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HOW HYBRID WORKING FROM HOME WORKS OUT

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ABSTRACT

Hybrid working from home (hybrid), whereby employees work a mix of days at home and at work each week, has become common for graduate employees. This paper evaluates a randomized control trial of hybrid on 1612 graduate engineers, marketing and finance employees of a large technology firm. There are four key results. First, hybrid was highly valued by employees on average, reducing attrition by 33% and improving job-satisfaction measures. Second, hybrid reduced working hours on home days and increased them on office days and the weekend, altering the structure of the working week. Third, hybrid increased messaging and video calls, even when all employees were in the office, reflecting a move towards more electronic communication. Finally, there were large differences in the valuations of hybrid between managers and non-managers. Non-managers were more likely to volunteer into the hybrid experiment, to work from home on eligible days, to predict positive impacts on productivity, and to reduce their attrition under hybrid. In contrast, managers were less likely to volunteer, less likely to work from home on eligible days, predicted a negative average impact of hybrid on productivity, and saw increased attrition rates under hybrid.

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1. Introduction

Working from home (WFH) has been increasing for several decades in the United States but surged after the COVID-19 pandemic. By early 2023 about 30% of full-paid days are worked from home, with hybrid WFH being the most common approach to this (Barrero et al., 2023). Hybrid WFH – hereafter called hybrid – involves typically 2 to 3 days a week at home and the other days in the office.

Hybrid has is promoted as combining the best of working in the office and working from home. The idea is to break an employee’s working week into tasks, distinguishing between tasks that are typically best in person, like meetings, training events, or mentoring on office days, and those that are best individually, like reading, writing, or coding on home days.

This hybrid WFH approach has four benefits. First, on home days, employees avoid having to commute and prepare for work, which for the average US employee saves about 70 minutes a day.¹ Second, home working is often better for individual-focused activities like coding or writing as it is usually quieter.² Third, WFH also allows greater time flexibility. For example, employees can break to exercise, to go to the doctor or pick their children up from school. Finally, hybrid WFH can also reduce space costs if firms rotate the days in which teams work from home. Detractors argue, however, that hybrid WFH is complex, suffers from transition costs from switching between fully in-person and fully remote, and is detrimental to employee performance and innovation. Not surprisingly, there is a vigorous debate about the efficacy of hybrid WFH among managers, policymakers, and the media.

In this paper, we describe a randomized control trial that took place in 2021 and 2022 when Trip.com, a NASDAQ-listed global travel agent with 35,000 employees headquartered in Shanghai, decided to evaluate hybrid WFH. Their motivation was to improve employee job satisfaction to reduce attrition and ease hiring. The obstacle to implementing hybrid WFH was managers’ concerns that employees would underperform on their days at home. So Trip.com decided to formally evaluate a hybrid WFH system in two divisions over six months before making a decision over a full firm roll-out.

¹ See, for example, Barrero et al. (2020) and Teodorovicz et al. (2022).

² For example, Bloom, Liang, Roberts and Ying (2015) found a 4% increase in per-minute productivity for home-working on individual tasks, which was primarily attributed to a quieter home working environment.

They took the 1612 engineers, marketing, and finance employees in the Airfare and IT divisions and randomized them into providing the option to WFH on Wednesday and Friday. Importantly, this contained 1219 non-managerial employees and 393 managers as the firm was keen to evaluate the impact of hybrid-WFH on both managers and non-managers. Employees with odd birthdays (those born on the 1st, 3rd, 5th, etc., day of the month) were randomized into the treatment group allowing hybrid-WFH, while those with even birthdays were the control group who continued to come into the office full-time as before.

The experiment revealed four results.

First, WFH reduced average attrition rates by 33% and improved self-reported work satisfaction scores, highlighting how employees place a sizeable average value on this amenity. This is consistent with the prior results from Mas and Pallais (2017 and 2018), Maestas (2018) and Barrero et al. (2023) that employees value working from home at the equivalent of about a 4% to 8% wage increase.

Second, WFH reduced hours worked by around two hours on home days, but increased it on in office workdays and on the weekend, and reduced sick days and holidays. Employees reported working from home afforded them the flexibility to attend a dentist appointment, pick their children up from school, exercise, or travel to their hometown early on a Friday. This matches the survey evidence from the US that the second-largest benefit of working from home is flexibility (the largest is avoiding commuting).

Third, WFH employees increased individual messaging and group video call communication, even when all employees were in the office, reflecting the impact of remote work on modes of communication. This suggests that home working leads to persistent changes in employees' behavior even in their days in the office. Interviewing employees, we heard that they became accustomed to a more electronic communication, carrying this over to their days working in the office.

Fourth, we found striking differences in impact and opinions on hybrid between non-managers and managers. Non-managers were significantly more likely to volunteer to be in the first wave of the experiment, to take-up the option to work at home on eligible Wednesday and Fridays, to report a positive impact of hybrid on productivity, and to display lower quit rates in the hybrid treatment group. This was

particularly true for employees with longer-commutes. In contrast, managers reported significantly negative impacts of hybrid-WFH on their productivity, were less likely to volunteer and work at home on eligible days and displayed higher quit rates of those randomized into the hybrid treatment group.

There was also one important null result, which is we found no significant impact of hybrid treatment on employees' performance reviews or promotion rates. Lines of code written, another measure of employee productivity for IT engineers, rose by 4.4% for hybrid employees, but this was insignificant. Given the large 1612 employee size of this experimental sample, this rules out substantial positive or negative impacts of hybrid-WFH on productivity. This is important as the main criticism of hybrid-WFH has been its negative impact on productivity, specifically in collaborative environments, which executives like Elon Musk at Tesla and Twitter, Jamie Dimon at JP Morgan, and David Solomon at Goldman Sachs have noted when pushing for a full return to the office. The prior randomized control trial evidence on WFH has focused on call center employees, who, while easy to measure and evaluate, do not have much of a team or creative component in their job. In contrast, the Trip.com employees in this experiment are graduate employees working in teams and creating new products and services, in both managerial and non-managerial roles. So, this larger sample null result – which also holds in all major sub-samples – is notable.

Once the 6-month experiment ended, the firm evaluated the data on performance, attrition, employee satisfaction, and communications and decided to roll the WFH policy out to the entire company at an executive meeting. Their view was the impact on reduced attrition was extremely positive with no negative impacts on performance and some potential longer-run costs savings from reduced office space. This was announced on February 14th, 2022, and was immediately picked up by the Chinese media, with coverage in Reuters, South China Morning Post, US News, Yahoo and the Standard since working from home was exceedingly rare in China. Since then, several other Chinese tech firms following this experiment have started adopting similar policies.

This paper connects to three strands of literature.

First, there is literature on the adoption and impact of working from home on firms and their employees. The closest papers are Bloom et al. (2014), who run a field experiment at cTrip.com³ on 250 call-center workers, and Emanuel and Harrington (2021), who examine the call center of a large US firm. Both find positive productivity effects of working from home of around 10%, reduced attrition but negative promotion effects. The challenge with these papers is that call center employees are not really team workers or involved in creative tasks, so it is hard to extrapolate these findings to professional or managerial employees. Choudhury et al. (2019) study US Patent examiners who were allowed to work from anywhere, finding productivity rose by 4.4%, although they note that patent examiners, like call center workers, are in roles that do not require significant collaboration. Choudhury et al. (2022) study 103 employees in an 8-week experiment in an NGO in Bangladesh, finding in an RCT that hybrid WFH is associated with higher levels of emails and increased productivity. Kunn et al. (2021) exploits natural variation in remote vs. in-person competitions in professional chess during the pandemic and find a negative impact of the remote activity, but again chess playing is not a team activity. Finally, Gibbs et al. (2022) examine graduate team employees in an Asian IT firm who shifted to working from home during the pandemic. They find large negative effects on productivity, although their result examines a shift from fully in-person to fully remote executed at speed at the onset of the pandemic without a control group, making these results hard to assess. Our study is, as far as we know, the only randomized evaluation of the impact of hybrid working-from-home, and importantly the only study to include hundreds of managerial and non-managerial graduate employees.

A second piece of literature tries to evaluate the impact of working from home through self-assessed performance surveys. Etheridge et al. (2020) find that employees who work from home state they are about as productive as in the office. Barrero et al. (2023) report US employees to perceive about a 3% to 5% increase in productivity, while Aksoy et al. (2022) report slightly lower (but still positive) figures from 20 countries globally.

Finally, recent research examines the extent and incidence of WFH during the COVID pandemic and the outcomes associated with WFH. See, for example, Adams-Prassle et al. (2020), Althoff et al. (2020), Bartik et al. (2020), Bick et al. (2020), Brynjolfsson et al. (2020), Mongey et al. (2020) and Ozimek

³ cTrip.com purchased Trip.com, a smaller Singaporean travel agent, and adopted the name. So cTrip.com and Trip.com are ostensibly the same firm.

(2020). Bai et al (2021), Davis et al. (2021), Favilukis et al. (2020), Pagano et al. (2020), and Papanikolaou and Schmidt (2020) study the relationship between firm-level stock returns during the COVID pandemic and the capacity of their employees to work from home. Behrens et al. (2021) and Davis et al. (2022) offer general equilibrium analyses of WFH and its consequences, while Gupta et al. (2021) look at the impact of WFH on property markets, Liu and Su (2021) the impact of density via WFH on valuations and Delventhal et al. (2021) impacts on city structure. Like us, they stress that the effects of a shift to WFH are highly uneven across people and locations.

Section II discusses the experimental design, section III the impact of attrition and employee satisfaction, section IV the impact of messaging and communication, and section V the impact on performance evaluations, promotions, and productivity. Finally, section VI concludes.

II The Experiment

Our experiment took place at Trip.com, the third-largest global travel agent by sales in 2019 (after Expedia.com and Booking.com). Trip.com was established in 1999, was quoted on NASDAQ in 2003, and was worth about \$20bn at the time of the experiment. It is headquartered in Shanghai with offices across China and internationally, accommodating its roughly 35,000 employees.

In the summer of 2021, Trip.com decided to evaluate hybrid WFH after seeing its popularity amongst US tech firms. The firm believed this could improve employee job satisfaction, reducing the costs of employee attrition, and potentially improving productivity.

The key obstacle to implementing hybrid WFH was the concern of many managers that employees would underperform on their days at home. In addition, in 2021, no major Chinese firm was offering hybrid WFH, with total attendance at the office the norm. So Trip.com decided to formally evaluate a hybrid WFH system in two divisions over six months before making a decision over a full firm roll-out.

The first step took place on July 27th, 2021, when the firm surveyed 1612 eligible⁴ engineers, marketing and finance employees in the Airfare and IT divisions about the option of hybrid WFH. They chose these two divisions as representative of the firm, with a mix of employee types to assess any potentially heterogeneous impacts. Just over 70% of the employees in these divisions are technical employees, writing software code for the website, and front-end or back-end operating systems. The remainder work in business development, so talking to airlines, travel agents, or vendors to develop new services and products, in market planning and executing advertising and marketing campaigns, and in business services, dealing with a range of financial, regulatory, and strategy issues. Across these groups 393 were managers and 1219 non-managers, providing sufficient samples of both groups to evaluate their response to hybrid working from home.

The employees were sent an email (see Appendix A1) outlining how the 6-month experiment offered them the option (but not the obligation) to WFH on Wednesday and Friday. After the initial email and two follow-up reminders, a group of 518 employees volunteered. The firm randomized odd employees, those born on the 1st, 3rd, 5th, 7th, etc., to become eligible for the hybrid-WFH scheme starting on the week of the 9th of August.

The top management at the firm was surprised at the low volunteer rate of the optional hybrid-WFH scheme. They suspected that many employees were hesitating because of concerns that volunteering would be seen as a negative signal of ambition and productivity.⁵ So, on 6th September, all the remaining 1094 non-volunteer employees were told they were also included in the program. The odd birthday employees were again randomized into the hybrid WFH treatment and began the experiment on the week of 13th September.

Figure 1 shows some pictures of employees working in the office (left side) and employees working from home from October 2021 (right side). A few points are worth noting. First, in 2021 COVID incidence rates in Shanghai were extremely low, so employees were neither masked nor socially distanced at the office. So, this office control baseline is comparable to a pre (or post) COVID situation

⁴ This excludes interns and rookies that are in probation periods, as onsite learning and mentoring are very important for them.

⁵ This is not unreasonable. For example, Harrington and Emmanuel (2021) found in the US firm they evaluated that work-from-home employees were negatively selected on productivity.

in the US. Second, employees all worked in modern open-plan offices in desk groupings of four or six colleagues from the same team. In contrast, when working from home, they usually worked alone in their apartments, typically in the living room or kitchen. Figure 2 shows the overall office (on the left), highlighting this is a large modern building, similar to many large US and European corporate offices. The figure also shows an example floorplan for part of the second floor, highlighting how entire teams tend to have their desks clustered together.

The experimental sample are typically in their mid-30s, about two-thirds are male, with all of them having a university undergraduate degree and almost one-third having a graduate degree (typically a master's degree). In addition, nearly half of the employees have children (details in Appendix Table A2).

In Table 1 we examine the decision to volunteer for the work from home experiment. We see that non-managers and employees with a long commute were significantly more likely to volunteer. The magnitudes of these differences are also large, with managers almost 38% ($-0.38 = -0.134/0.353$) less likely than non-managers to volunteer. We see female employees are less likely (-17%) to volunteer than male employees. Interestingly, there is no relationship between volunteering and prior performance scores, highlighting, at least in this case, the lack of any negative selection effects around WFH.

Figure 3 plots the take-up rates of WFH on Wednesday and Friday by volunteer and non-volunteer groups. We see a few notable facts. First, take-up overall was about 55% for volunteers and 40% for non-volunteers, indicating that both groups tended to WFH only one day, typically Friday, each week. At Trip.com, large meetings and product launches often happen mid-week, so Fridays are seen as a better day to work from home. Second, the take-up rate even for non-volunteers was 40%, indicating that Trip.com's suspicion that many employees did not volunteer out of fear of negative signaling was well-founded, and highlights how amenities like work-from-home, holiday, maternity, or paternity leave may need to be mandatory to ensure reasonable take-up rates. Third, take-up surged on Fridays before major holidays. Many employees returned to their hometowns,⁶ using their WFH day to travel home on the quieter Thursday evening or Friday morning. Finally, take-up rates jumped for both treatment and control

⁶ Most Shanghai employees who are not local are from neighboring provinces of Jiangsu and Zhejiang. And the Shanghai headquarters is right next to the bullet-train station. So, some employees stopped renting expensive Shanghai apartments and just booked hotels nearby for three nights per week.

employees in late January 2022 after a COVID case in the Shanghai building. Trip.com allowed all employees at that point to WFH, so the experiment effectively ended early on Friday, 21st January.

Looking at take-up rates in Table 2 we see that, non-managers, employees with a longer commute and employees with children under 18 are more likely to opt to WFH on eligible days. In contrast, take-up is, perhaps surprisingly, flat across gender, age and prior performance.

Table 3 shows striking evidence of heavy coordination across employees within teams on work-from-home days. In column (1), we regress whether a treated individual works remotely on a Wednesday or Friday conditional on the share of their team members working remotely on that day, finding a large, highly significant coefficient of 0.551. This indicates if an individual's whole team works from home on a particular day, they are 55% more likely to do the same than if the entire team comes to work. In columns (2) and (3) we control for date and desk fixed effects to check if this correlation is being driven by individual events (like holidays when everyone works from home) or persistent differences across teams, finding very similar results. So, this reveals remarkably strong coordination by teams towards working from home on the same days. This matches the survey results from the US that employees' primary motivation for coming to work is to spend time with colleagues and co-workers (e.g., Appendix figure A6), suggesting hybrid works best when office and home days are coordinated.

Table 3 column (4) adds an indicator for whether the team-manager is WFH on the same day and finds this is significant, although about 20% of the magnitude of the team coefficient (and adding it has little impact on the team coefficient). This suggests managerial presence is secondary in importance to team-mate presence. In column (5) we see that coordination is strongest in teams with a high share of connected individuals, proxied by having exchanged messages on at 5+ days in the 3-months prior to the experiment.⁷ In columns (6) and (7) we include proxies for friends within the team – the share of team-members in the same intake cohort or same age⁸ – and find no effect. Together with column (5) this suggests employees are potentially coordinating to be in the office together with team members when they are working closely with them, rather than mostly for social reasons.

⁷ As explained in greater detail below this counts messages in a firm work messaging system which is not typically used for personal or social messaging.

⁸ In Trip.com it is typical for employees to have friends from their intake cohort since these groups underwent early training sessions together. Similar age is a weaker proxy for possible friendship.

III Employee Attrition and Job Satisfaction

Perhaps the most important result for Trip.com was the substantial reduction in attrition rates seen in the treatment employees. As seen in Table 4, the attrition rate over the 6-month experimental period for the treatment group was 4.7% versus 7.2% for the control group, a 33% reduction in attrition. This was matched by a significant increase in survey measures of job recommendation, work satisfaction, life satisfaction and work-life balance in treatment employees (Appendix Table A10).

Interestingly, this impact of hybrid on attrition rates varied heavily across employees as Table 4 and Figure 4 explores. The most striking difference in Figure 4 is between non-managers whose treatment quit rate was 5.3% compared to 8.6% for the control group (a 38% reduction) and managers whose treatment quit was 3.1% compared to 2% for the control group (a 55% increase). This result matches a sentiment often reported in the media that managing employees remotely is hard, so managers are less enthusiastic about remote work than employees.

We see in the other three panels of Figure 4 that female employees, employees with longer commutes, and less tenured employees (those with no more than 36 months) are significantly more likely to have lower attrition rates in the WFH treatment group. The commuting result is perhaps the most intuitive as the most frequency cited benefit of working from home is avoiding the commute⁹. The link with tenure arises because more recently hired employees have weaker social ties with co-workers so have a relatively lower value from coming to the office. Finally, the negative impact on female quit rates from hybrid is interesting and echoes papers like Emanuel et al. (2022) and Goldin (2022) emphasizing a potentially greater valuation on remote work by women. Women are less likely, however, to volunteer to WFH as noted in Table 1 and show no difference in take-up rates in Table 2, possibly suggesting some gender differences in concerns over the costs of actively signaling a preference for remote work.

⁹ For example, Appendix Figure A7

IV Working Patterns

IV.A Working Hours

The experiment also changed working hours and patterns. US surveys find the second largest benefit of remote work is increased work schedule flexibility (with reduced commuting the first benefit). Consistent with this, treatment employees from Trip.com reported an improved ability to flex their hours when working from home, such as visiting the dentist, spending time with their children, taking a home delivery, or performing chores.

This greater flexibility when working from home shows up in Table 5 in terms of time-shifting from WFH days to other days. In the top panel, we see that treatment employees have a significant increase in their Virtual Private Network (VPN) time, which is required by employees to access company servers from home. This occurs both on their WFH days of Wednesday and Friday and on all other weekdays and the weekend. This suggests treatment employees increased working time from home even on office days and weekends. On the lower panel, we look at time in the office and notice this falls on Wednesdays and Fridays for treatment employees since they frequently work from home. This also falls somewhat on Thursdays when they are slightly more likely to take the day off, but it is unchanged on all other days. Figure 5 left-panel shows this increase in VPN use on office days and weekends, while the right-panel shows the increase in messaging outside of core working hours. These suggest that WFH spreads work outside of the core 9am-5pm Monday to Friday period into evenings and weekends, similar to results from McDermott and Hansen (2021) showing an increase in GitHub event activity in afterwork hours and weekends during the pandemic.

In quantitative terms we see that on Wednesday and Friday, treatment employees reduced their office time by a total of 6.4 hours ($3.071+3.296$) but increased their VPN time by a total of 3.4 hours ($1.656+1.745$). Applying the 0.75 ratio of VPN time/working time implies a total increase at the home of 4.5 hours from this additional VPN time.¹⁰ So WFH employees work about 1.9 hours ($6.4-4.5$) less on Wednesday and Friday. In contrast, on all other days, they have a net reduction in office time of 0.256 hours and an increase in VPN time of 0.379 hours, which applying the VPN/working time ratio implies a net increase of 0.25 hours of total working time. Given treatment employees typically WFH one day a

¹⁰ We surveyed 107 employees about VPN use and found this is used on average 75% of the time when working from home. So, 1 hour of VPN time at home implies $1/0.75$ hours (1 hour and 20 minutes) of additional working time.

week (the 0.46 average take-up rate in Figure 3), we can infer they work about 2 hours less on home days, partly offset by about 0.25 hours more work on all other days.

The top-panel of table 6 examines hybrid treatment impacts on non-working days, which combines sick-leave, holidays, and absences, finding a significant 1.174% reduction. With about 250 working days a year, this translates into about three more working days annually for hybrid workers. This is entirely driven by increases on Wednesdays and Fridays. In interviews employees mentioned that when they are working from home they are often able to continue working if they have a mild illness, some childcare issue or need to be home (for example, to oversee a delivery or domestic repair) but could not come into the office.

Tables 5 and 6 together show substitution of working time across days, with hybrid employees working almost two hours less on WFH days but partly making up for this on other days and with less days off. Indeed, given their similar performance and promotion results and increased coding output, to the extent they are reducing total “working” hours they likely work more efficiently per hour. This would be consistent with the results of higher WFH working intensity in the Bloom et al. (2014) paper, where employees working at home had a higher output per minute and took fewer breaks within their working day.

In the lower-panel of Table 6, we see how business trips – visits to supplies, customers, or other external contacts – fell dramatically on WFH days, particularly Fridays, but rose on the in-office days. Hence, the total weekly number of business trips remained unchanged. This implies the common pattern of working from home on Monday and Friday in US firms could increase the peak-loading of business travel onto Tuesday to Thursday.

IV.A Communications

Employees in Trip.com use verbal communications frequently in the office, given the open-plan nature of the building, as shown in Figures 1 and 2. They also commonly use three modes of written communication: email for formal more extensive communications, like team or firm-level reminders and notifications; WeChat for personal social messaging between individuals to discuss social issues, such

as lunch or weekend plans; and finally TripPal internal messaging for higher-frequency, less formal messaging typically between individual employees about various work issues (code, client, or business questions). We have the data for this TripPal communication in terms of the message, sender, and recipients alongside an hour stamp, so we can use this to evaluate the impact of remote working on messaging.

Unsurprisingly, the treatment employees saw a significant increase in their messaging, of 12.7%, as highlighted in Table 7 (and shown by hour in Appendix Figure A3). As expected, this has the largest impact on the Wednesday and Friday working from home days, with 13.1% and 19.3% treatment impacts respectively. More notably, treatment messaging is also higher on all other days, including by 10.7% on Tuesday. The Tuesday difference is the most striking as treatment employees have been working in the office the previous day (Monday), so this is not a conversation carrying over from the previous day. This is possibly conversations carrying on from the prior Friday, but from discussions with employees, it is very rare for a TripPal message conversation to carry over from Friday, across the weekend, across Monday, and into the following Tuesday. Instead, the main driver is treatment employees starting to increase their overall level of messaging even in the office. For example, treatment employees reported in discussions that if they had to ask a simple question about coding, a product, or a customer, they were now more likely to do this by message rather than in person. They also reported more regularly using Zoom for meetings, including for meetings in the office when employees were located on different floors, with Zoom use in the treatment divisions doubling versus pre-pandemic levels while other non-experimental divisions like “business trip” were relatively flat (Appendix figure A4).

Figure 6 shows how this leads to more messaging by treatment employees by hour throughout the day. This figure breaks this out both by the treatment/control status of the sender and the recipient. We see, first, that treatment employees both send and receive more messages overall, and second, that this is particularly between treatment employee pairs. This is important because T2T, T2C and C2T all cannot talk in person on home days – at least one of the pair is at home – but it is the T2T pair that sees the highest increase in messaging, again reflecting this change in communications with treatment employees becoming more comfortable messaging even when in the office.

Table 8 highlights a related phenomenon with remote working, which is that treatment employees increased their messaging most towards team members (an increase of 19% for team members vs. 12.5% for non-team members) and towards close contacts (20% for close contacts vs. 6.3% for non-close contacts), where "close contact" is defined as co-workers they have messaged 5+ different days in the 3 months before the experiment. This highlights the silo concern of Yang et al. (2021) that WFH tends to encourage communication with individual's current contacts at the expense of making new contacts. In our experiment, we see messaging both within and across teams and new contacts increases, but the increase is notably higher for messaging to team members and pre-existing contacts.

Hence, in summary, hybrid working from home leads to increased electronic communication both at home and in the office, particularly between treatment pairs. This increase is greatest for team members and existing close contacts suggesting hybrid-WFH may lead to some mild silo-effect for individuals, reflecting the importance of the office days for employees to network and develop weaker ties.

V Employee Performance and Productivity

V.A Pay, promotions and lines of code written

A key question for Trip.com was the impact of hybrid working from home on employee performance. To assess that, we first use two measures of performance – their six-month performance reviews and promotion rates for the second half of 2021 and the first half of 2022. We then turn to data on lines of code written for 653 of the experimental employees whose primary job is coding, and self-assessed productivity.

Starting with performance reviews, these are extremely important within Trip.com as they determine employees' pay and career progression, so are carefully conducted. The review process for each employee is built on formal reviews provided by their managers, co-workers, direct reports, and if appropriate, customers (external or internal). They are reviewed by employees, collated by HR and managers, then discussed between the manager and employee. This lengthy process takes more than four weeks, providing a well-grounded measure of employee performance. And while these are not perfect, given their tight link to pay and career development both managers and employees put large amounts of

time and effort into these to make them informative measures of overall performance. The promotion data measures two types of promotion – a minor promotion which keeps the title but involves an additional pay increase, and a major promotion, which involves a change of title and position. For regression purposes, we code a minor promotion as "1" and a major promotion as a "2" but results show a similar null result for each examined individually.

Figure 7 shows the key result from these performance reviews and promotion regressions both for the end of 2021 (called 2021H2) and the first half of 2022 (called 2022H1). These two time periods are included to provide both an immediate and a slighter longer-run perspective on any potential impact of hybrid-WFH on employee performance. There is no significant or material difference between treatment and control employees overall – while grades are slightly higher for treatment employees and promotions are slightly higher for control employees, neither are statistically significant. We also took the full text of the performance reviews and searched (in English after using Google translate) for the frequency of terms related to development, leadership, new products, learning, execution, etc. and found no significant impact of treatment (Appendix Table All). This null result holds both in the overall sample, and when we interacted treatment with a range of measures including their manager also being in treatment, volunteer status, tenure, commute length, gender, children, messages sent and business function. In all cases, the results are almost always insignificant, and even if they are individually significant for performance reviews or promotions, they are never significant for both for the same interaction (Appendix Table A5). Hence, we conclude there is no *robust* overall or sub-group impact of WFH on the 6- or 12-month performance or promotion outcomes in the experiment.

Table 9 checks for spillovers within teams: could having more treatment co-workers impact individual performance. Column (1) regresses individual performance grade on the treatment variable finding results consistent with Figure 7 of no significant effect. Column (2) includes the share of the rest of the team in the treatment and finds no significant results, and in column (3) we include having 1+ team member in treatment (since this could shift the team to having more zoom meetings if at least one team member is at home on Wednesdays or Fridays) and again find no difference. Columns (4) to (6) repeats this for promotions, again finding no significant individual or spillover effects.

Finally, Table 10 turns to lines of code written, another measure of output for computer coders. Lines of code is certainly not a perfect measure of performance,¹¹ but it is one of many indicators Trip.com follows internally, suggesting it provides some signal on employee's output. We find lines of code rises by an insignificant 4.4% for treatment employees in column (1). Columns (2) to (5) break this down by weekdays, home days, and office days and weekends, and we see the results are somewhat larger on the office days. This is consistent with the data on working patterns in section IV where we see WFH employees tend to reduce hours on their home days and make up on their office days and the weekend.

V.B Self assessed productivity impact of hybrid WFH

All experimental subjects were polled pre-experiment in a baseline survey on 29th and 30th, July 2021, which included a two-part question asking about their beliefs on the impact of hybrid-WFH on productivity. Employees were asked “*What is your expectation for the impact of hybrid working from home on your productivity?*”, with three options of [positive], [about the same], or [negative]. Respondees that chose positive were then offered a set of options asking about how positive ranging from [5% to 15%], up to [35% or more], and similarly so for negative choices. For aggregate impacts we take the mid-points of each bin and 42.5% for >35% and -42.5% for <-35%. Employees were resurveyed with the same question after the end of the experiment.

Figure 8 left panel shows that employees' pre-experimental beliefs were extremely varied. The baseline mean was -0.1% but with a very wide spread. This spread should be unsurprising to anyone following the active debate over the productivity impact of remote work. At the endline these beliefs had significantly increased to 1.5% driven by a reduction in the left tail. This suggests the experience of hybrid led to a small improvement in employee average productivity beliefs, particularly for those with initially very negative views.¹²

Interestingly, the right panel of Figure 8 shows in the baseline survey managers were substantially more negative on the perceived impact of hybrid on their productivity with a mean effect of -2.6%. Non-

¹¹ See, for example, the Wikipedia discussion here https://en.wikipedia.org/wiki/Source_lines_of_code

¹² Another explanation is of course selective attrition in that employees with negative views on WFH quit. Somewhat surprisingly baseline productivity expectations have a positive insignificant correlation with attrition, suggesting at least on baseline views selection was not leading to the upward shift in beliefs. Indeed, the average baseline productivity view of the employees that did not attrit at baseline was -0.14%.

managers in contrast were +0.7% in the baseline survey. This negative baseline productivity view matches managers significantly lower volunteering rates, take-up rates and higher treatment attrition rates. Managers were significantly less in favor of hybrid WFH pre-experiment, and indeed it was this concern from managers that motivated Trip.com executive management to run the experiment rather than directly roll the policy out. At the end of the experiment the views of managers improved substantially and were no longer significantly different from non-managers (Appendix Table A9). One other notable variation in survey views on productivity was across commuting distance as shown in Figure 9. Both in the baseline and the endline employees with a longer-commute reported significantly more positive beliefs on the impact of hybrid on their own productivity. The average Trip.com employee has an 80 minute daily total commute, suggesting a substantial fraction of the efficiency gain from remote work accrues from avoiding commuting costs.

Finally, we see that treatment and control employees saw a similar increases in self-assessed productivity, suggesting personal experience is not necessary if individuals are in close contact with co-workers who are working from home. When employees from four other divisions in Trip.com were polled about the productivity impact of hybrid-WFH *after the end of the experiment* in March 2022 the mean estimate +2.8% (on a sample of 3461 responses), was very similar to the end-line views in the experimental sample. This suggests the personal experience of working from home, or close exposure to people doing this, leads employees to update on the experience, matching the evidence of a positive society-wide update on WFH productivity after the 2020 pandemic.¹³

So, in conclusion, external indicators of productivity from performance reviews, promotion outcomes and lines-of-code show no significant impact of hybrid. Self-reported survey measures show small positive effects for non-managers, and pre-experiment negative effects for managers that turned slightly positive post-experiment. This null result on objectively measured productivity rules out the large negative impacts on performance some of the detractors of working from home have claimed in public statements, while the negative survey assessments of managers pre-experiment is consistent with the perception that managers are broadly more negative on remote work than non-managers. Perhaps most

¹³ See Aksoy et al. (2022) for evidence of positive updates of employees on the productivity impact of working from home in 20 countries, including China.

optimistically for advocates of hybrid this negative view of managers dissipates after the six-months of experimental experience, mirroring the broad shift in public sentiment after the pandemic.

VI Conclusions

This paper evaluates a large, randomized control trial on 1612 engineers, marketing and finance employees of a multinational technology firm that allowed odd birthday employees to WFH on Wednesday and Friday and kept even birthday employees full-time in the office. There are four key results. First, hybrid was highly valued by employees on average, reducing attrition by 33% and increasing job-satisfaction measures. Second, hybrid reduced working hours on home days and increased them on office days and the weekend, altering the structure of the working week. Third, hybrid increased messaging and video calls, even when all employees were in the office, reflecting a move towards more electronic communication. Finally, there were large differences in valuations on hybrid between managers and non-managers. Non-managers were significantly more likely to volunteer into the hybrid experiment, to work from home on eligible days, to report positive impacts on productivity, and to reduce their attrition. In contrast, managers were negative on the productivity impact of hybrid at baseline, less likely to volunteer into hybrid or take up working from home and saw increased quit rates when randomized into hybrid.

Given the benefits of increased retention and job satisfaction, once the 6-month experiment ended, the technology firm rolled out the hybrid WFH scheme to the entire company. Indeed, this positive impact was so evident within the firm that in the survey endline experiment, 54% of employees thought that the firm would stick with hybrid-WFH (40% were unsure, and 6% thought it would not).

These findings highlight how hybrid-WFH is typically beneficial for both employees and firms but is usually underappreciated in advance, particularly by managers. This was a common experience in the US and Europe during the pandemic when WFH went from being rare to mainstream and is now a permanent feature for most graduate employees.

Data Appendix

Data was provided by a combination of Trip.com sources, including HR records, payroll, building swipe card data, VPN records, messaging, performance reviews and surveys. All data was anonymized and coded using a scrambled individual ID code. Office-time data was not available on 6 weekday public holidays: 9.20(holiday, Mon), 9.21 (public holiday, Tuesday), 10.1(Friday), 10.4 (Monday), 10.7 (Thursday), and 1.3(Monday). There is missing VPN data on 6 days, 1.7~1.12 2022, because of an error with the data storage system. The 11 people missing from the message data did not send any messages over this period. Non-working days include paid personal holidays that are not public holidays, absence for work and sick leave. Throughout the paper daily VPN time is winsorized at 12 hours, office time at 15 hours and lines of code at 500 lines, and hourly messages at 20, to limit the impact of outliers (noting results for all of these are similar with unwinsorized data – for VPN and office time these are both naturally limited at 24 hours per day anyway and for lines-of-code using the inverse-hyperbolic sine transformation limits the impact of large values).

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Figure 1: Office and Home (October 2021)

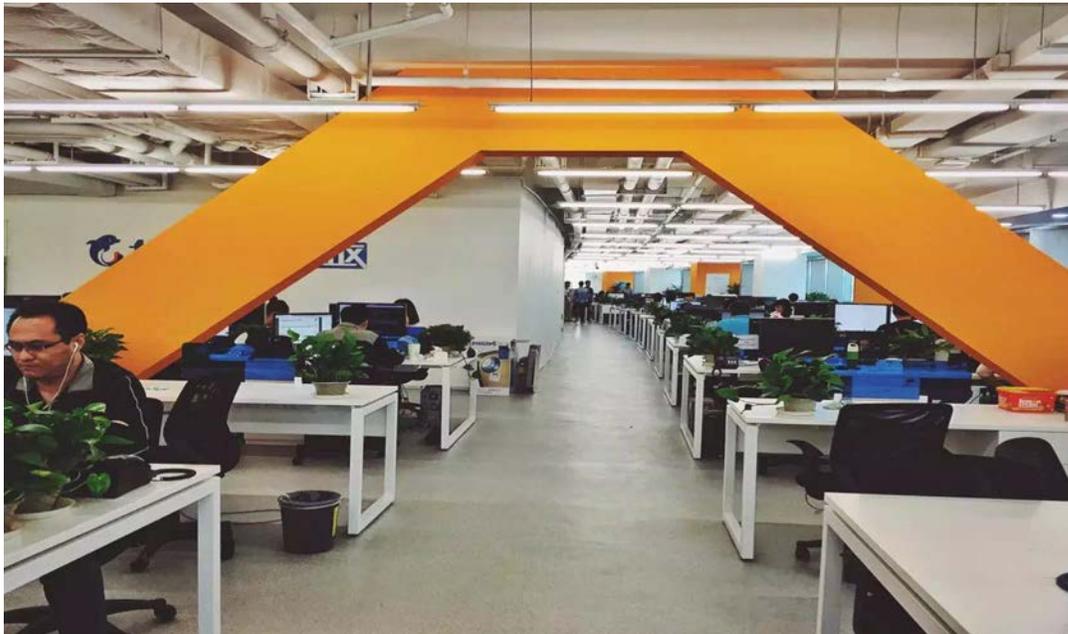
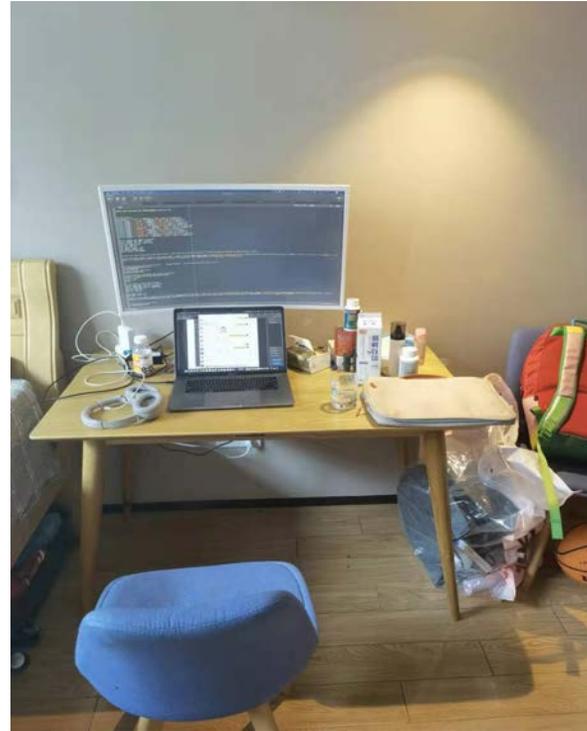


Figure 2: Trip.com has a modern office with teams usually located together



Trip.com headquarter building in Shanghai (top) and part of its floor plan (right)

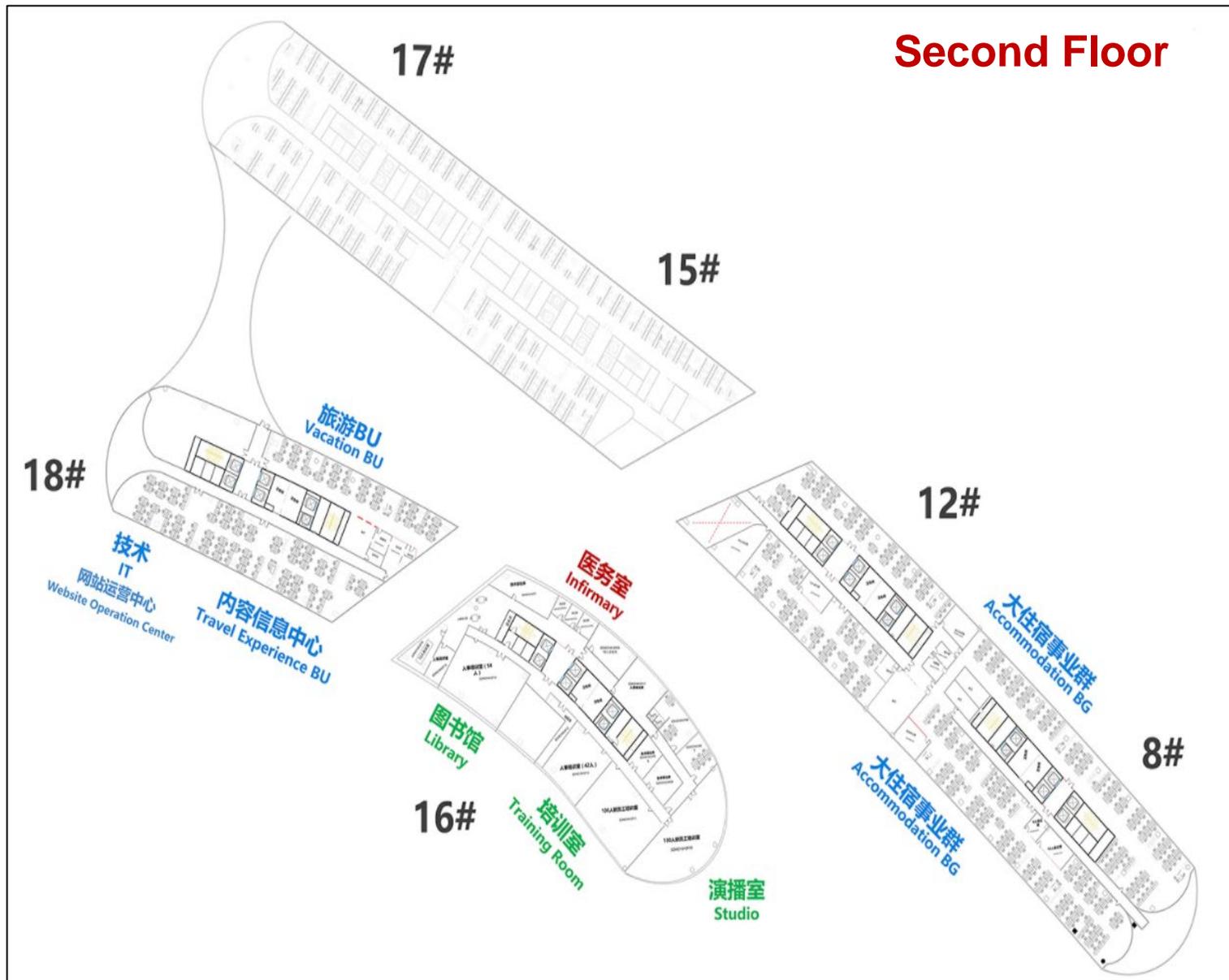
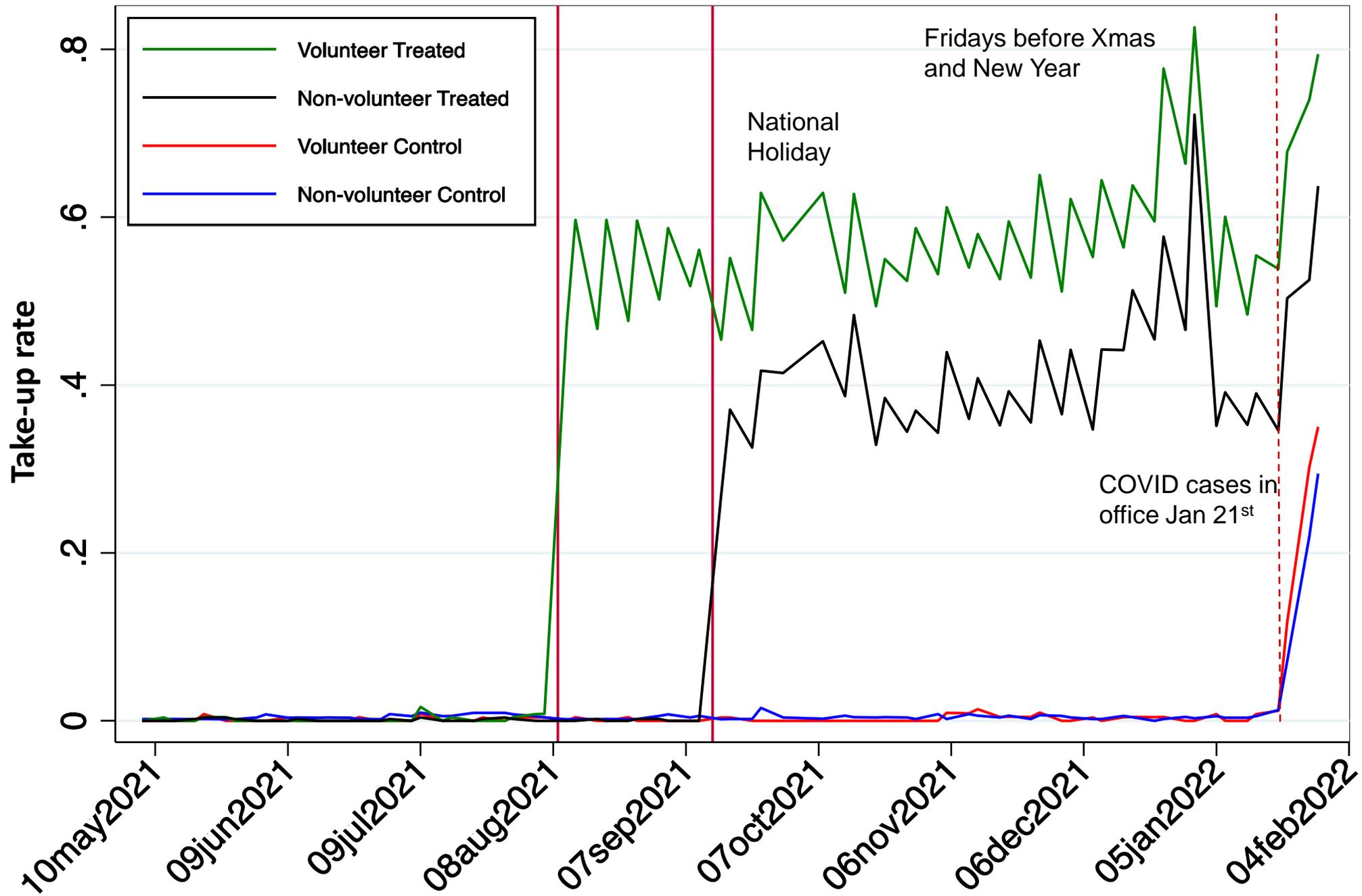
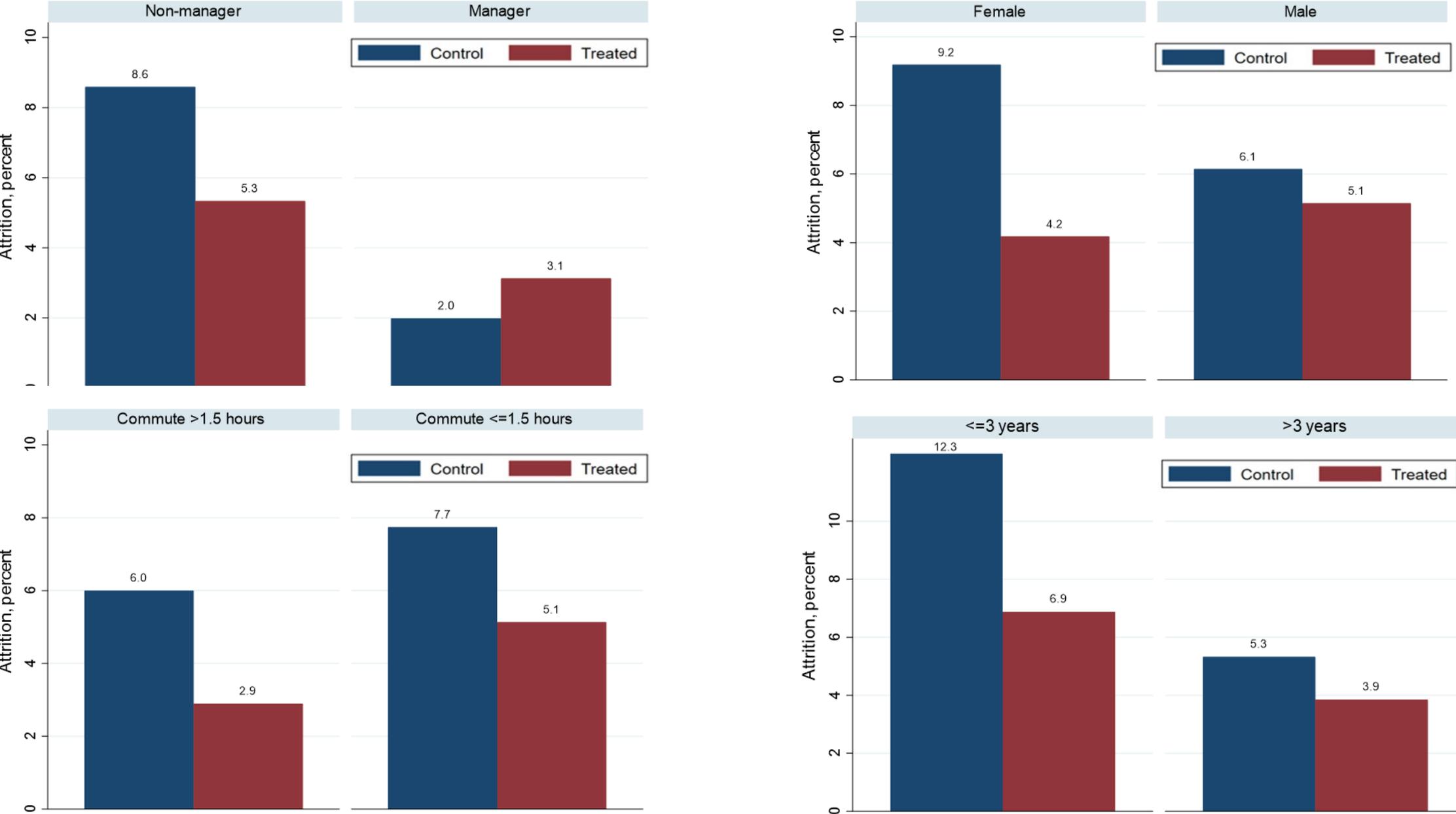


Figure 3: Take-up rate for WFH treatment and control by volunteer status



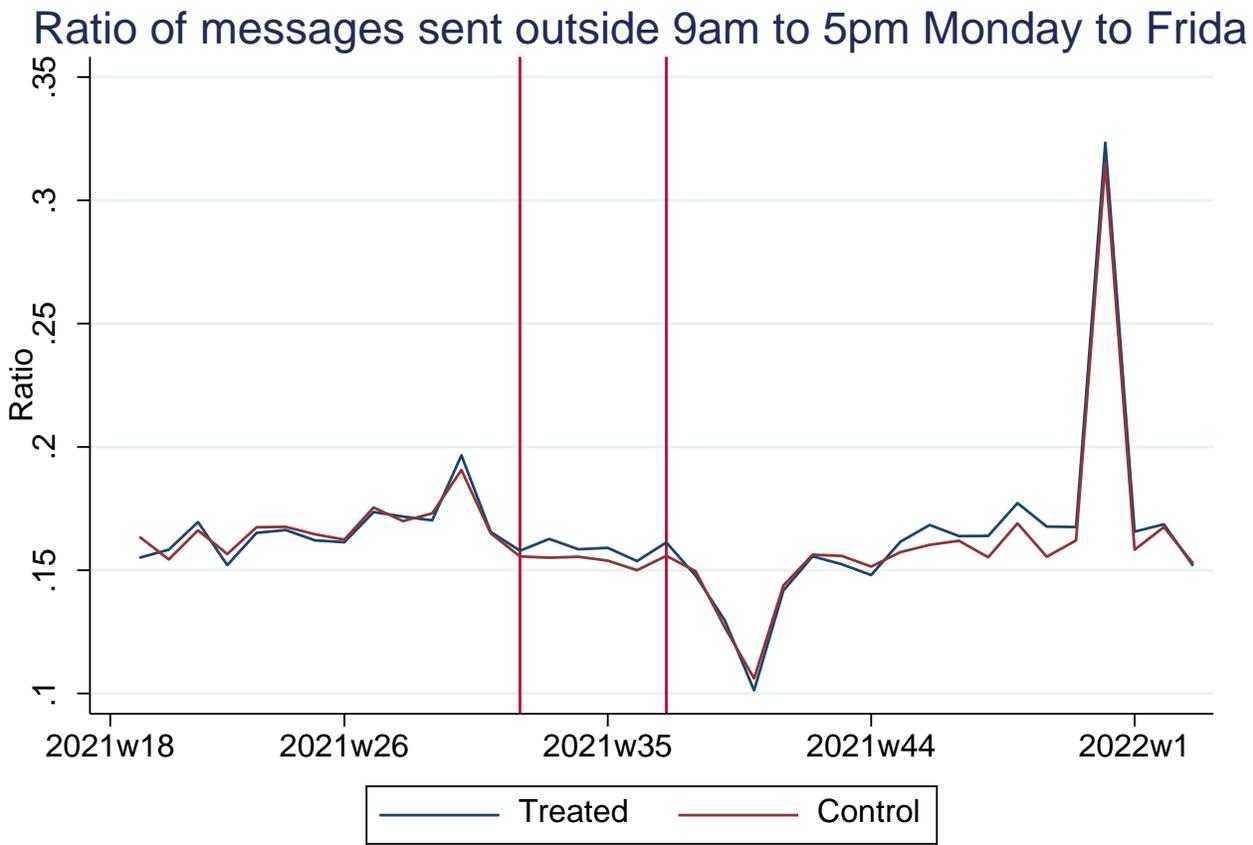
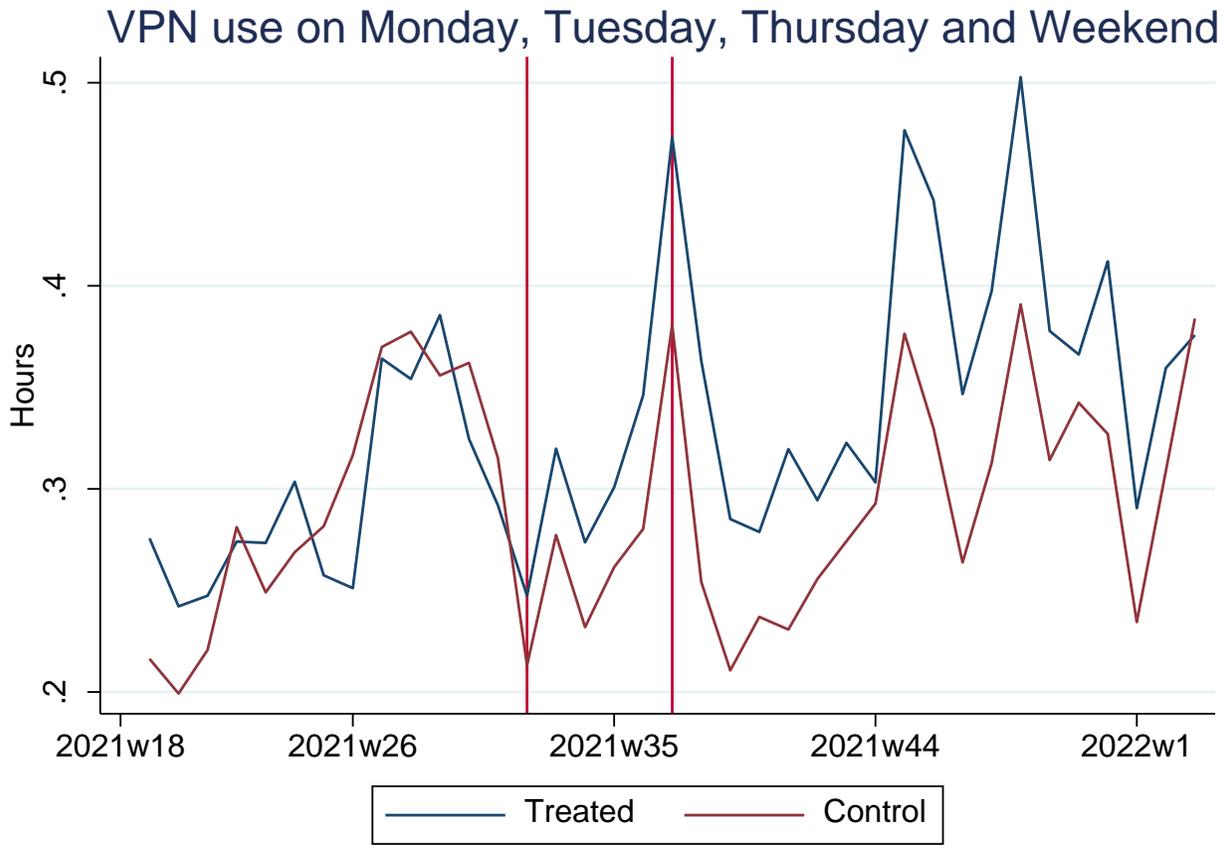
Notes: Data for 1612 employees from August 9th 2021 (volunteers) and September 13th (non-volunteers) to January 23rd 2022. Public holidays, personal holidays and excused absence (e.g. sick leave) excluded. Take-up rate is percentage of Wednesday & Friday each week they WFH.

Figure 4: WFH treatment reduction in attrition was larger for non-managers, females, those with longer commutes, and employees <=3 years tenure.



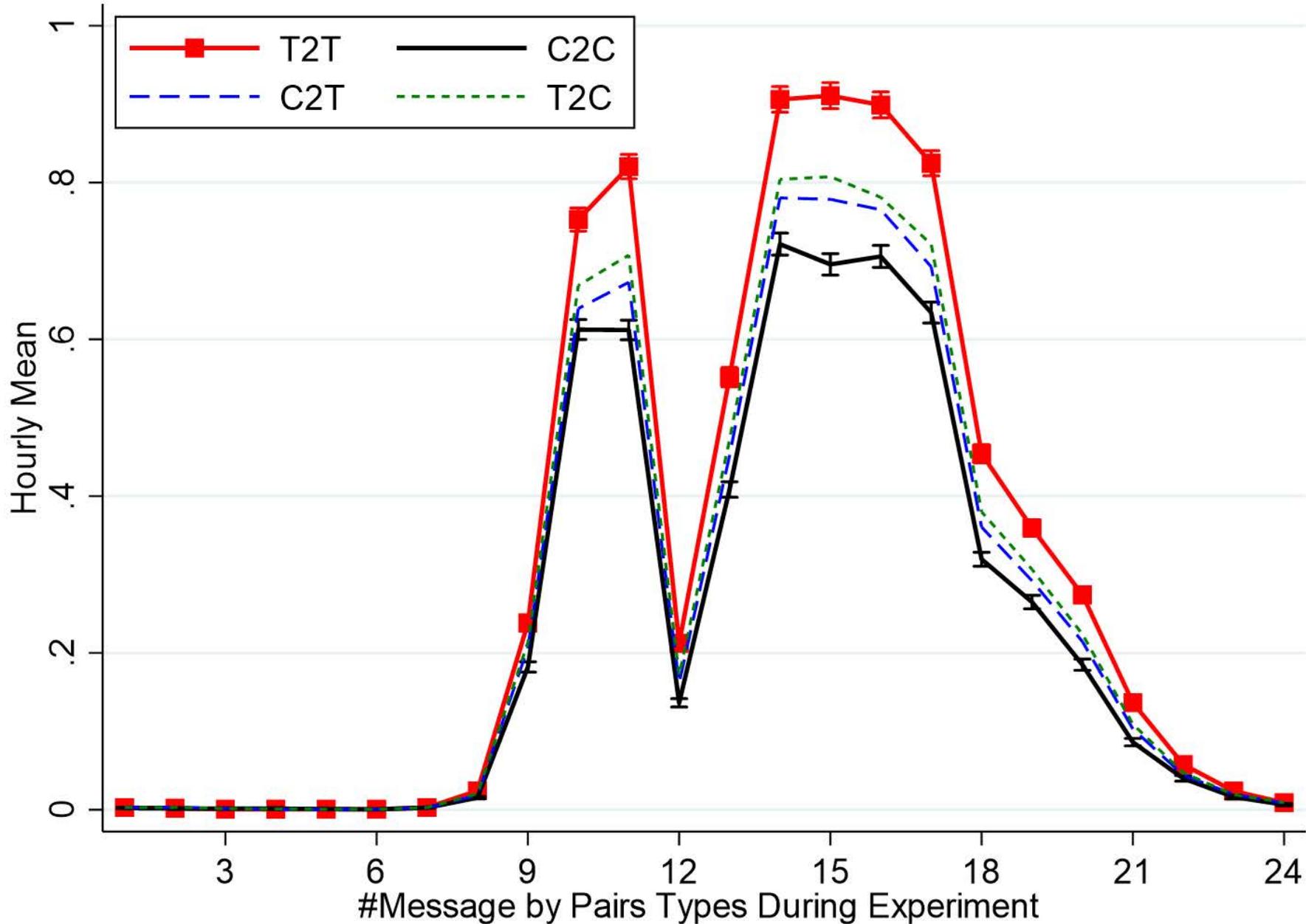
Notes: Data on 1612 employees attrition (1610 in top-left panel) between August 9th 2021 (volunteers) and September 13th (non-volunteers) to January 13th

Figure 5: WFH treatment employees have 7.5% greater VPN use and 1.5% more messages outside regular hours



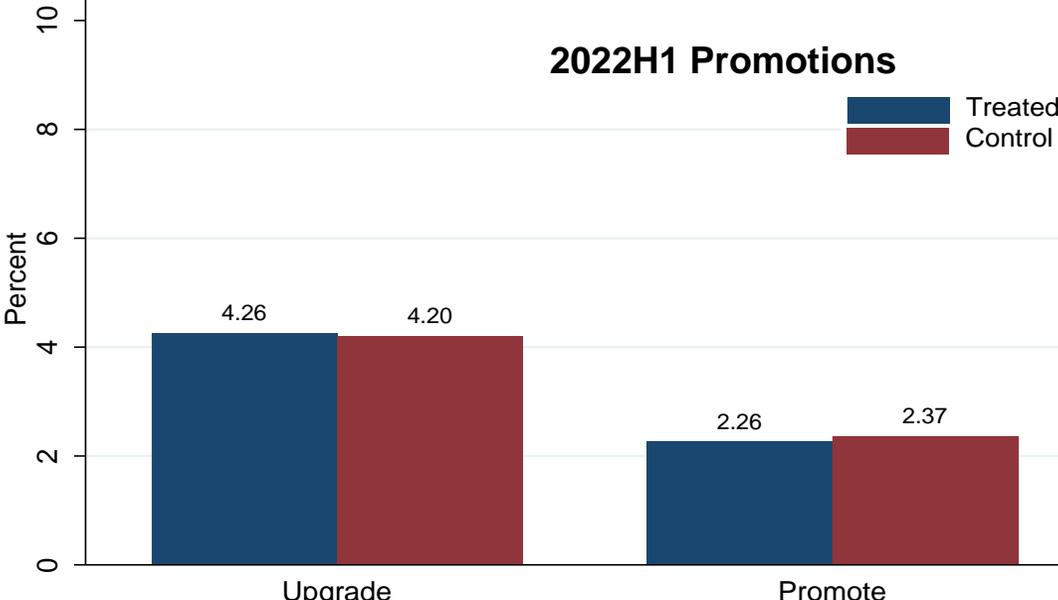
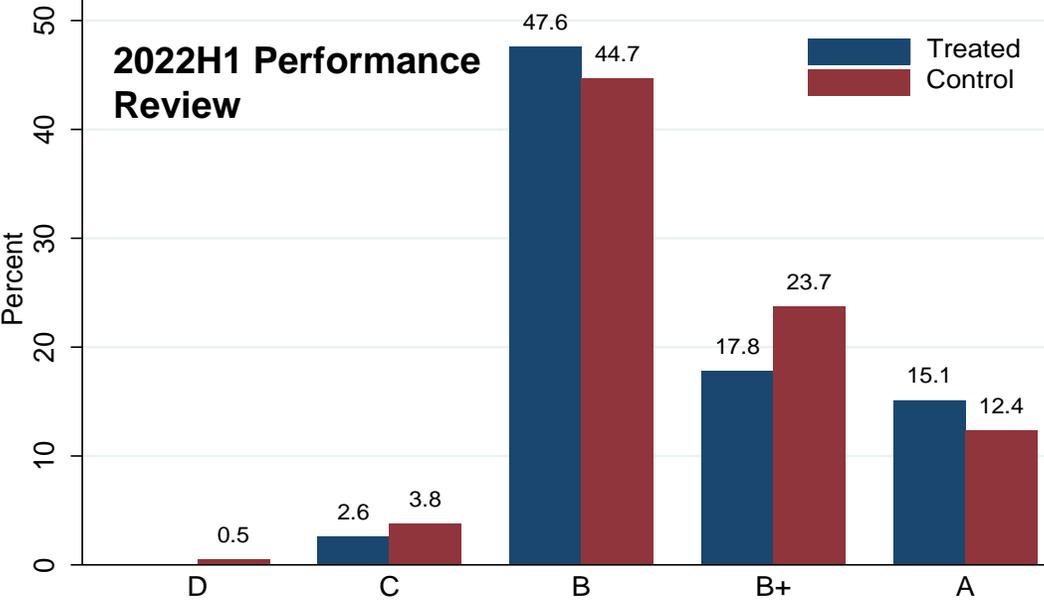
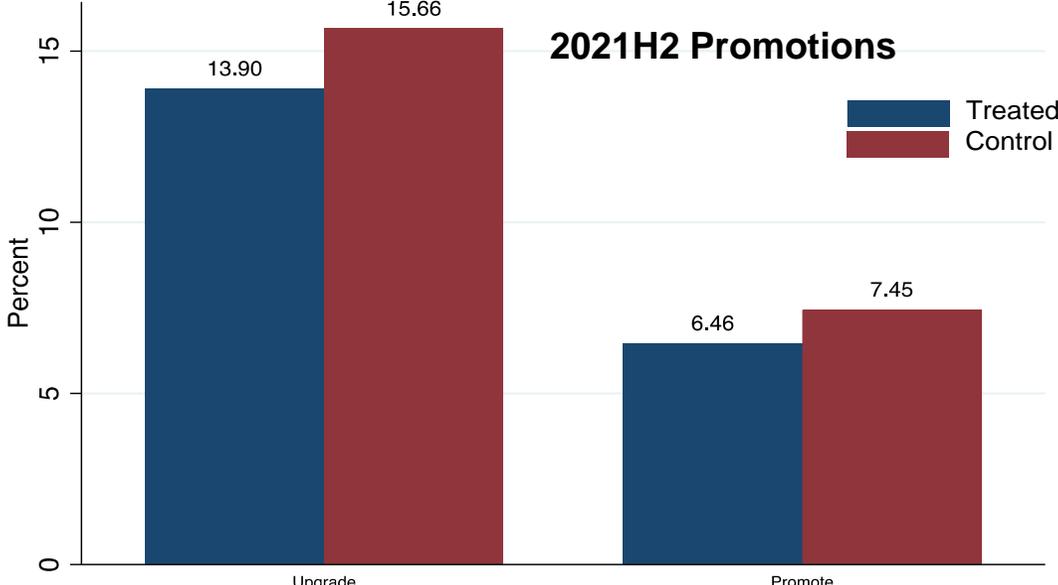
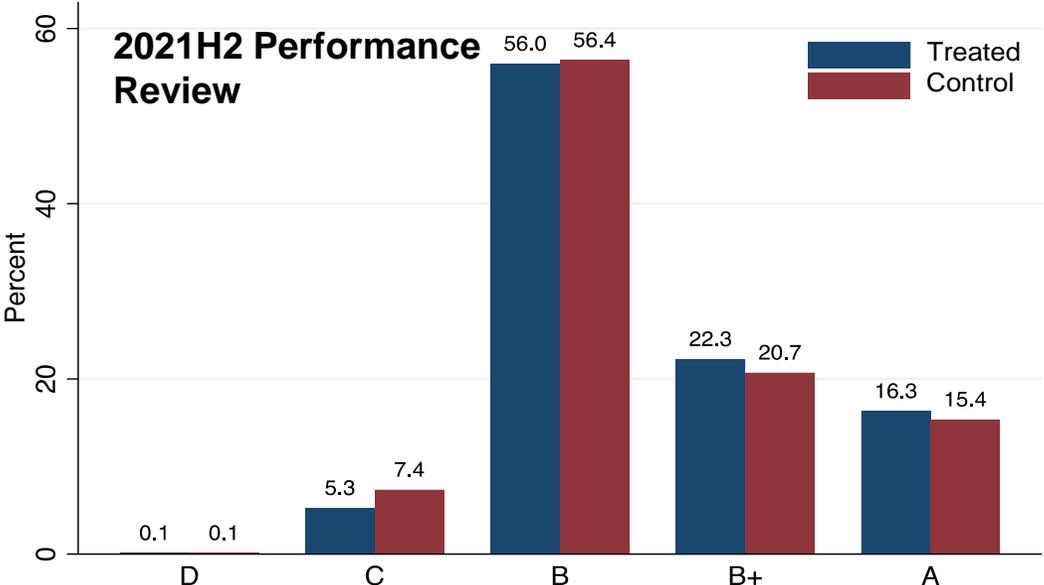
Notes: Weekly plot from May 10th 2021 to January 23rd 2022 for 1612 employees for VPN and 1599 for messages (as 13 employees do not send messages over this period). Daily Differences significant at the 5% level for both share of messages and VPN use between treatment and control.

Figure 6: WFH Treatment employees message each other more than control employees



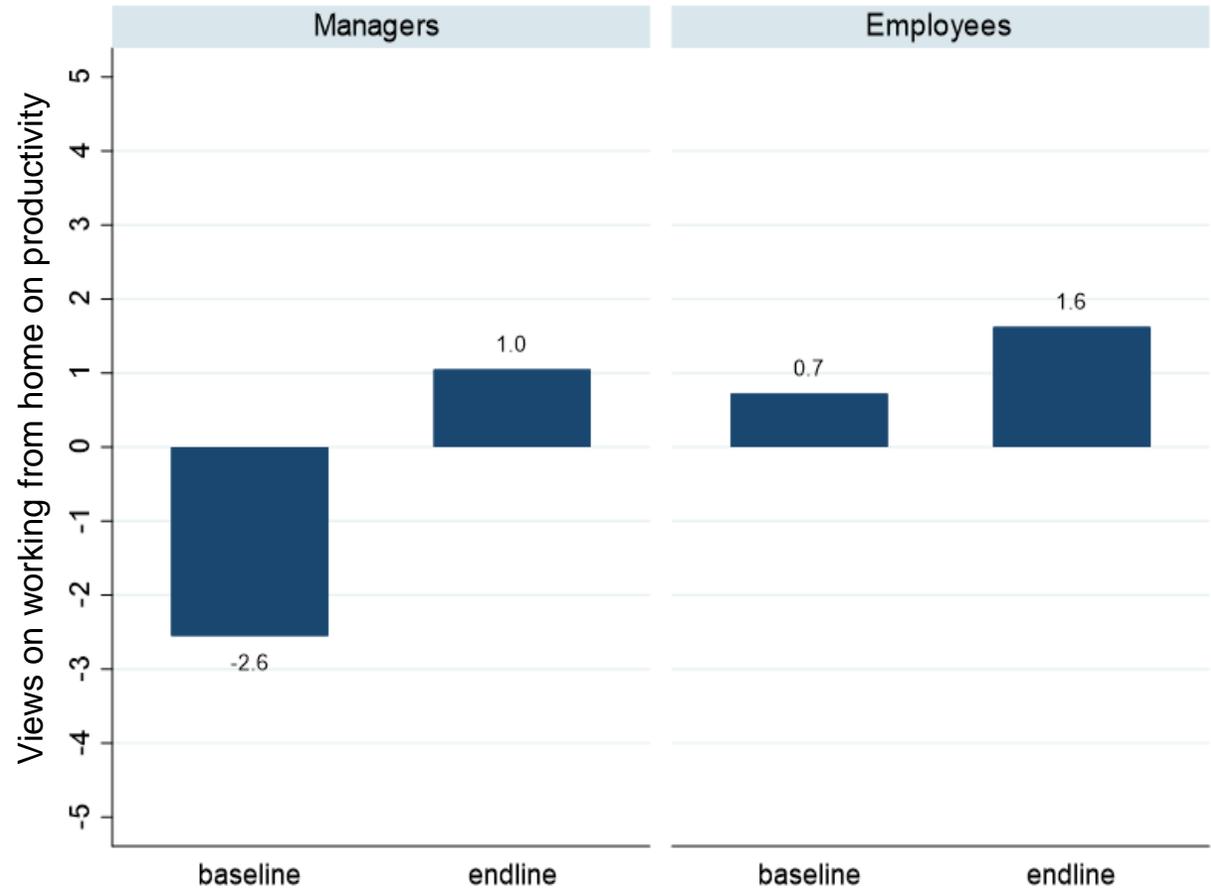
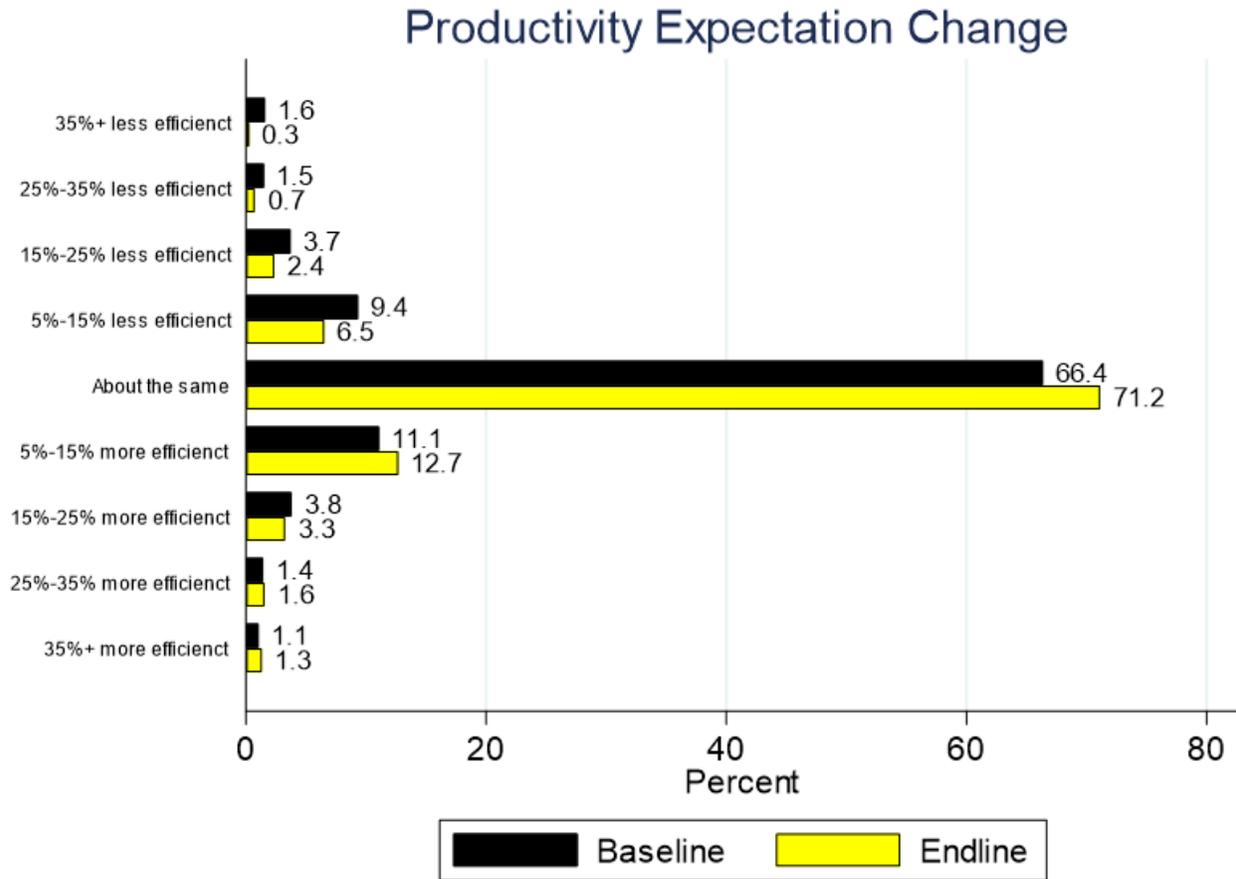
Notes: Data for 1599 employees from August 9th 2021 (volunteers) and September 13th (non-volunteers) to January 23rd 2022. Monday to Friday combined data. Here “T2T” means messages sent from treatment to treatment employees, “C2C” means messages from control to control employees, “C2T” means messages from control to treatment employees, and “T2C” mean messages from treatment to control employees.

Figure 7: No impact of treatment on performance review or promotions in 2021H2 or 2022H1



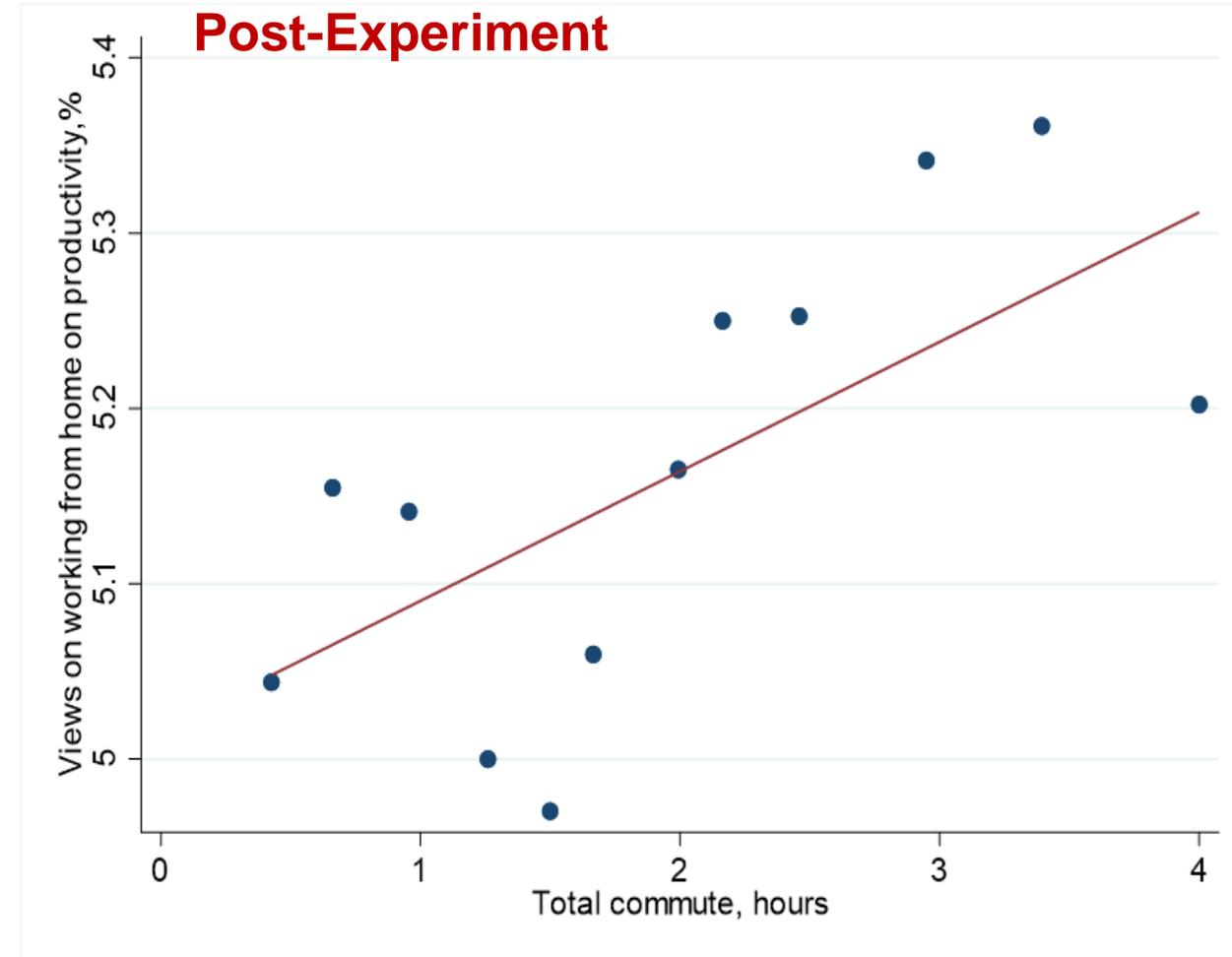
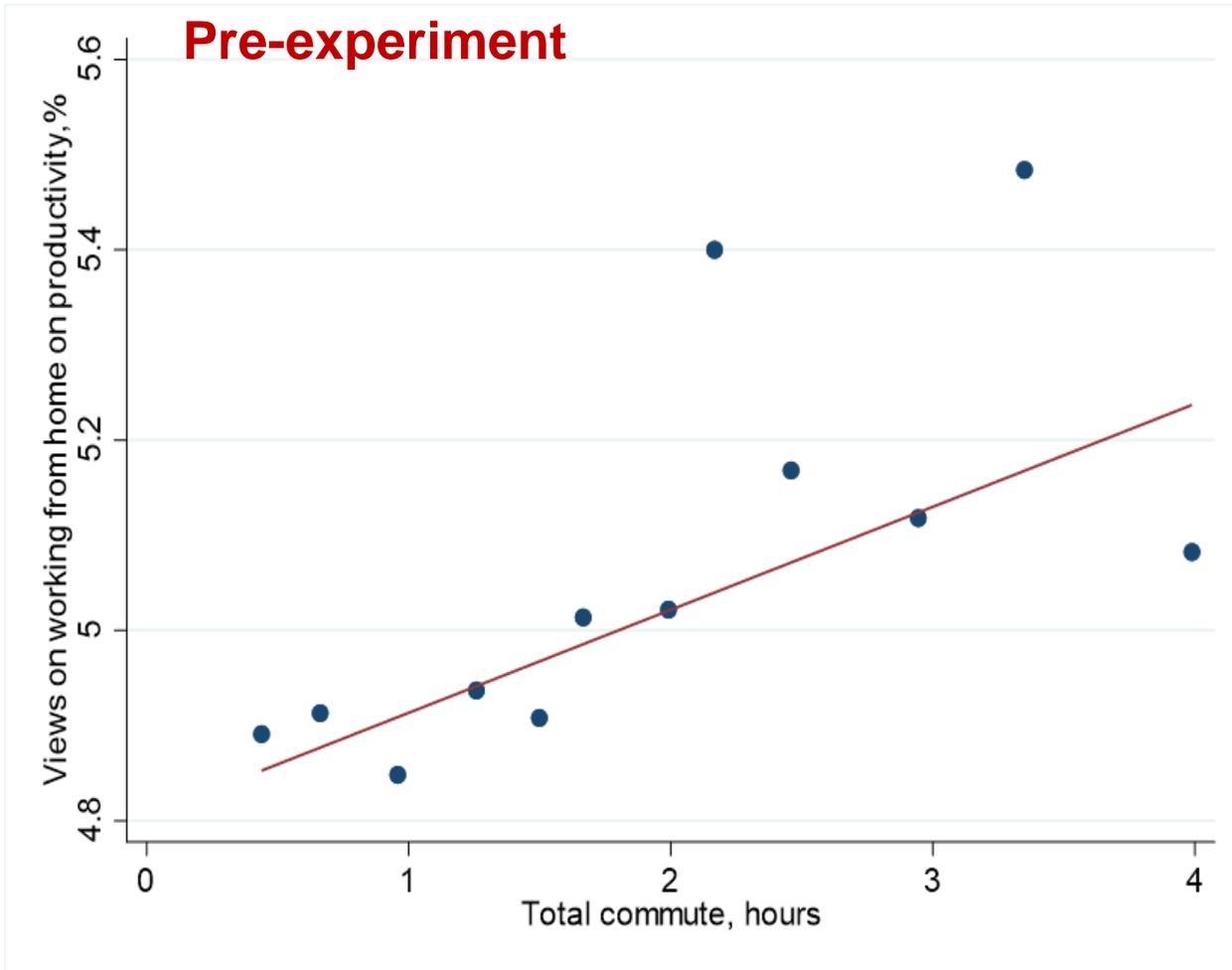
Notes: Results from 1507 employees in 2021H2 and 1355 employees in 2022H1.

Figure 8: Employees views on the productivity impact of WFH increased from -0.1% at baseline to 1.5% at endline, rising most among managers



Notes: Sample from 1315 employees (314 managers, 1001 non-managers) on baseline on the left, 1345 employees (324 managers, 1021 non-managers) on the endline.

Figure 9: Employees with longer commutes were significantly more positive on the productivity benefits of WFH both pre and post experiment



Notes: Sample from 1315 employees (314 managers, 1001 non-managers) on baseline on the left, 1345 employees (324 managers, 1021 non-managers) on the endline on the right.

Table 1: Non-managers, employees with a longer commute and employees with less tenure were more likely to volunteer for the WFH experiment

Dep Variable:	Volunteer							
Manager	-0.134*** (0.025)						-0.105*** (0.028)	
Commute (hours)	0.057*** (0.016)						0.062*** (0.016)	
Children			-0.023 (0.023)				0.030 (0.029)	
Female			-0.049** (0.024)				-0.029 (0.024)	
Age (years)					-0.007*** (0.002)		0.004 (0.003)	
Tenure (years)							-0.016*** (0.002)	
Prior performance							-0.028 (0.024)	
_cons	0.353*** (0.014)	0.258*** (0.028)	0.332*** (0.016)	0.339*** (0.015)	0.555*** (0.071)	0.420*** (0.020)	0.332*** (0.015)	0.249** (0.099)
<i>N</i>	1612	1612	1612	1612	1612	1612	1612	1612

Notes: Sample of 1612 employees. Linear regression. Prior performance was performance grade of A or B+ in 2021H1. Robust standard errors.

Table 2: Non-managers, employees with a longer commute and employees with children had higher WFH take-up rates

Dep Var: Daily WFH Take-up	(1)	(2)	(3)	(4)	(5)	(6)
Treat	0.461*** (0.012)	0.461*** (0.012)	0.458*** (0.012)	0.461*** (0.011)	0.461*** (0.011)	0.461*** (0.011)
Manager		-0.023* (0.013)	-0.020 (0.013)	-0.032** (0.014)	-0.033** (0.014)	-0.036** (0.015)
Commute (hours)			0.040*** (0.008)	0.035*** (0.008)	0.035*** (0.008)	0.035*** (0.008)
Children				0.039*** (0.012)	0.039*** (0.012)	0.027* (0.014)
Female					-0.004 (0.013)	-0.005 (0.013)
Age (years)						0.001 (0.002)
Tenure (years)						0.001 (0.002)
Prior performance						-0.010 (0.012)
_cons	0.008*** (0.001)	0.014*** (0.004)	-0.040*** (0.014)	-0.050*** (0.014)	-0.049*** (0.015)	-0.059*** (0.021)
<i>N</i>	59071	59071	59071	59071	59071	59071

Notes: Number of observations is 59071, where an observation is person-day (only WFH permissible Wednesday and Fridays). Children comes from the HR database and is defined as having children. Age is measured in years, commute in hours, level from 1 (most junior) to 7 (most senior), team treated is a share from 0 to 1, and messages is messages per hour. All others are binary definitions. Data from August 9th to January 23rd for 1612 employees. Prior performance is performance grade of A or B+ in 2021H1. Linear regression. Standard errors clustered by individual.

Table 3: WFH take-up rates were strongly correlated at the team-level

Dep Var: WFH	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Team WFH Share	0.551*** (0.033)	0.526*** (0.036)	0.428*** (0.037)	0.412*** (0.037)	0.347*** (0.046)	0.492*** (0.077)	0.418*** (0.099)
Manager WFH				0.084*** (0.019)	0.081*** (0.018)	0.084*** (0.019)	0.084*** (0.019)
Connected Ratio					-0.094 (0.081)		
Team WFH Share*Connected Ratio					0.550*** (0.195)		
Same Cohort Ratio						0.006 (0.059)	
Team WFH Share*SCR						-0.153 (0.137)	
Same Age Ratio							-0.024 (0.062)
Team WFH Share*SAR							-0.008 (0.124)
Date FE		Y	Y	Y	Y	Y	Y
Desk FE			Y	Y	Y	Y	Y
N	27025	27025	27025	27025	27025	27025	27025

Notes: Team WFH share are calculated using colleagues who are participants in the experiment, leave oneself out. Data from August 9th 2021 (1st wave) and September 13th (2nd wave) to January 23rd 2022. Sample all treated employees (N=792) with 1+ treated teammate (N=670). Connected defined as having exchanged messages on 5+ days within the three months before the experiment began. Same cohort and age defined as +/- 1 year difference. Standard errors clustered by individual.

Table 4: Non-mangers, employees with long commutes, females and new hires saw significant reductions in quit rates under hybrid

Attrition Rate, %	Obs C	Obs T	Mean C	Mean T	Dif	p-value
All	820	792	7.195	4.798	2.397*	0.043
Non-managers	617	600	8.590	5.333	3.256**	0.026
Managers	203	192	1.990	3.125	-1.135	0.479
Short(≤ 1.5 hours) commute	336	312	7.738	5.128	2.610	0.175
Long(> 1.5 hours) commute	300	311	6.000	2.894	3.106*	0.064
Female	283	287	9.188	4.181	5.006**	0.017
Male	537	505	6.146	5.149	0.997	0.486
With Children	415	354	5.301	2.825	2.477*	0.080
No Children	405	438	9.136	6.393	2.743	0.139
Tenure ≤ 3 years	219	247	12.329	6.883	5.446**	0.049
Tenure > 3 years	601	545	5.325	3.853	1.471	0.233

Notes: Number of observations is 1612 except for commute which is 1259 which is the sample of employees that responded to the commute time survey, 1610 for manager/non-manager as two employees are missing manager information and 1582 for 2021H1 performance as 30 employees did not have a 2021H1 performance grade. Attrition rate measured from 9th August 2021 to January 23rd 2022. Obs C and Obs T are the observation count in control and treatment for employees with the characteristics in the row heading, and mean C and mean T are their attrition rates, while Dif and p-value are the difference between these means and its probability value.

Table 5: WFH Treatment employees spent more time on VPN and less time in the office

	Overall	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
dependent variable	Individual daily VPN time, hours							
Treat	0.536*** (0.036)	0.056 (0.036)	0.067* (0.037)	1.656*** (0.091)	0.069* (0.035)	1.745*** (0.084)	0.083*** (0.028)	0.104*** (0.034)
_cons	0.342*** (0.020)	0.314*** (0.025)	0.489*** (0.025)	0.341*** (0.028)	0.295*** (0.024)	0.378*** (0.026)	0.263*** (0.015)	0.317*** (0.018)
<i>N</i> (person-day)	205990	29400	29395	29199	30535	29175	29144	29142
dependent variable	Individual daily Office time, hours							
Treat	-1.364*** (0.078)	-0.073 (0.072)	-0.086 (0.074)	-3.071*** (0.143)	-0.097 (0.071)	-3.296*** (0.124)		
_cons	8.291*** (0.046)	8.498*** (0.051)	8.450*** (0.052)	8.547*** (0.054)	8.440*** (0.051)	7.550*** (0.048)		
<i>N</i> (person-day)	147336	27316	28831	30407	30399	30383		

Notes: 1601 participants, from August 9th 2021 (1st wave) and September 13th (2nd wave) to January 23rd 2022; VPN and daily office time is in hours. Daily office time is capped at 15 hours and daily VPN time is capped at 12 hours. Standard errors clustered by individual. Regression includes day fixed-effects.

Table 6: WFH Treatment employees saw a 15% reduction in non-working days

	(1)	(2)	(3)	(4)	(5)	(6)
Non-working day	Overall	Monday	Tuesday	Wednesday	Thursday	Friday
Treat	-1.174***	0.429	0.367	-2.430***	0.818**	-4.815***
	(0.231)	(0.351)	(0.314)	(0.303)	(0.320)	(0.345)
_cons	7.589***	6.835***	5.478***	6.567***	7.498***	11.385***
	(0.186)	(0.254)	(0.233)	(0.240)	(0.232)	(0.270)
Business Trip						
Treat	-0.280	0.540**	0.547*	-0.597*	-0.211	-1.556***
	(0.287)	(0.271)	(0.296)	(0.319)	(0.413)	(0.348)
_cons	4.484***	2.645***	6.111***	2.878***	4.721***	5.961***
	(0.206)	(0.167)	(0.196)	(0.243)	(0.297)	(0.265)
<i>N</i>	147336	27316	28831	30407	30399	30383

Notes: The dependent variable is percentage of days, so -1.174 in column (1) means almost 1.1% less days were missed (about 2.9 given ≈ 250 working days in a year). Given the baseline of 7.589 days missed (≈ 18 days for holidays, absence, sick leave etc) this is a reduction of about 15%. “Business trip” is visits to suppliers, customers etc. Standard errors clustered by individual. Regression includes daily fixed effects.

Table 7: WFH treatment employees sent more messages on every day of the week

	Overall	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Dependent variable	Individual daily message							
Treat	4.476*** (1.425)	5.431*** (1.904)	5.343*** (2.047)	6.837*** (2.156)	4.335** (1.926)	8.150*** (1.843)	0.702*** (0.240)	0.523*** (0.169)
_cons	35.25*** (0.95)	45.77*** (1.27)	49.73*** (1.37)	52.11*** (1.42)	47.45*** (1.30)	42.22*** (1.19)	5.37*** (0.16)	4.00*** (0.11)
Treat/_cons	0.127	0.119	0.107	0.131	0.091	0.193	0.131	0.131
<i>N</i> (person-day)	223206	31920	31913	31901	31893	31885	31848	31846

Notes: Data from the 1593 participants that send 1+ individual message of the 1612 experimental participants. Only individual messages used (no mass group messages used). Date span from August 9th 2021 (1st wave) and September 13th (2nd wave) to January 23rd, 2022. Standard errors clustered by individual. Regression includes day fixed-effects.

Table 8: WFH Treatment employees increased messages most to team members and recent contacts

	(1)	(2)	(3)	(4)
	Team	non-Team	Close	non-Close
Treat	0.642**	3.987***	3.305***	1.175
	(0.277)	(1.369)	(0.875)	(0.776)
_cons	3.377***	32.016***	16.560***	18.649***
	(0.176)	(0.904)	(0.562)	(0.536)
Treat/_cons	0.190	0.125	0.200	0.063
<i>N</i>	223206	223206	223206	223206

Notes: Data from the 1593 participants that send 1+ message of the 1612 experimental participants. Only individual messages used (no mass group messages used). Date span from August 9th 2021 (1st wave) and September 13th (2nd wave) to January 23rd, 2022. Standard errors clustered by individual. Regression includes day fixed-effects.

Table 9: No evidence of any individual or team-spillover effects of WFH treatment on performance

	(1)	(2)	(3)	(4)	(5)	(6)
	Performance grade			Promotion		
Treat	-0.0556 (0.0431)	-0.0556 (0.0432)	-0.0558 (0.0431)	0.0337 (0.0310)	0.0340 (0.0310)	0.0337 (0.0310)
Team Treatment%		-0.0211 (0.0762)			-0.00408 (0.0537)	
1+ team member in treatment			0.0108 (0.0668)			-0.0192 (0.0468)
<i>N</i>	1507	1507	1507	1507	1507	1507

Notes: Sample is the 1507 employees that have a performance review letter grade at the end of 2021H2 (the 105 employees that do not have a letter grade either quit (N=90) or switched teams (N=15) out of the experimental sample) out of the 1612 participants, from August 9th 2021 (1st wave) and September 13th (2nd wave) to January 23rd 2022. Robust standard errors.

Table 10: Treatment employees lines of code increases by an (insignificant) 4.4%

Dep Var: Lines of Code	All days	M to F	W&F	M,T&T	Weekend
Treat	0.0436 (0.0930)	0.0552 (0.1239)	-0.0340 (0.1219)	0.1148 (0.1280)	0.0144 (0.0231)
Date FE	Y	Y	Y	Y	Y
<i>N</i>	95494	68210	27284	40926	27284

Notes: The dependent variable is inverse hyperbolic sine of lines of code submitted, which for numbers much above 1 is almost identical to $\log(x)$ plus a constant, so is approximately a percentage change. Individual daily lines of code is capped at 500. The data covers the experimental period, so starting in August 9th 2021 for the 1st wave and September 13th for the 2nd wave, and running to January 23rd, 2022 for both waves. Lines of code is available for 653 employees whose primary role was writing code. Standard errors clustered by individual. Standard errors clustered by individual. Regression includes day fixed-effects.

Appendix A1: July 27th email to solicit WFH volunteers (English translation)

Subject: WFH Trials Invite Your Participation!

Dear Airline/Technology Center partners: In order to improve employee satisfaction and happiness, and to attract and retain outstanding talents, the company is currently researching the feasibility of working from home policy. We hope that "working from home freely" can become company's corporate culture in the future. and employee benefits. In order to verify the feasibility of the policy more scientifically and rigorously, the Air-Ticket Business Department / Technology Center became one of the first batch of experimental departments.

We are very supportive and welcome our Airline/Tech Center mates to join the work from home experiment! During the trial period, I experienced first-hand whether working from home was beneficial to personal output, team management, and my own living conditions. Your real feelings and every feedback will help the company to better think and design policies, so that working from home can become a "good office form, good culture and good welfare" that employees like to hear and hear. Please click this link to fill in the "Home Office Test Willingness Questionnaire" before July 31, express your participation and click this link to fill in your willingness and ideas. We invite you to join and try again, let us create a different working scene together!

For more details, please refer to the FAQ below. If you have any other questions, please consult the Organization and talents Development Center for details.

FAQ:

1. How long will the trial last?

The official trial period is from August 9, 2021, to January 30, 2022.

2. Can I start working from home if I choose to participate?

The project team will conduct scientific sampling from the employees who have chosen "willing" to participate, and there will be half of the employees were selected as the "experimental group" and the other half were selected as the "control group".

3. When will I know if I have been selected as the "experimental group"?

The project team will officially announce the sampling results from August 4th to 6th. The "experimental group", will sign the corresponding documents to ensure that you are in the experimental period. If there are no special circumstances, please participate in the whole process of the experiment.

4. How is the attendance calculated during the home office period?

During the test period, the employees of the "experimental group" will be uniformly set. For special classes, workdays that cannot be clocked in due to working from home are counted as normal attendance. In case of taking sick leave or annual leave, please log in to the attendance system normally submit a leave application within .

5. Will working from home affect my assessment?

No, the work goals of working from home are the same as working in the company, but you can arrange the office space more flexibly, the goals will not change, and the assessment method will not change. Participate in year-end assessments.

6. I have a desktop but no laptop, can I still apply for working from home?

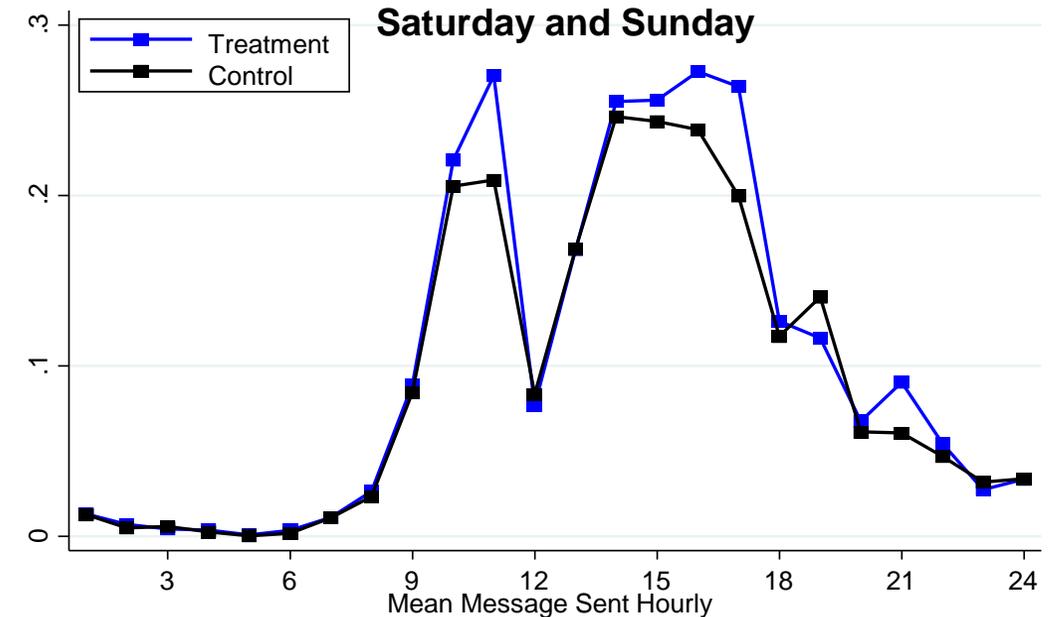
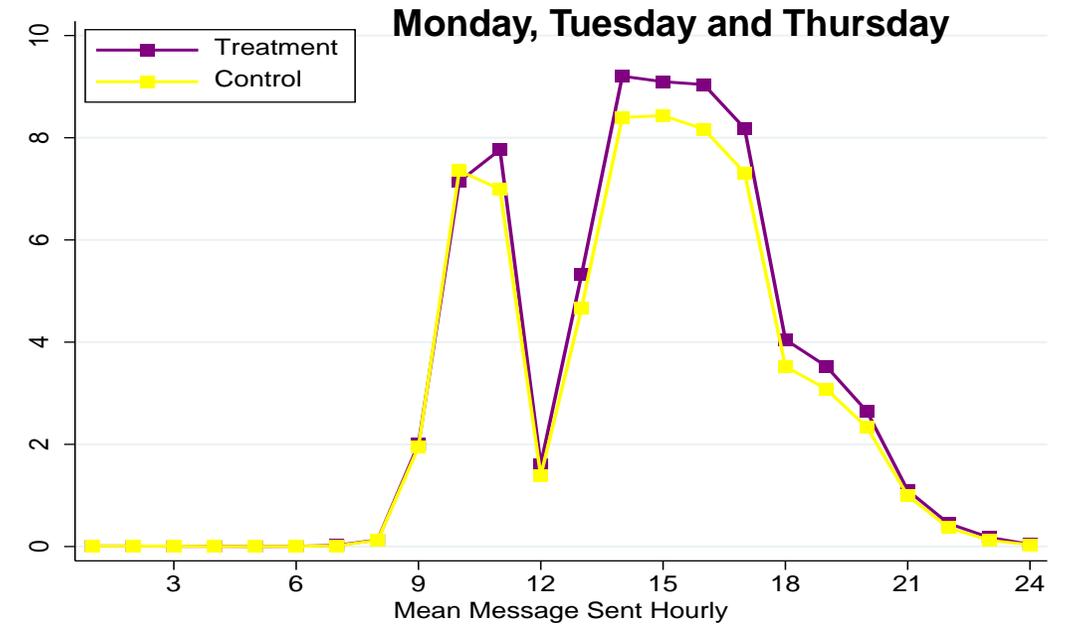
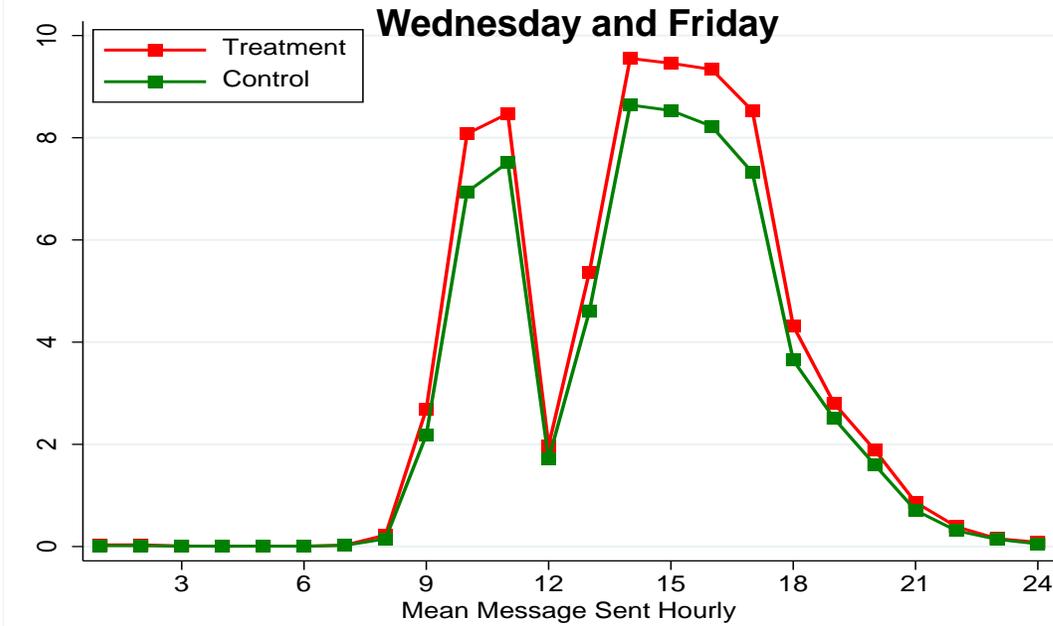
Yes. You only need a home computer and network at home.

Appendix A2: Descriptive statistics

Variable	N	Mean	Min	Max	Median	SD
Manager	1610	0.244	0	1	0	0.430
Commute (hours)	1259	1.658	0.067	4	1.5	0.867
Female	1612	0.354	0	1	0	0.478
Children	1612	0.477	0	1	0	0.500
Grad School	1612	0.324	0	1	0	0.468
Prior performance	1582	3.741	0	5	4	0.915
Age	1612	32.610	22	52	32	5.399
Tenure (years)	1612	6.349	0.333	22	5.750	4.626
Treated	1612	0.491	0	1	0	0.500
Take-up rate (Wednesdays)	15201	0.426	0	1	0	0.494
Take-up rate (Fridays)	15145	0.517	0	1	0	0.500
VPN time (daily hours)	205990	0.610	0	12	0	2.034
Office time (weekday daily hours)	147336	7.615	0	15	8.667	3.701
Messages per day	223206	37.474	0	294	20	51.136
Non-working days (percentage of day)	147336	7.007	0	100	0	22.902
Business trips (percentage of day)	147336	4.345	0	100	0	19.824
IHS Lines of code (per day)	95494	1.629	0	6.908	0	2.697
Lines of code (per day)	95494	81.210	0	500	0	168.939

Notes: Data from 1612 experiment participants. Missing data on some variables from different number of participants.

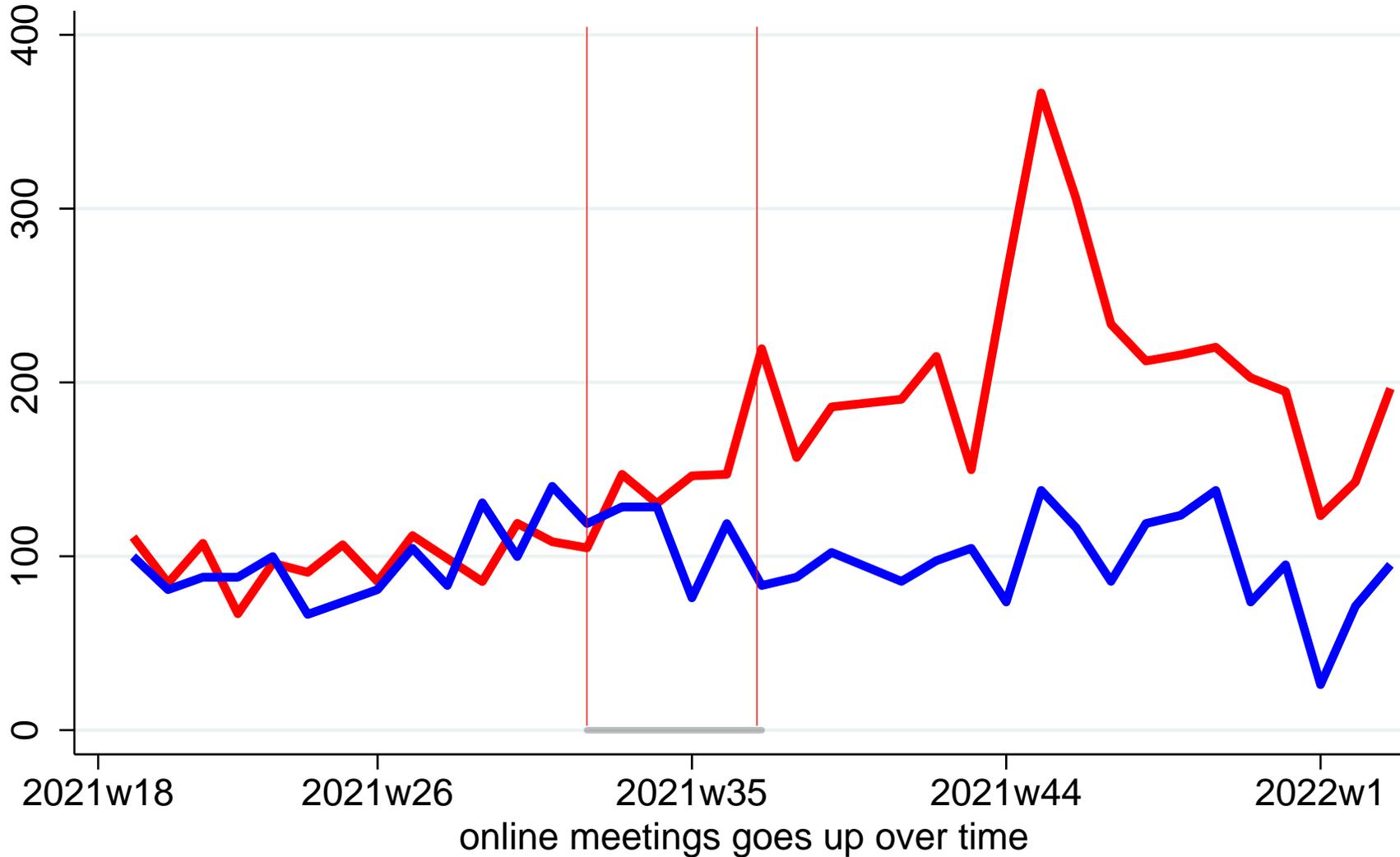
Appendix A3: WFH treatment employees exchanged more messages throughout the week



Notes: Data for 1612 employees from August 9th 2021 (volunteers) and September 13th (non-volunteers) to January 23rd 2022.

Appendix A4: Experimental divisions saw a rise in Zoom meetings

Zoom meetings per week



Notes: Data for 1612 employees from August 9th 2021 (volunteers) and September 13th (non-volunteers) to January 23rd 2022. The experimental divisions are the Airfare and IT divisions that were involved in the randomized control trial to WFH, while the business trip division was not involved.



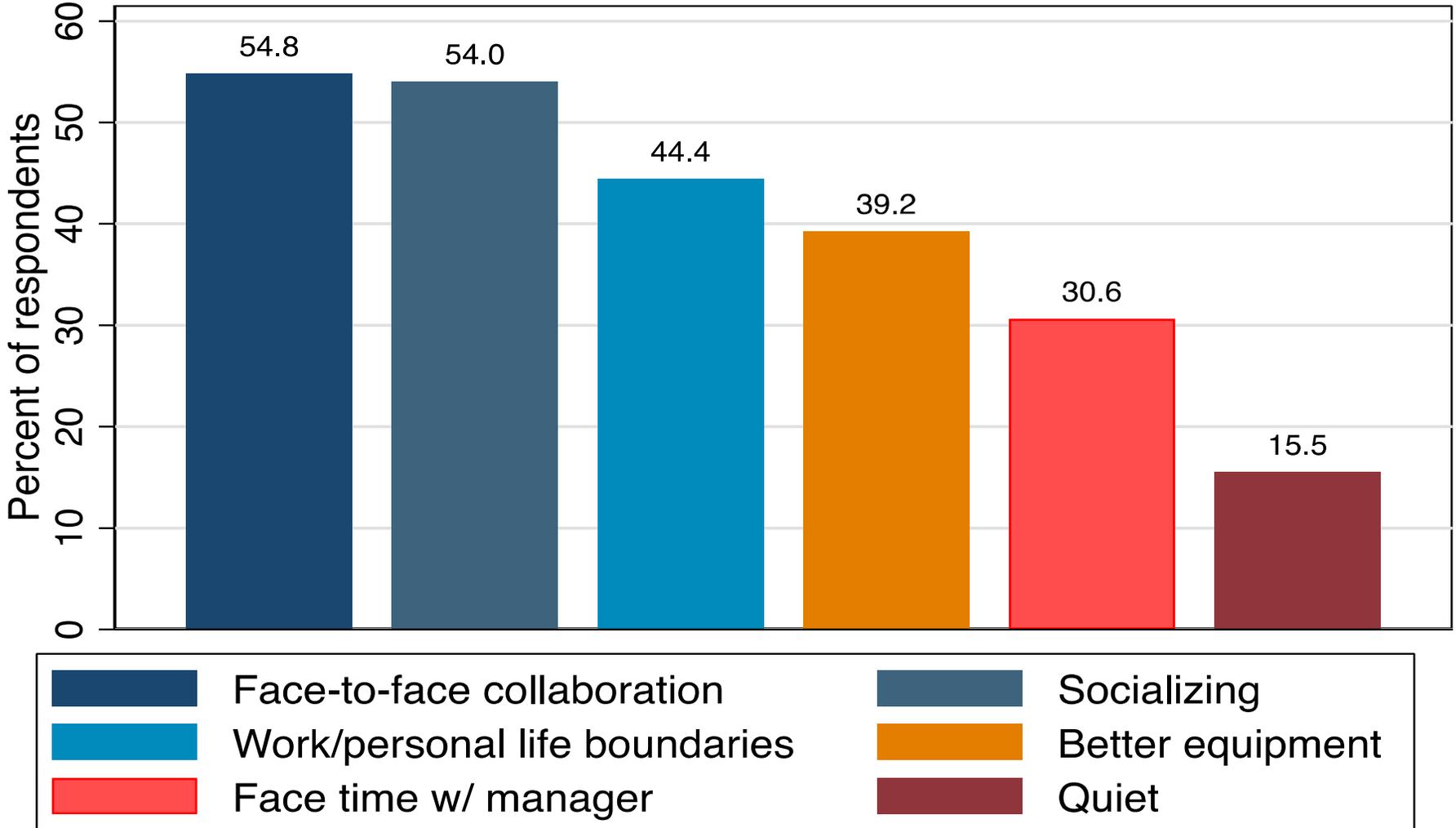
Appendix A5: No robust significant performance or promotion treatment heterogeneity

DV: Performance Grade	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	DV: Promotion	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat	-0.056 (0.043)	-0.047 (0.059)	-0.066 (0.049)	-0.025 (0.073)	-0.069 (0.107)	-0.075 (0.055)	0.011 (0.062)	-0.093 (0.068)	-0.073 (0.078)	Treat	0.034 (0.031)	0.053 (0.041)	-0.002 (0.038)	0.032 (0.056)	-0.044 (0.079)	0.051 (0.039)	0.009 (0.049)	0.065 (0.048)	0.011 (0.053)
Treat manager		0.043 (0.060)								Treat manager		0.086** (0.043)							
Treat*Treat manager		-0.021 (0.086)								Treat*Treat manager		-0.046 (0.062)							
Manager			0.286*** (0.069)							Manager			-0.206*** (0.039)						
Treat*Manager			0.058 (0.100)							Treat*Manager			0.136** (0.062)						
Tenure				-0.015*** (0.006)						Tenure				-0.024*** (0.004)					
Treat*Tenure				-0.006 (0.009)						Treat*Tenure				-0.002 (0.006)					
Commute					-0.089** (0.039)					Commute					-0.063** (0.027)				
Treat*Commute					0.008 (0.055)					Treat*Commute					0.037 (0.040)				
Female						-0.127** (0.061)				Female						0.020 (0.046)			
Treat*Female						0.064 (0.088)				Treat*Female						-0.049 (0.065)			
Children							-0.043 (0.061)			Children									-0.237*** (0.042)
Treat*Children							-0.151* (0.086)			Treat*Children									0.021 (0.061)
Messages								0.064** (0.025)		Messages									0.042** (0.019)
Treat*Messages								0.012 (0.035)		Treat*Messages									-0.027 (0.025)
Business Function									-0.067 (0.067)	Business Function									0.049 (0.046)
Treat*Business-F									0.023 (0.094)	Treat*Business-F									0.034 (0.065)
N	1507	1507	1507	1507	1507	1507	1507	1507	1507	N	1507	1507	1507	1507	1507	1507	1507	1507	1507

Notes: Age is measured in years, commute in hours, level from 1 (most junior) to 7 (most senior), team treated is a share from 0 to 1, and messages is messages per hour. All others are binary definitions. Data from August 9th to January 23rd for 1612 employees. Robust standard errors.

Appendix A6: US employees report the main benefits of being in the office is time with colleagues

What are the top 3 benefits of working on your employer's business premises?

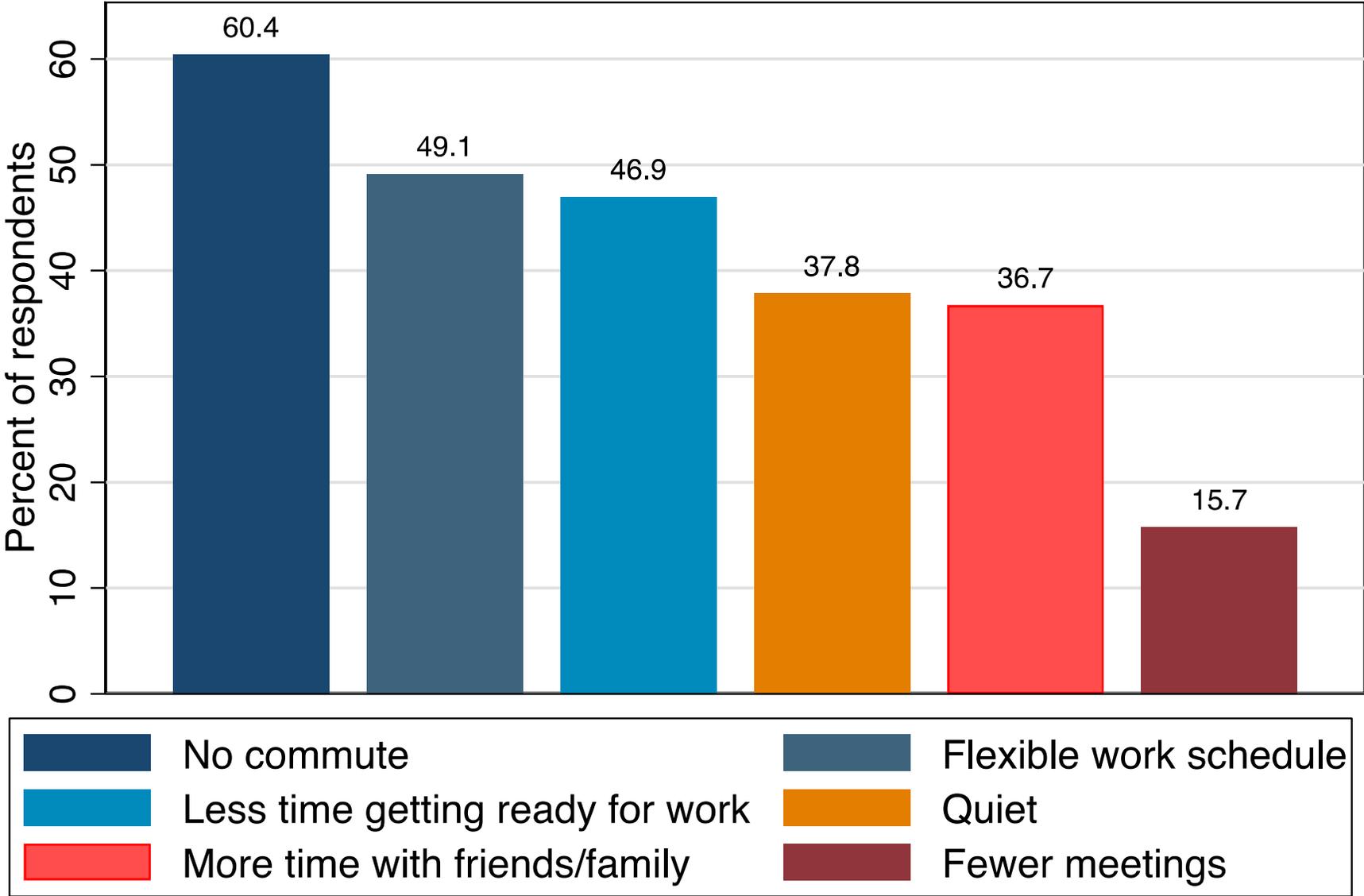


Notes: The sample includes respondents to the February 2022 SWAA who passed the attention check questions and worked from home at some point since the start of the COVID-19 pandemic. The SWAA samples US residents aged 20 to 64 who earned \$10,000 or more in 2019. **N = 2,973.**

Source www.wfhresearch.com

Appendix A7: US employees report the main benefits of WFH are reduced commute and more flexible work schedules

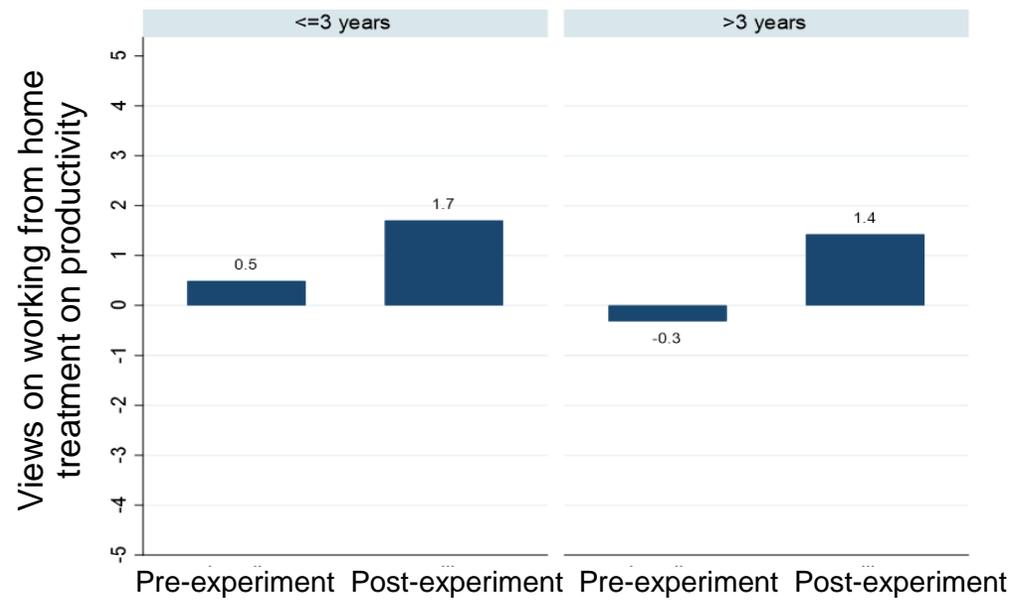
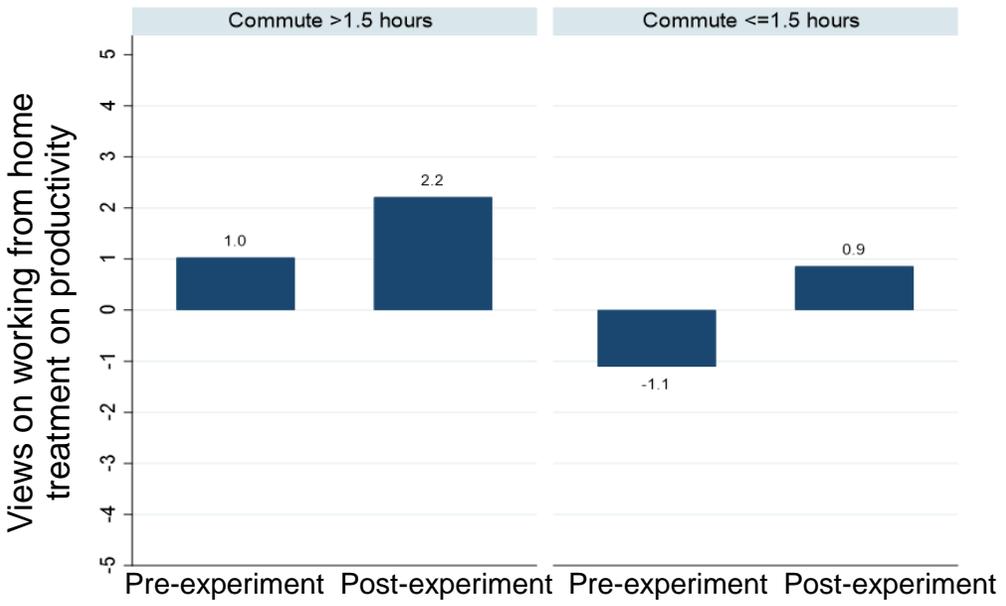
What are the top 3 benefits of working from home?



Notes: The sample includes respondents to the February 2022 SWAA who passed the attention check questions and worked from home at some point since the start of the COVID-19 pandemic. The SWAA samples US residents aged 20 to 64 who earned \$10,000 or more in 2019. **N = 2,973.**

Source www.wfhresearch.com

Appendix Figure A8: All types of employees – those with longer/shorter commutes, with less/more tenure, high/low performers and females/males - increased their productivity views on WFH



Notes: Sample from 1315 employees (463 volunteers, 852 non-v) on baseline, 1345 employees (446 volunteers, 899 non-v) on the endline.

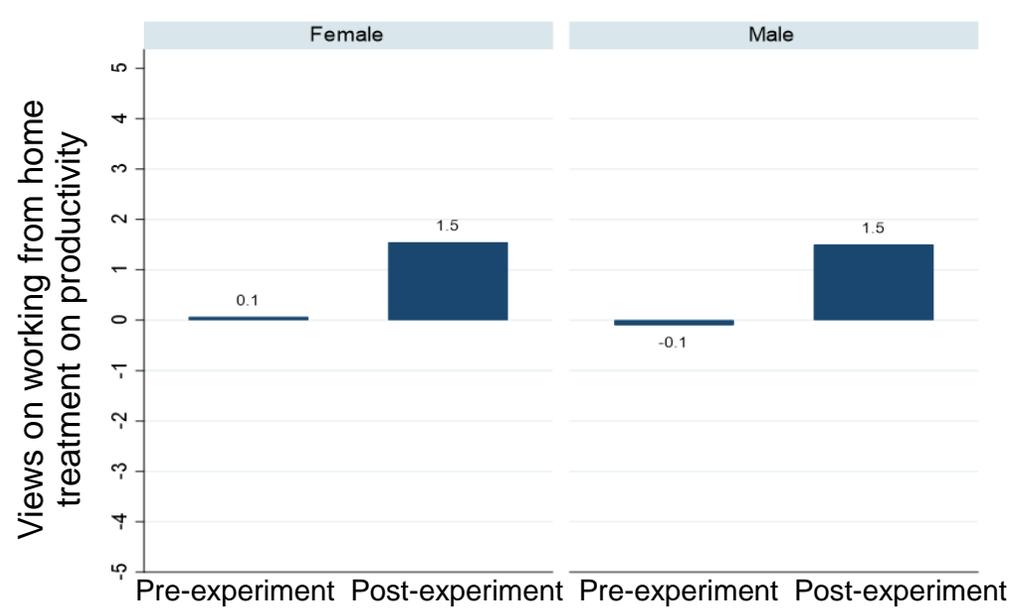
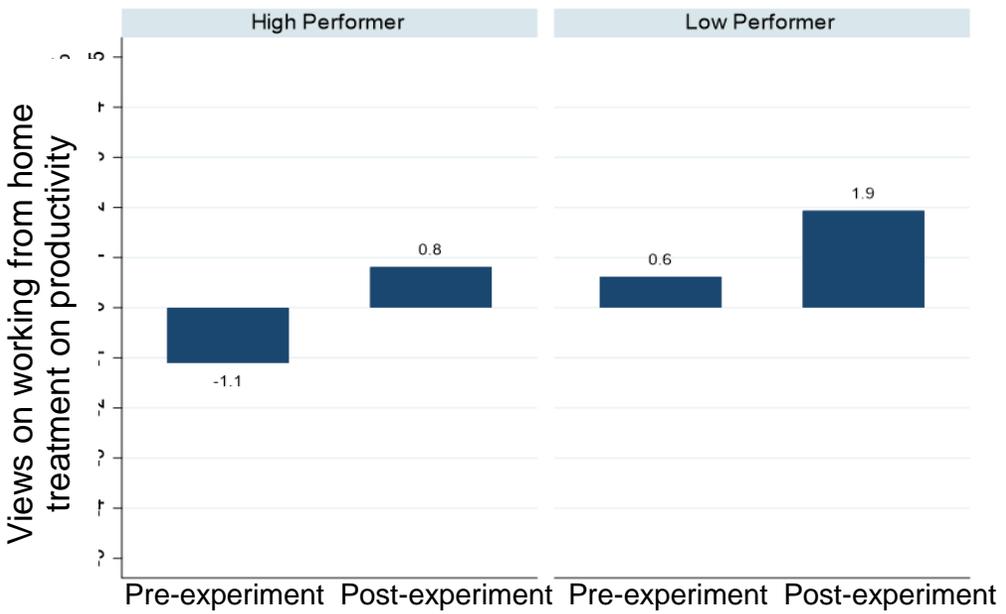


Table A9: Employees with a long-commute remained more positive on the productivity impacts of WFH, while managers went from negative to insignificant over the experiment

Dep Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Pre-experiment productivity expectation						Post-experiment productivity expectation							
Commute	0.015*** (0.004)						0.013*** (0.004)	0.010*** (0.003)						0.011*** (0.003)
Manager		-0.033*** (0.008)					-0.038*** (0.009)		-0.006 (0.006)					-0.007 (0.008)
Female			0.002 (0.006)				0.001 (0.006)			0.001 (0.005)				0.002 (0.006)
Age				0.000 (0.001)			0.000 (0.001)				-0.000 (0.000)			-0.001 (0.001)
Level					-0.005 (0.003)		0.003 (0.004)					-0.001 (0.002)		0.002 (0.003)
Children						0.001 (0.006)	0.001 (0.007)						0.003 (0.005)	0.004 (0.006)
_cons	-0.025*** (0.007)	0.007** (0.003)	0.001 (0.004)	-0.001 (0.007)	0.021 (0.014)	-0.001 (0.004)	-0.031* (0.016)	-0.002 (0.006)	0.016*** (0.003)	0.016*** (0.004)	0.018*** (0.006)	0.017* (0.010)	0.014*** (0.004)	-0.003 (0.012)
<i>N</i>	1315	1315	1315	1315	1315	1315	1315	1345	1345	1345	1345	1345	1345	1345

Notes: Sample from 1315 employees (463 volunteers, 852 non-v) on baseline, 1345 employees (446 volunteers, 899 non-v) on the endline. Commute is measured in hours and children is a 1/0 variable denoting the presence of children. Robust standard errors.

Table A10: Job satisfaction survey measures improved for treatment employees

	(1)	(2)	(3)	(4)	(5)
	Recommend to friends	Work satisfaction	Life satisfy satisfaction	Work-life balance	expected attrition
Treat	0.352*** (0.0988)	0.351*** (0.0841)	0.352*** (0.0972)	0.538*** (0.111)	-0.0241*** (0.00907)
_cons	7.994*** (0.0733)	7.835*** (0.0619)	7.462*** (0.0697)	6.946*** (0.0801)	-0.107*** (0.00642)
<i>N</i>	1345	1345	1345	1345	1345

Notes: Sample from 1345 employees (446 volunteers, 899 non-volunteers) in the endline survey. Values range from 0 (lowest) to 10 (highest). For example, “recommend to friends” ranges from “Definitely no” at 0 to “Definitely yes” at 10. Robust standard errors.

Table A11: Performance review text did not appear to change for treatment employees

Self assessment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	develop_ss	lead_ss	new_ss	learn_ss	excu_ss	communicate_ss	risk_ss	project_ss	effi_ss	account_ss
treat	0.000510	-0.0415	-0.0209	-0.00587	-0.00158	-0.0141	0.0304	0.00454	0.0142	-0.150
	(0.0394)	(0.0374)	(0.0445)	(0.0412)	(0.0291)	(0.117)	(0.0384)	(0.0588)	(0.0277)	(0.101)
_cons	3.952***	4.008***	3.998***	3.890***	3.970***	4.070***	3.915***	3.984***	4.041***	4.117***
	(0.0187)	(0.0187)	(0.0224)	(0.0208)	(0.0139)	(0.0721)	(0.0198)	(0.0289)	(0.0141)	(0.0406)
N	864	619	426	656	1384	102	698	596	1790	184

Manger assessment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	develop_bs	lead_bs	new_bs	learn_bs	excu_bs	communicate_bs	risk_bs	project_bs	effi_bs	account_bs
treat	0.0255	-0.0281	-0.0449	0.0135	-0.0231	0.0954	-0.0221	0.0928	-0.0270	-0.115
	(0.0337)	(0.0494)	(0.0421)	(0.0352)	(0.0296)	(0.0888)	(0.0310)	(0.0710)	(0.0275)	(0.0743)
_cons	3.665***	3.699***	3.768***	3.731***	3.705***	3.745***	3.729***	3.594***	3.816***	3.743***
	(0.0160)	(0.0246)	(0.0212)	(0.0178)	(0.0142)	(0.0548)	(0.0160)	(0.0349)	(0.0140)	(0.0299)
N	864	619	426	656	1384	102	698	596	1790	184

Notes Dependent variable is the score for employees 2021H2 assessment in the categories of “Development”, “Leadership”, “Innovation”, “Learning”, “Execution”, “Communication”, “Risk taking”, “Project management”, “Efficiency” and “Accountability”. Depending on their roles employees are assessed in a number of areas, so for example in column (1) the N=864 means 864 employees were assessed on a 1 to 5 scale on “Development”. Standard errors clustered by individual. Robust standard errors.