the treatment group. We will first explore whether the probability of working from home has actually

[5]To be specific, the question asked is « *Comment est votre état de santé en général ?*» (How is your health in general ?) and the possible answers are « *Très Bonne » (*Very good*)*, « *Bonne » (*Good*)*, « *Assez bonne » (*Fair*)*, « *Mauvaise » (*Bad*)*, « *Très mauvaise »* (Very bad) plus two options : « *Ne sait pas*» (Do not know) and « *Refus*» (Do not want to answer).

risen more sharply for employees working in establishments that have signed at least one agreement on teleworking, 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.).[6] With our specification, the upper group represents about 22% of the working sample, the mid group represents 36% and the lower group 42%.

Before moving on to our graphical and econometric analysis, Table A1 in Online Appendix A provides some descriptive statistics. The table confirms that lower-level employees very rarely work from home: on average, over the 2013-2023 period, only about 2% have worked from home at least once in the last 4 weeks. The table also confirms that upper-level employees work from home much more frequently than mid-level ones (on average 49% vs. 17% have worked from home at least once in the last 4 weeks). When it comes to hours worked and wages, unsurprisingly, upper-level employees work longer hours for significantly higher hourly wages. The data collected since 2021 also show that they have much greater freedom in choosing their working hours: two-thirds have an employment contract that specifies neither the number of hours to be worked each week nor when these hours must be worked, compared with just 11% of mid-level employees and 6% of lower-level employees. Finally, the available data confirms that the health of employees is all the better the more skilled their occupations, consistent with existing data in France on inequalities in health and life expectancy across occupational groups (see, e.g., Blanpain, 2016, Equipe Sumer, 2021).

[6] The upper group corresponds to category 3 of the French classification of occupations (*cadres et professions intellectuelles supérieures*), the mid group corresponds to category 4 (*professions intermédiaires*), to which we have added the sub-category 54 of administrative employees. The lower group corresponds to the remainder of category 5 (*employés de commerce* and *personnels des services aux particuliers*) and category 6 (*ouvriers*).

III. Telework Agreement and Working from Home: Graphical Analysis

The first important step in our analysis is to check that agreements covering telework are indeed a vehicle for the spread of home working. To shed light on this issue, 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 during the 2018-2019 period (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 confirms that employees in the lower-level group hardly ever work from home, regardless of whether or not their establishment has signed a telework agreement. The figure also confirms that working from home is a possibility that only began to spread rapidly in the French economy at the very end of the 2010s, with the COVID pandemic, and to a much greater extent for employees in the upper-level group than for those in the mid-level one. As expected, the figure also shows that the spread of home working in the early 2020s was stronger in establishments that have signed a telework agreement in the two years following the 2017 law than in establishments that have signed other types of agreements in the same two-year period. The gap in the probability of working from home between employees in establishments that have signed a telework agreement and employees in other establishments appears to be even stronger for employees in mid-level occupations than for those in upper-level occupations. For example, in 2022, the proportion of mid-level employees who work from home is about 10 percentage points higher in establishments that have signed a telework agreement, whereas it is only about 5 percentage points higher among upper-level employees.[7] Many employers allow their upper-level employees to work from home, even when there is no specific agreement. Employers appear to be more reluctant to grant the same telework possibilities to their mid-level employees. To take one step further, Figures A1(a) to A1(c) in the Online Appendix show the differences in the probability of

[7] However, we see the start of a catch-up in 2023, which likely reflects the fact that control group establishments are also beginning to sign telework agreements.

working from home between the two types of establishments, separately for the 3 occupational groups, using the 2017 gap as a reference. The figures confirm that there is no trend in these gaps prior to 2017 and confirms that there is a significant increase in these gaps after 2019, mainly for mid-level and (to a lesser extent) upper-level employees.

IV. Telework Agreements and Workers' Outcomes: Regression Analysis

The graphical analysis in the previous section showed that the wave of telework agreements that followed the 2017 law prompted a rise in home working that was particularly significant for mid-level employees. In the following sections, the question will be whether this also coincided with changes in the outcomes of these employees. To explore this issue, we use the same LFS sample as that used for the graphical analysis in the previous section, 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 familiar difference-in-differences model,

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

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 2018-2019 (our treatment variable), $Post_t$ is a dummy variable indicating that the observation year is after 2019, 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 $Post_t$.

Telework Agreements and Employees' Characteristics

Before moving on to exploring the effects of telework agreements on the work situation and health status of employees in treated establishments, we will begin by evaluating the effects of telework agreements on the characteristics of these employees (in terms of gender, age, education, seniority or occupational level). The aim is to test whether telework agreements have induced specific changes in the composition of the workforce in the establishments covered. Such changes could occur if telework

agreements led some employees to stay with the establishments concerned rather than leave them (or led some employees to apply for jobs with the establishments concerned rather than with others).

To shed light on this issue, the first column of Table 1 shows the regression results of model (1) 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 a upper-level position (d) a dummy indicating the gender of the respondent, (e) a variable indicating respondent's age, (f) a dummy variable indicating whether the respondent dropped out of high school, (g) a dummy indicating whether the respondent lives alone and (h) a dummy indicating whether the respondent has 4 or more years of seniority (i.e., was not hired after the waves of agreements under consideration). For each of these dependent variables, the estimated parameter α is small and not statistically significant at standard levels, in line with the hypothesis that the signing of telework agreements did not coincide with significant changes in the share of the main occupational groups or with significant changes in the socio-demographic composition of the workforce. The fact that the share of employees with 4 or more years of seniority did not evolve differently in the treatment and control groups after 2019 further indicates that employees who were in place at that time had no particular propensity to stay (or to leave) the treated firms after the implementation of the telework agreements. Based on this result, the second column of Table 1 replicates the analysis of the effects of the agreements on the composition of the workforce, focusing on the subsample of employees with 4 or more years of seniority, all of whom were already with their firm at the end of 2019. Once again, no significantly differentiated evolution is observed after 2019, again in line with the assumption that the agreements did not induce any differentiated evolution in the propensity to stay with the company in the treatment and control groups. Based on these results, the next question is whether the agreements have induced a differentiated evolution in the work situation or health status of employees in these two groups.

Telework Agreements, Wages, Hours Worked and Health Status

The effect of the expansion of home working on working hours or wages is not easy to predict ex ante. Insofar as the possibility of working from home 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.[8] However, in the French context, employers are obliged to ensure that the switch to telework (or back to on-site work) is made without any change in wage or number of hours worked. In addition, we cannot rule out the possibility that working from home may coincide with an increase in productivity (or in the number of hours worked), 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 worked from home in the previous 4 weeks, (b) a variable indicating that the employee has spent more than 50% of his 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. Based on the fact that the telework agreements had no differentiated impact on the occupational structure of treated and control establishments (as shown in the previous subsection), the model is estimated separately on the upper-level, mid-level and lower-level sub-samples, which takes into account the considerable differences in exposure to teleworking of the main occupational groups.[9]

The results first confirm that telework agreements induced a significant increase in the probability of working from home for both upper-level and mid-level employees, while little increase is perceptible for lower-level employees. They also confirm that the impact of telework agreements on working from home is significantly stronger for mid-level employees than for upper-level employees, in line with our previous graphical analysis. Specifically, our regression results suggest that telework agreements

[8]For a measure of the value placed by workers on the possibility of working from home, see Mas and Palais (2017).

[9] 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.

induce on average an 8.8 percentage points increase in the probability of having worked from home in the last four weeks for mid-level employees, compared with only a 5.1 percentage points increase for upper-level employees. The results remain qualitatively similar when we analyze separately the male and female sub-samples. The table also reveals that telework agreements have led to a very significant increase in the probability of having worked more than 50% of the time at home in the last four weeks. For upper-level employees, the increase in home working is almost entirely driven by this type of arrangement.

As far as working hours are concerned, the results in Table 2 further suggest that the signing of a telework agreement did not induce significant changes in the number of weekly hours worked, whether we consider upper, mid or lower-level employees. Nor is there much change in hourly wages, although we note that the effect tends to be slightly positive for male mid-level employees and negative for female mid-level or upper-level employees (-2.1% and -2.7%), perhaps reflecting 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. Generally speaking, the modest impact on hours worked and hourly wages is consistent with the fact that, after the reform, switching to teleworking (or, conversely, back to on-site work) can be done without renegotiating the employment contract.

As we mentioned above, working from home 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, but negatively affected by an overly sedentary lifestyle. 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 considers 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).[10]

The regression results reveal that telework agreements had no effect on the health of either lower-level or upper-level employees, but did coincide with a decline in the health of mid-level employees, the very group for which the telework agreements were followed by the strongest increases in working from home. The proportion reporting a chronic disease increased by about 2.3 percentage points in treated establishments compared with control establishments. This increase in chronic disease is mainly driven by men (3.2 percent points) and it coincides with an increase in the proportion of mid-level males declaring themselves to be limited in their usual activities (2.1 percent points). Consistently, we find that telework agreements is followed by a significant increase in the proportion of male mid-level employees reporting that they are not in very good health (3.3 percent points).[11] The overexposure of men to the health risks of working from home may be explained by the fact that they are more exposed to illnesses that can be aggravated by a sedentary lifestyle and by increased sitting time, such as diabetes and hypertension. It is also likely that the extra sitting time induced by working from home is in practice greater for men than for women, notably because of the unequal sharing of domestic tasks (see e.g., Craig and Powell, 2015, Farré et al., 2021).

In the end, the synthetic health index of mid-level male employees decreases by about 9.4% of a SD in treated establishments after 2019. For reference, this impact represents about 30 % of the gap in health index between upper- and lower-level employees (and about 67 % of the gap between mid- and lower-level employees). The fact that mid-level employees suffered more from the post-2019 shift to working from home than upper-level employees is consistent with the fact that they were twice as exposed to the increase in working from home and sedentary lifestyles. This also likely reflects that

[10]Weights are determined by the inverse of the covariance matrix of standardized elementary outcomes. The less correlated a primary outcome is with the others, the more new information it provides and the greater its weight in the average.

[11]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.

telework arrangements are less a source of constraints and controls for upper-level employees. As we pointed out above, the possibility of working from home is actually much more often combined with complete freedom of choice in working hours for upper level employees, which undoubtedly gives them much greater latitude to reconcile work and family life.[12] The homes of upper level employees are also on average more spacious and maybe more suited to teleworking than those of mid-level employees.[13]

In the end, our difference-in-differences approach suggests that an 8.8 percentage points increase in WFH for mid-level male employees causes a decline in their health index of about 9.4 % of a SD. As mentioned 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 telework agreements. To test the credibility of this parallel trend assumption, Figure 2 shows the evolution of the estimated difference in health index between treated and control mid-level male employees, year by year, over the 2013-2023 period (with 2017 taken as the reference year). The figure confirms that the gaps remained very stable throughout the years preceding the period when the telework agreements were signed. They only began to diverge gradually after the telework agreements were signed.[14]

A Triple Difference Approach

The difference-in-differences approach developed in the previous section is based on the assumption that telework agreements did not coincide with any shocks specifically affecting the health of mid-level employees in treated establishments. To take one step further, it is possible to develop a triple-difference approach, based on the assumption that the agreements did not coincide with any shocks

[12] On the benefits of being able to choose both one's place of work and one's working hours (so called "smart working"), see Angelici and Profeta (2023).
[13] 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).
[14] Figures A2(a) to A2(c) in the Online Appendix reproduce this graphical analysis for each of the three primary health outcomes, reaching similar conclusions for each.

specifically affecting the *relative* health of mid-level employees and lower-level employees in treated establishments. 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 an occupational level dummy. In this set up, the regression coefficient of the three-way interaction variable represents the impact of telework agreements on the *relative* outcome of mid-level and lower-level employees.

The table first confirms that telework agreements were followed by a significant increase in the gap in WFH between mid-level and lower-level employees. The table also confirms that the agreements have not had a very significant effect on the number of hours worked or on hourly wages, although once again we can point to a rather positive effect on those of men and a negative one on those of women. Consistent with previous difference-in-differences analysis, the table further shows that telework agreements were followed by a decline in the relative health status of mid-level male employees in treated establishments. Compared to lower-level male employees, their exposure to chronic disease increased by 4.5 percentage points, their exposure to physical limitations increased to 2.2 percentage points (significant at the 9% level only), and their probability of reporting to be not in very good health increased by 4.1 percentage points. As regards their synthetic health index, it decreased by about 12% of a SD.

In the end, assuming that there was no persistent shock after 2019 in the relative health status of mid-level and lower-level employees in treated establishments, these DDD results suggest that that a 7.8 percentage points increase in WFH for mid-level male employees causes a 12 % of a SD decline in their health index. This result is consistent with our previous DD results and further suggest that there exists a strong causal effect of link between WFM and health problems.

To test the robustness of these results, we replicated the previous regression analyses focusing on the sub-sample of employees with 4 or more years of seniority, i.e. excluding employees who were hired after the agreements were signed. 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 telework agreements, but the question arises as to whether they were indeed affected by the changes in health status previously highlighted, particularly among men. The panel B of Table 3 shows that the answer is affirmative: the estimates obtained on this sub-sample are qualitatively similar to those obtained on the full sample. The depressing effect of the telework agreements on the various health indicators of mid-level males appears even more marked when the analysis is restricted to employees who were already present in 2019. Overall, their health index decreases by about 16 % of a SD. The decline in the (relative) health status of mid-level male employees in treated establishments does indeed reflect a decline in the health status of the group of employees already present at the time of these agreements.[15]

V. Conclusion

In 2017, the French government passed a law whose ambition was to facilitate the development of teleworking in private sector companies. In this paper, we show that this policy led to an unprecedented development of working from home for mid-level employees, who had previously been little involved. Lower-level employees, on the other hand, remained largely untouched by this development. Differences in working from home between mid-level and lower-level jobs increased particularly sharply in establishments that signed teleworking agreements within two years from the 2017 law, before the start of the pandemic.

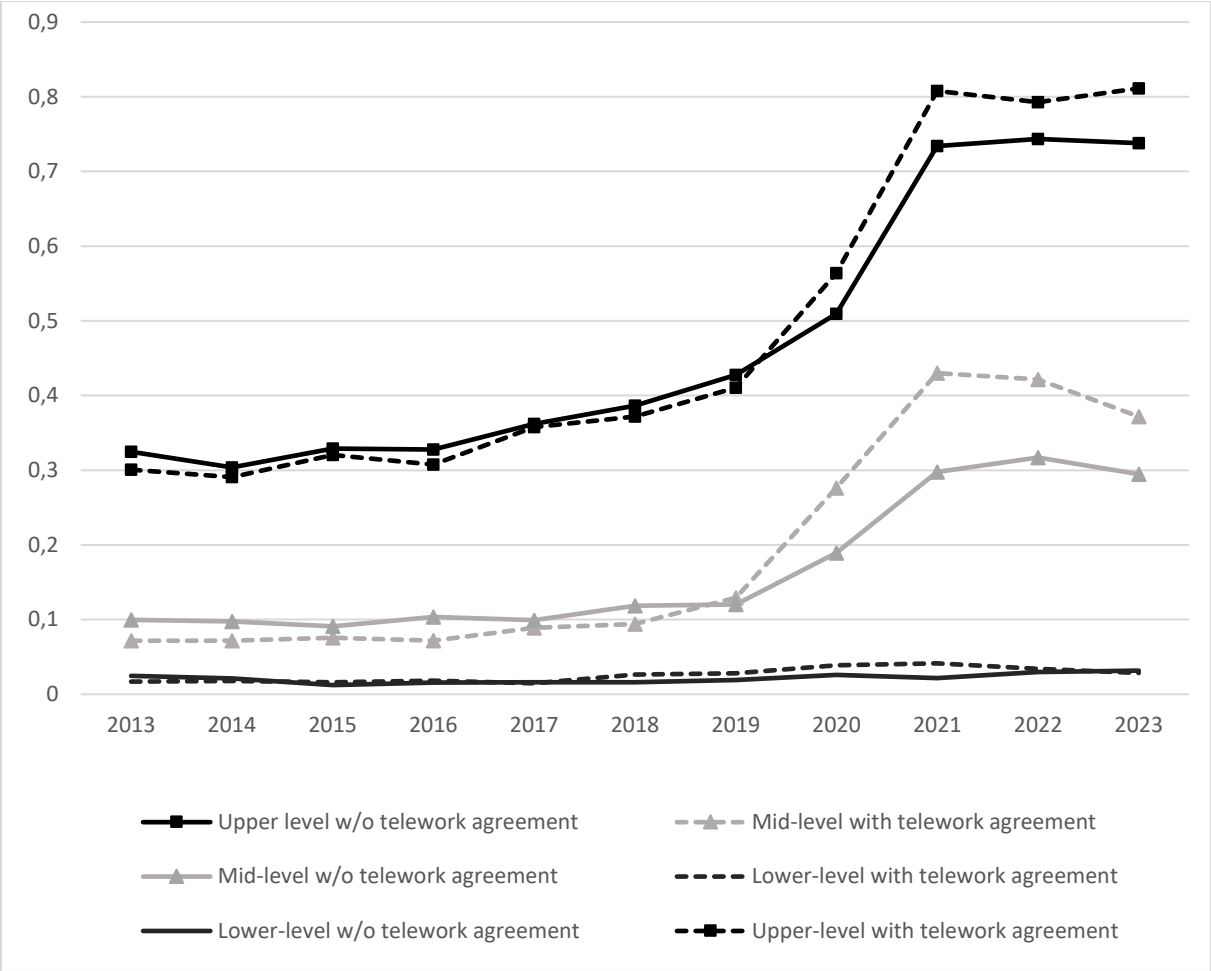
By comparing middle- and lower-level employees, in establishments with and without telework agreements, before and after 2019, we highlight a progressive decline in the health status of middle-

[15]On the other hand, it should be noted that the effect of the telework agreements on wages appears even less significant when the analysis is restricted to employees already present in 2019, in line with the fact that the law prohibits changes to the wages or occupational status of people who switch to teleworking.

level employees, particularly men. This trend is consistent with the public health literature, which has long highlighted the association between working from home, screen time, a sedentary lifestyle and health problems. Unlike higher-level employees, mid-level workers rarely have the freedom to choose their own working hours, which also likely limits the benefits of working from home, particularly in terms of reconciling work and family life.

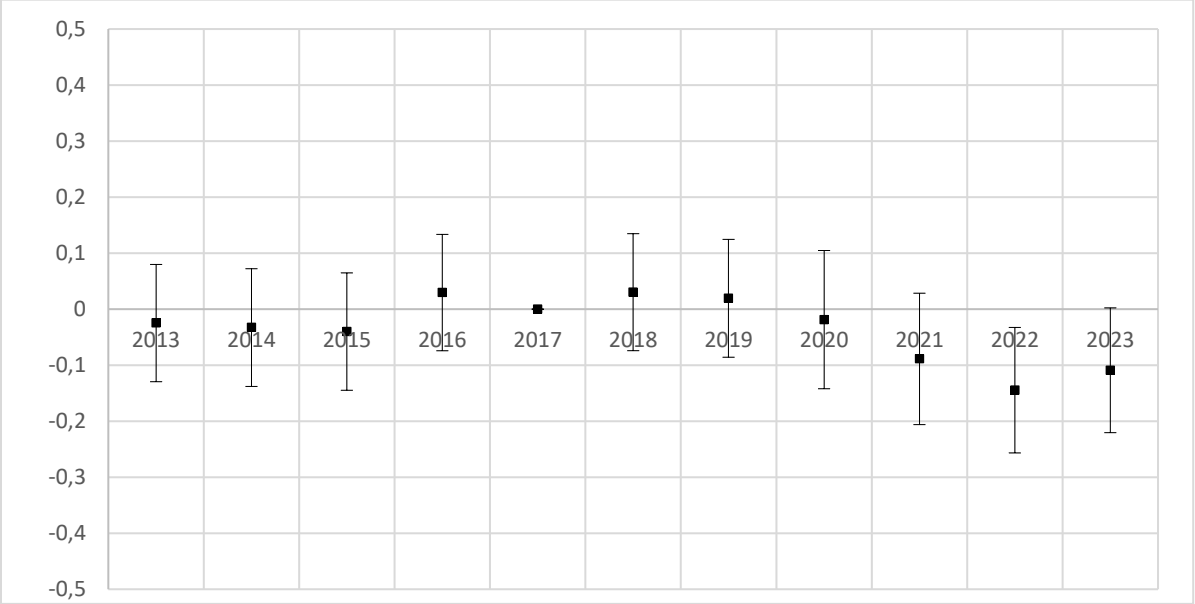
Driven by new information technologies, the rise of home working is a trend that will undoubtedly be very difficult to reverse. There is much debate today about the impact this development is likely to have on productivity, particularly in occupations where face-to-face interactions in the workplace 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.

Figure 1: The Rise in Working from Home, by Occupational Group and Type of Agreement



Note: For the three main types of occupations, the solid lines show the growth of working from home in establishments that signed telework agreements in 2018-2019. Dotted lines show the growth of working from home in establishments that signed other types of agreements on the same dates.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

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 sample of mid-level male employees. For each year, the figures show the estimated difference in the health summary index between treatment and control groups obtained using a saturated version of model (1) (i.e., replacing TxPost in model (1) by the full set of interactions between the treatment dummy T and year dummies) and using 2017 as the reference year.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Table 1: The Impact of Telework Agreements on the Composition of the Workforce

	All (1)	Subsample Seniority ≥4 years (2)
Lower-level occupation	0.003 (0.007)	-0.003 (0.008)
Mid-level occupation	-0.012 (0.007)	0.001 (0.009)
Upper-level occupation	0.009 (0.006)	0.001 (0.007)
Women	0.006 (0.007)	0.006 (0.008)
Age	-0.175 (0.172)	-0.282 (0.174)
High-school dropout	0.007 (0.007)	0.010 (0.009
Single	0.004 (0.006)	0.006 (0.006)
Seniority≥4 years	0.007 (0.007)	-
Nb Obs.	162 683	113 306

Note: The table refers to the sample of private sector employees observed in Labor Force surveys between 2013 and 2023 in an establishment that signed at least one agreement with employee representatives in 2018-2019 (whether or not this agreement covers telework). 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 variable interacting the dummy indicating that the date *t* is after 2019 and the dummy indicating that the establishment has signed a telework agreement. Standard errors are in parentheses.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Table 2: The Impact of Telework Agreements on Work Arrangements, Wages and Health Status, by Occupational and Gender groups

	All			Female			Male		
	Lower	Mid	Upper	Lower	Mid	Upper	Lower	Mid	Upper
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Labor market outcomes									
WFH	0.008	0.088	0.051	0.004	0.087	0.017	0.010	0.088	0.068
	(0.003)	(0.007)	(0.011)	(0.006)	(0.010)	(0.018)	(0.004)	(0.011)	(0.014)
WFH≥50 %	*0.000*	*0.055*	*0.044*	*-0.004*	*0.072*	*0.040*	*0.001*	*0.039*	*0.046*
	(0.002)	*(0.004)*	*(0.007)*	*(0.004)*	*(0.006)*	*(0.012)*	*(0.002)*	*(0.005)*	*(0.009)*
Working Hours	-0.227	-0.044	0.121	-0.503	-0.260	0.430	-0.075	0.196	-0.106
	(0.148)	(0.126)	(0.186)	(0.279)	(0.182)	(0.301)	(0.162)	(0.175)	(0.236)
Hourly wage	-0.012	-0.008	-0.017	-0.005	-0.021	-0.027	-0.017	0.012	-0.011
	(0.006)	(0.006)	(0.008)	(0.010)	(0.008)	(0.013)	(0.008)	(0.009)	(0.010)
Panel B: Health outcomes									
Chronic disease	0.001	0.023	-0.009	0.026	0.014	-0.008	-0.012	0.032	-0.010
	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)	(0.015)	(0.011)	(0.012)	(0.011)
Limitation	0.002	0.008	-0.007	0.003	-0.007	-0.012	-0.001	0.021	-0.006
	(0.008)	(0.007)	(0.006)	(0.013)	(0.010)	(0.010)	(0.009)	(0.009)	(0.007)
Not very good health	-0.006	0.015	0.003	-0.010	-0.003	-0.002	-0.007	0.033	0.005
	(0.010)	(0.010)	(0.011)	(0.016)	(0.014)	(0.019)	(0.012)	(0.014)	(0.014)
Heath Index	0.003	-0.048	0.015	-0.016	-0.001	0.026	0.021	-0.094	0.011
	(0.021)	(0.020)	(0.021)	(0.036)	(0.029)	(0.035)	(0.027)	(0.029)	(0.025)
Nb. obs.	68 819	57 761	36 103	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 full sample, the next three columns to the female subsample and the last three columns to the male subsample. For each of the three 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 variable interacting the dummy indicating that the date *t* is after 2019 and the dummy indicating that the establishment has signed a telework agreement. Standard errors are in parentheses.

Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labour.

Table 3: The Impact of Telework Agreements on Working from Home and Health Status: Triple Difference Estimates

	All (1)	Male (2)	Female (3)
Panel A: All			
WFH	0.080	0.078	0.083
	(0.008)	(0.010)	(0.013)
Working hours	0.180	0.265	0.251
	(0.199)	(0.239)	(0.325)
Hourly wage	0.005	0.029	-0.017
	(0.009)	(0.012)	(0.013)
Chronic disease	0.022	0.045	-0.012
	(0.012)	(0.016)	(0.019)
Limitation	0.006	0.022	-0.010
	(0.010)	(0.013)	(0.016)
Not in very good heath	0.021	0.041	0.007
	(0.014)	(0.019)	(0.021)
Health index	-0.052	-0.115	0.016
	(0.030)	(0.039)	(0.046)
Nb. obs.	126 580	69 111	57 469
Panel B: Seniority≥4 years			
WFH	0.089	0.091	0.083
	(0.010)	(0.012)	(0.016)
Working hours	-0.337	0.033	0.034
	(0.222)	(0.269)	(0.380)
Hourly wage	-0.001	0.025	-0.024
	(0.010)	(0.013)	(0.015)
Chronic disease	0.014	0.055	-0.053
	(0.016)	(0.021)	(0.025)
Limitation	0.013	0.041	-0.019
	(0.013)	(0.017)	(0.021)
Not in very good heath	0.038	0.052	0.028
	(0.016)	(0.022)	(0.025)
Health Index	-0.072	-0.163	0.042
	(0.037)	(0.048)	(0.059)
Nb. Obs.	85 236	47 186	38 050

Note: The table refers to the same sample as Table 1, restricted to lower and middle-level employees. Panel A refers to the full sample and panel B to the subsample of employees with 4 or more years of seniority. In each of the 2 panels, column 1 uses all observations, while column 2 is restricted to men and column 3 to women. Each row corresponds to a specific dependent variable. For each dependent variable and each column, the table reports the regression coefficient corresponding to the variable interacting (a) the dummy indicating that the date *t* is after 2019, (b) the dummy indicating that the establishment has signed a telework agreement and (c) the dummy indicating that the employee holds a mid-level job. 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 are in parentheses.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

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Online Appendix

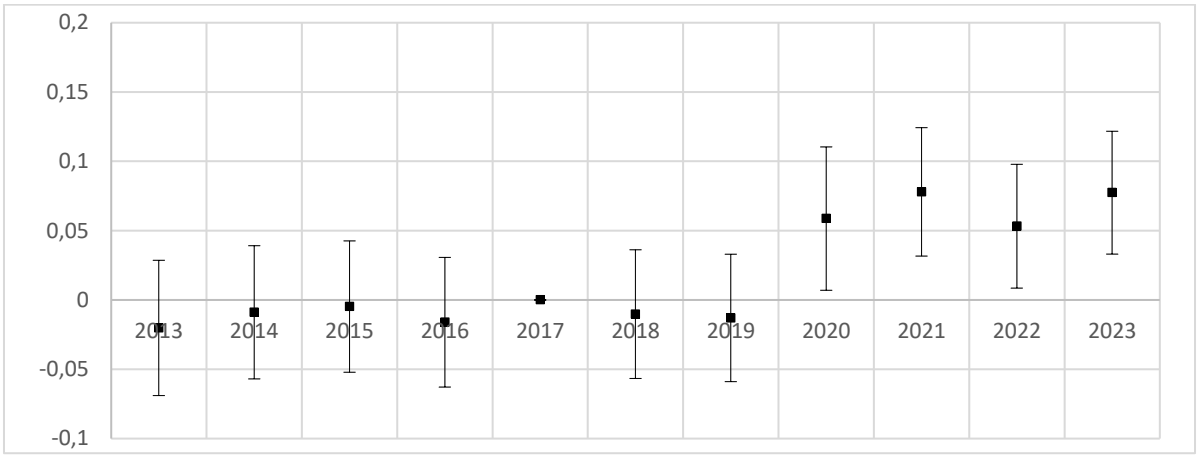
Table A1: Some Descriptive Statistics

	All	Lower	Mid	Upper
	(1)	(2)	(3)	(3)
Female (%)	43.1	40.9	50.7	35.1
High-School graduate (%)	60.8	32.3	74.9	92.8
Age (years)	42.5	41.8	42.4	44.1
WFH (%)	18.7	2.2	16.8	49.4
Nb. hours worked/week	37.4	34.6	36.7	43.0
Flexible arrangement (%)	24.8	6.1	11.3	65.8
Hourly wage (ln)	2.49	2.26	2.48	2.87
Chronic disease (%)	21.3	24.4	21.1	16.5
Physical limitations (%)	11.8	15.1	11.3	6.8
Very good health (%)	37.6	33.0	38.1	44.6
Health index	0	-0.123	0.014	0.187

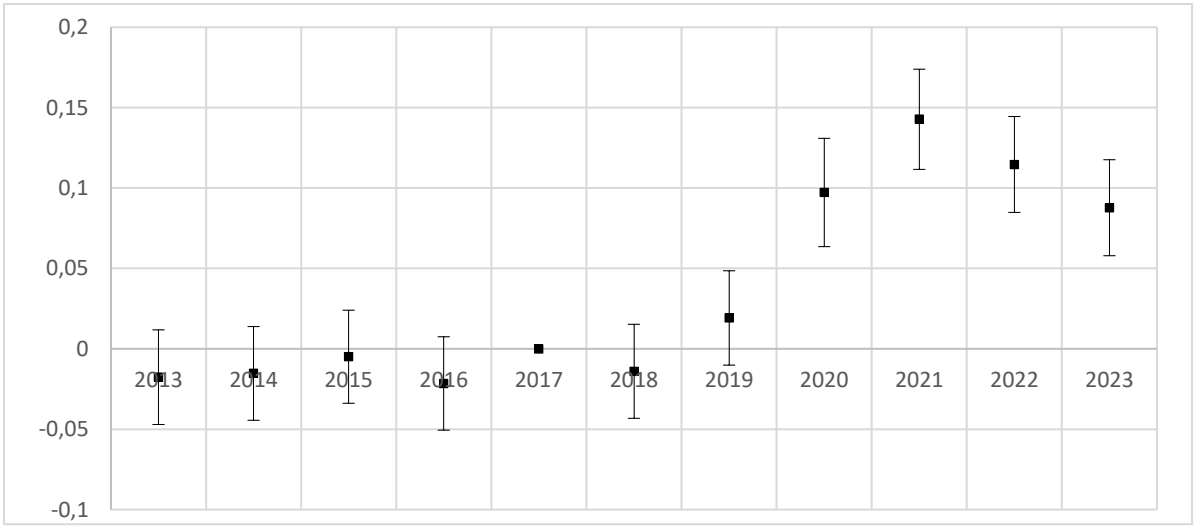
Note: The table refers to the sample of private sector employees observed in Labor Force surveys between 2013 and 2023 in an establishment that signed at least one agreement with employee representatives in 2018-2019 (whether or not this agreement covers telework). Column (1) refers to the full sample, column (2) to the sub-sample of lower-level employees, column (3) to the subsample of mid-level employees and column (3) to the subsample of upper-level employees. Data on flexible arrangement (i.e., *forfait jour*) are only available from 2021.
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.

Figure A1: Evolution of the Gap in Working from Home between Employees in Treated and Control Establishments

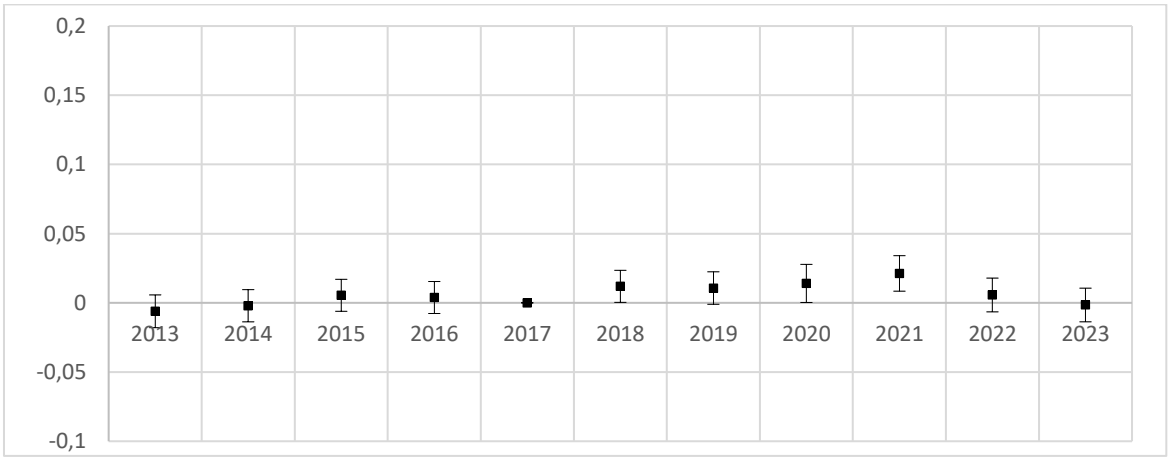
(a) Upper-level Employees.



(b) Mid-level Employees.



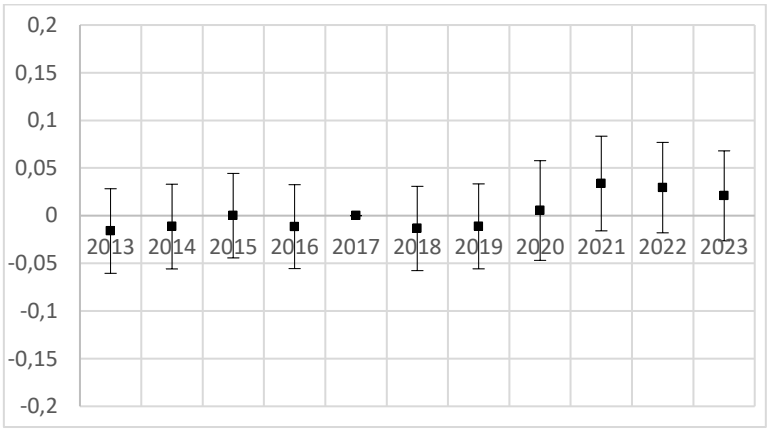
(c) Lower-level Employees



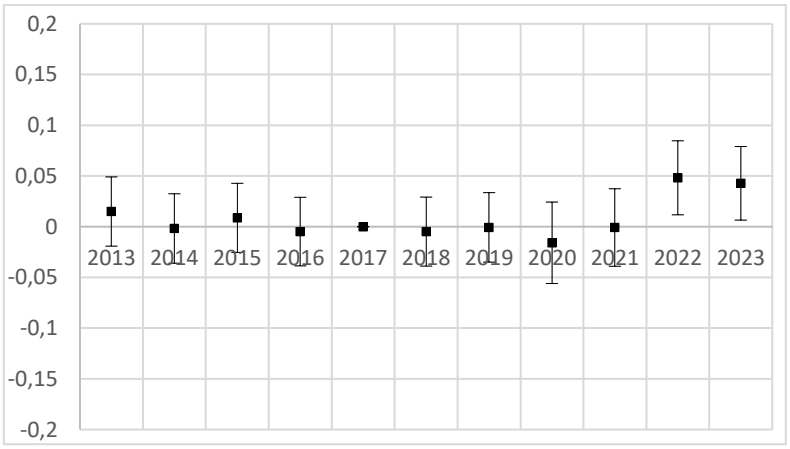
Note: The figures refer to the same sample as Table A1. For each occupational group and each year, the figures show the estimated gap in working from home between treatment and control groups. Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labour.

Figure A2: Evolution of the estimated difference in health indexes between mid-level male employees in the treatment and control groups

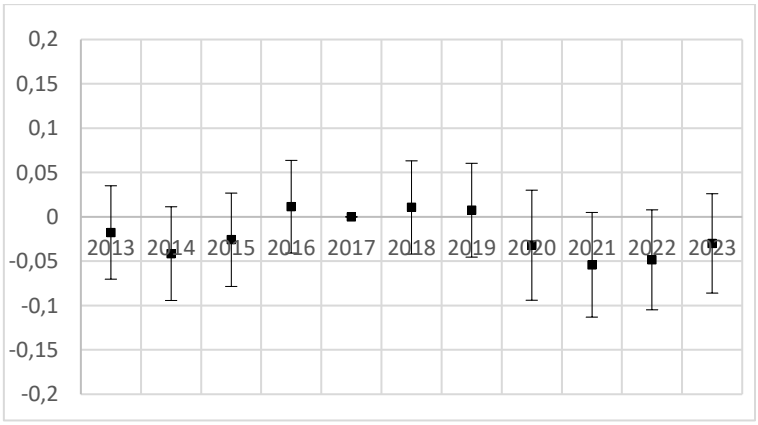
(a) Chronic Disease



(b) Physical Limitations



(c) Very Good Health (self-reported)



Note: The figures refer to the subsample of mid-level male employees. For each outcome and each year, the figures show the estimated gap between treatment and control groups obtained using a saturated version of model (1) (i.e., replacing TxPost in model (1) by the full set of interactions between the treatment dummy T and year dummies).
Source: LFS, 2013-2023, INSEE, and D@ccord database, Ministry of Labor.