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Remote Work and Compensation Inequality*

Gianni De Fraja[1,6], Jesse Matheson[2], Paul Mizen[3], James Rockey[4], Shivani Taneja[5], and Gregory Thwaites[1]

[1]School of Economics, University of Nottingham
[2]Department of Economics, University of Sheffield
[3]King's College London
[4]Department of Economics, University of Birmingham
[5]Department of Economics, University of Kent
[6]C.E.P.R, London

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Abstract

This paper examines how the rise of working-from-home (WFH) affects compensation inequality. Using a novel survey, we find that the option to WFH is highly valued by workers (worth 8% of wages) but concentrated among higher earners, suggesting increased inequality. However, using a simple model where WFH and in-person workers are complements, we show that increased WFH leads to lower wages for WFH workers, potentially offsetting the benefits of WFH. Empirically, workers in WFH-capable occupations experienced 2–7% lower wage growth post-pandemic, consistent with the theory. Overall, we find no change in inequality but a substantial increase in compensation.

Keywords: Remote working, Work-from-home, Inequality, Compensation, Pandemic, Perks

JEL Classifications: R12, J01, H12.

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1 Introduction

This paper argues that remote work (RW hereafter) may increase welfare without increasing inequality. This is important since in recent years there has been a rapid shift to RW in many countries, a shift that has proven persistent (Barrero et al., 2021a; Aksoy et al., 2022). But not all jobs can be done remotely. Lund et al. (2020) observe that "the potential for remote work is highly concentrated among highly skilled, highly educated workers in a handful of industries, occupations, and geographies". Likewise Dingel and Neiman (2020) note that "these jobs typically pay more than jobs that cannot be done at home and account for 46 percent of all US wages." This seems to suggest an increase in inequality connected with RW. As we show, many workers value the opportunity to RW, and thus for these workers being able to do so is a valuable perk. As these workers tend to be better off to begin with, other things equal, RW has the potential to raise the effective compensation for those who have the opportunity and create a new source of inequality.[1] The contribution of this paper is to show this is not the case.

The reason why inequality does not rise with RW is due to our full *general equilibrium* approach to the analysis of the effects of RW on compensation inequality. In a partial equilibrium approach, RW has the potential to exacerbate labor market inequalities as better paid and better educated employees are more likely to be in occupations amenable to RW (Dingel and Neiman, 2020; Adams-Prassl et al., 2020; Sostero et al., 2020; Bonacini et al., 2021; Stantcheva, 2022). The non-pecuniary direct benefit to those who can RW is likely to be strengthened if, as shown by preliminary work (Barrero et al., 2021a), RW lowers employers' costs and, to the extent that this is shared with employees, leads to a wage premium for those who RW. On the other hand, RW, among

[1]Bonacini et al. (2021) forecast an increase in inequality based on an analysis of RW in Italy in 2018 in which they assume *randomization* into RW conditional on observables. They ignore any general-equilibrium effects and any non-pecuniary value of RW to workers, which play a central role in our paper.

other benefits, also reduces employees' costs allowing employers to hold down wages (Barrero et al., 2022). The ubiquity and far-reaching consequences of RW necessitate studying its effects in a general equilibrium set-up, to fully account for its indirect effects on the markets which are not directly affected by it.[2]

Using a bespoke survey for the UK,[3] we characterize 1) who can work from home, 2) who wants to do so, and 3) how much they value it. To show how the complementarities between remote and in-person work can be taken into account, we construct a simple general equilibrium model, with standard assumptions such as a Cobb-Douglas production function, increasing labor supply functions, competitive labor and product markets, and workers' utility functions which are concave in income and increasing in the proportion of time spent working remotely. Using this model, we show that, if there are two groups of workers, with different RW ability consistent with the facts described by Lund et al. (2020) and Dingel and Neiman (2020), wages for remote workers may be lowered by RW partially offsetting the utility gain from the RW perk. At the same time, due to complementarities, the lower costs for firms also increases the demand for jobs that cannot be done remotely: but these workers cannot be compensated by the benefit of allowing them to RW, and so they must be paid more.[4] While the model's

[2]Our conceptual analysis intentionally abstracts from the role of productivity changes due to RW. The relationship between productivity and RW is nuanced and context dependent. On the one hand, Bloom et al. (2015) find evidence of small productivity increase and a larger output increase among travel-agents. On the other, Gibbs et al. (2021) and Emanuel and Harrington (forthcoming) both uncover declines in productivity when office workers switch to RW. Given the current lack of a strong empirical consensus on the role of productivity, we remain agnostic in our conceptual analysis. However, our quantification uses actual changes in wages, which should also reflect changes in productivity.

[3]We draw on the Survey of Working Arrangements and Attitudes (SWAA-UK) part of the international suite of surveys that explore RW. See www.WFHresearch.com

[4]We do not extend our general equilibrium model to include location decisions, another potential benefit for RW, who can choose cheaper locations to live. In an important recent paper Davis et al. (2024) develop and simulate a quantitative model which, *inter alia* predicts an increase in labor market inequality due to a productivity benefit for skilled workers of RW arising from complementarity between RW and non-RW work and a subsequent increase in the demand for housing. Our approach to this problem has some fundamental differences. In terms of methodology, our model is a simple conceptual model from which we can obtain closed-form solutions and which we can use to illustrate the potential for RW to affect wages in a way that is not immediately obvious. The mechanisms in our model are also different. We allow for the fact that RW is a benefit to many workers but may come at a cost to many firms (e.g. monitoring costs, productivity losses.) In this scenario, we expect a reduction in wages for high-skilled workers in exchange for the opportunity to RW.

prediction of reduced wages for those who can RW is unambiguous, the overall effect on inequality will in general depend on the relative labor supply elasticities, on the proportional increase in utility and the initial position of the two groups on the income distribution.

Returning to the data, we use the UK Labour Force Survey (LFS) and SWAA-UK, to evaluate how the rise in RW since 2020 has affected compensation inequality.[5] Our approach requires that we calculate a) the valuation to workers of the option to RW; b) the proportion of workers who benefit from a RW option across the income/wage distribution using the SWAA-UK; c) and changes in wages using the LFS. This allows us to compute the wage benefit to RW, accounting for the fact that preference heterogeneity is likely correlated with occupation choice.

To analyze changes in wages, we employ a difference-in-differences (DD) framework. Specifically, we estimate the parameters of a model where the dependent variable is log-wages. The key independent variables are remote working status interacted with a post-pandemic indicator variable. To address potential endogeneity concerns, we also implement an instrumental variables (IV) strategy. In this approach, we instrument for reported remote working status using an index of occupational amenability to remote work, also interacted with the post-pandemic indicator variable. Both regressions indicate that workers in RW jobs experienced a post-pandemic wage growth between 2 and 7% less than those in other occupations. This is consistent with a significant RW wage penalty.

To aggregate these results we compute Gini coefficients for the UK in 2019 and 2023 adding to remote workers' pay their self-reported value of RW. Our headline figure is that inequality has remained unchanged across the labor force relative to pre-pandemic levels. Our decomposition analysis shows that this reflects the balance of the rise of

[5]The LFS survey contains more than 200,000 working respondents between April 2017 and December 2023, and provides information on remote working status, wages, type of employment, and a number of demographic and employment characteristics.

RW as a benefit and lower wage growth in RW-occupations. More precisely, we find the benefit of RW is equivalent to around 4% of total earnings, skewed towards jobs which can be done remotely, which tend to be higher paying. However, differences in wage growth are sufficiently large to offset the increase in inequality arising from the direct benefit of RW so that in the aggregate there is no net change in inequality.[6]

This paper expands on the literature looking at income and compensation inequalities (Chung, 2003).[7] We think of RW as a tangible employment benefit as described by respondents to our survey: the average respondent to our survey is willing to sacrifice 8.2% of their wages for the option to RW two to three days per week.[8] Our innovation, relative to most of the literature that appeared in response to the 2020 imposition of RW in many countries, is our general equilibrium approach.

The remainder of this paper is structured as follows. Section 2 describes our data and presents three stylized facts about who can and who wants to work from home. Section 3 presents the model, Section 4 tests its predictions in terms of relative wages, Section 5 quantifies the wage-equivalent increase in welfare, and how this is distributed across different workers and groups. Section 6 closes the paper with a brief conclusion.

2 Stylized Facts

This study draws information from two data sources. First, our implementation for the UK of the Survey of Working Arrangements and Attitudes, which we refer to as SWAA-UK, part of the suite run in the US Barrero et al. (2021a) and internationally

[6]It is important to note that we focus solely on inequality among workers. A separate strand of the literature has emphasized the unequal impacts of shelter-in-place orders on those that can and cannot work remotely (Adams-Prassl et al., 2020; Statistics Canada, 2020). Palomino et al. (2020) compute the potential increase in inequality and poverty due to wage losses for those unable to work during lockdowns.

[7]A related but separate issue is how at below cost government provision of services such as health care affects inequality (Kaestner and Lubotsky, 2016).

[8]This is consistent with findings reported in Barrero et al. (2021a) that workers would accept a pay cut of 7% for the option to WFH two or three days a week. Likewise, it is consistent with the results of Bagga et al. (2023) who develop and calibrate an on-the-job search model of the labor market in which jobs differ in wages and amenities, and find an average compensating wage differential of around 6%, which they interpret as the value of RW.

Aksoy et al. (2022). These data are a repeated cross-section conducted monthly from January 2021 to December 2023, with around 2,500 respondents per wave. From SWAA-UK, as well as demographic and employment information, we take three variables: Q1: respondents' employers' plans for RW as a percentage of a five-day week; Q2: how much respondents would like to RW as a percentage; and Q3: how much, as a percentage of their salary, they (would) value it. These data are matched to LFS data collected by the UK Office for National Statistics, which is a long-running representative labor force survey. Full details of the data and how we handle them are provided in Appendix A.

Analysis of Q1-Q3 provides three preliminary stylized facts about RW in the UK. The first is that the increase in RW is permanent and, for those that could RW, accounted for around 50% of working days at the end of our sample.[9] This stylized fact is consistent with findings from other surveys in the UK (Hendry et al., 2023) and the US (Barrero et al., 2023, 2021b). Figure A1 presents time-series evidence suggesting that this average has been stable since the end of the pandemic (during the last year of our sample) and has been converging with employers' plans, although a wedge exists between the two.

The second stylized fact is that employees' and their employers' preference for working remotely are positively correlated: a simple bivariate regression of employers' plans for RW on employees' preferences yields a coefficient of 0.59 with standard error 0.007 ($p < 0.00001$). This is observed across industries, but consistently we find that employees prefer to work remotely more days than their employers are planning for them to do so (for details see Figure A2 in the online appendix).

Our third stylized fact is that RW benefits are higher among advantaged groups. We establish this in two ways. First, OLS and IV regressions suggest that those in better paying jobs and with more education are more able to RW (and those with

[9]We define those that can RW as workers in occupations for which the Dingel and Neiman (2020) index is greater than or equal to 0.85.

longer commutes living in better housing in the suburbs are more willing and able to do so).RW is also higher among the young and male workers. Second, estimating equivalent regressions for Q3, the valuation placed on RW, on average equivalent to 8.2% of income, suggests that women, younger, better paid, and better educated workers as well as those with more demanding commutes, are more willing to pay to RW.

It follows that the ability to RW is unequally distributed, and so is the extent to which individuals value it. The distribution of this benefit is a function of both the distribution of who is able to RW and the distribution of who values it. To obtain this distribution we use Q1-Q3 to compute the income equivalent of this benefit. Recall that Q3 above provides information on workers' valuation of RW, specifically the percentage of their salary equivalent to the (possibly negative) subjective value of having the option to work remotely for 2-3 days per week.[10] From this we can determine the monetary equivalent of workers' total compensation: if w_i is a worker i's salary, we posit that he/she attributes a monetary value $v_i w_i$ to working remotely 2.5 days (the midpoint between two and three days) per week. The actual value of her in-kind RW benefit depends of course on how much RW their employer is prepared to let them do. We calculate this, respondent i's *realized* value of RW as the fraction R_i of 2.5 days that i's employer plans to let i work remotely up to a maximum of 1.[11] Formally, denoting by v'_i worker i's monetary valuation of the in-kind benefit of her realized RW, we can write:

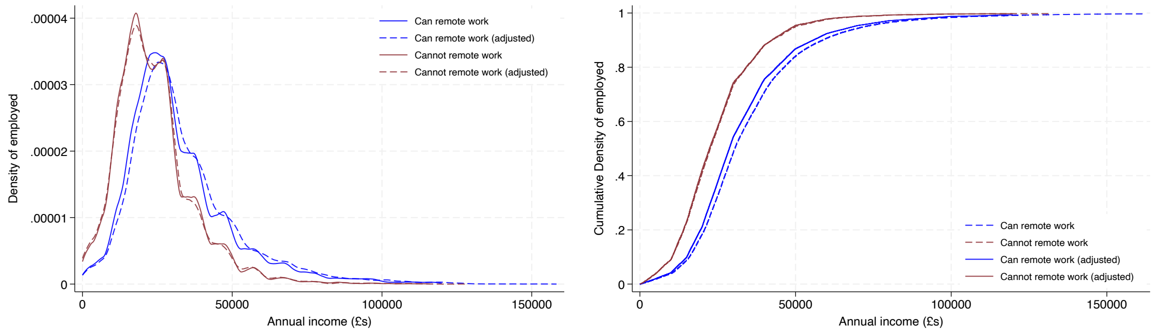
$$v'_i = v_i \times \frac{1}{2.5} \min(R_i, 2.5). \tag{1}$$

Given this, we can write the RW-adjusted income, y_i, as the sum of actual wages w_i

[10]Of course, the value of an option cannot normally be negative but in this context there are two possible explanations for negative valuations. First, it may be that, in the context of their employer, individuals do not regard an option as a genuine choice. Second, they may regard the option to work remotely as eliminating the commitment technology offered by the workplace following Clark (1994) who argued in the context of the British Industrial Revolution that workers effectively hired capitalists to make them work harder because they lacked the self-control to achieve higher earnings on their own.

[11]That is, we make the conservative assumption that i receives no additional benefit (or cost) for working remotely more than half of the week.

Figure 1: Income distribution before and after remote working benefit adjustment.



Note: Densities (left-hand side) and cumulative distributions (right-hand side) of incomes from employment and overall compensation, including the monetary valuation of realized RW. The solid curves are monetary payments only, the dashed curves include RW; the blue curves are those describing the workers who can RW, the red curve those who cannot. **Source:** Data are from the SWAA-UK

and the realized RW benefit, v_i':

$$y_i = w_i \left(1 + v_i'\right). \tag{2}$$

We use these derived values to look at the implications of including the benefit of RW into the overall compensation will on the compensation distribution in the economy (income plus RW benefits).

Next we show the effects of including the benefit of RW, as valued by individual workers, as part of overall compensation.

Figure 1 depicts the density and the cumulative distribution of compensation, with and without the RW benefit, for all waves of SWAA-UK.[12] Visual inspection suggest that those working remotely are paid more (both in average and in distribution) than those who cannot (the blue curves in the RHS panel first order stochastically dominates the corresponding red one). It also makes clear, that the compensation of those who can RW is more affected by the inclusion of the valuation of RW into their effective compensation. (The blue dashed lines are to the right of the blue solid lines, whereas

[12] We assign all workers in our data to one of the two groups based on their self-reported ability to RW.

the dashed red lines are essentially in the same position are the of the red solid lines.) We obtain the same pattern using data from the LFS as reported in figure A3 in the appendix.

A bivariate regression of the component of compensation due to RW v_i' on its monetary component w_i (using the same sample as for Table 1) returns a positive and statistically significant coefficient of 5.4 ($p \leq 0.001$), supporting the intuition that those who benefit most from RW are the best-paid workers.

Of course, the estimated effects in Figure 1 are naive in that wages are assumed to be unaffected by the change in RW. In the next section we present a conceptual framework to illustrate how wages might be affected in a general equilibrium.

3 Conceptual framework

The previous section suggests that the distribution of the *potential* benefits of the option to RW seem to point mostly to the workers who are already better off as the main beneficiaries of the convergence to a higher steady-state level of RW. A Pareto improvement which accrues mostly to the better-offs inevitably suggests an increase, *ceteris paribus*, in inequality (Schraepen and Petropoulos, 2021).

The *ceteris paribus* assumption of the above analysis by its nature cannot capture the full "general equilibrium" adjustment of a complex labor market to the "new normal" of a substantial proportion of work being done remotely. When the unit cost of one input changes, firms will want to change the *relative* use of all inputs: thus even in the extreme case where lower paid workers are completely unable to RW, their pay and employment may change as a consequence of some other workers' increased ability to work remotely.[13]

[13]In the short-period; we should expect that, over time as people change or enter jobs, the firm's willingness to allow its employees to work remote will become one of the dimension affecting the quality of the match, leading both to greater job search effort (Pissarides, 1994; Cahuc et al., 2006; Postel-Vinay and Robin, 2002), and to increased sorting of workers who can work remotely, further benefiting them.

To get to grips with this interdependence, we propose a basic model, with the key feature that only some workers can RW. We assume that workers' utility is given by

$$(a + \theta\lambda) U(w), \tag{3}$$

with $\theta \in [\underline{\theta}, \overline{\theta}] \subseteq [-1, 1]$, a parameter measuring the preference for remote work ($\theta\lambda$ is δ_{ij}^{RW} in (2)), and where wage is $w > 0$, and $\lambda > 0$ is the amount of time spent RW. The parameter a can be normalized away to 1. Thus, if a worker's θ is close to 0, then the worker cares very little where she works, and a negative (positive) θ indicates a dislike (a liking) for RW. This captures the trade-off between RW and pay, which corresponds to the survey evidence in the "willingness to pay" for RW question.

The economy is made up of a continuum of industries, indexed by a parameter α. In each industry α, a continuum of competitive firms produce their homogeneous output, which is sold in a competitive product market at unit price 1, each using the same Cobb-Douglas production function. They use only two types of inputs, type R labor and type P labor: type R labor executes tasks that can be done remotely, and type P involves tasks which require in person presence at the workplace.

The firm's cost, in addition to salary, is given by the location of work. Formally, the firm employs n_R and n_P type R and type P workers, pays them w_R and w_P, and asks them to RW fraction λ_R and λ_P of their time. Therefore, the firm's unit profit[14] is

$$\pi = n_R n_P - (w_R + \sigma_R \lambda_R) n_R - (w_P + \sigma_P \lambda_P) n_P, \tag{4}$$

where σ_R and σ_P the exogenously given extra cost of RW for type R and type P workers: in general $\sigma_R < \sigma_P$. We make the simplifying assumption that σ_i and θ_i are constant for all workers of the same type, $i = R, P$. While the survey data show that there is idiosyncratic variation in the workers' preferences, and so a more general model would

[14]The production technology has increasing returns to scale. This is to simplify the algebra and entails little loss of generality, as the increasing labor supply function prevents the firm to want to expand without limit.

assume a distribution of these parameters, these within-group differences play no role in the subsequent analysis.[15]

We capture heterogeneity among workers with their labor supply. Specifically, in each industry α, the two types of labor are supplied according to a standard increasing labor supply function. While not necessary, it helps to think of each worker i supplying n_i units of labor, and all workers in an industry having identical preferences, so that the supply function is given by $\alpha_i n_i$, for $i = R, P$.[16] In each industry a, firms employ workers up to the point where their profit is 0; the units n_i supplied by worker i ensure equality of marginal cost and marginal revenue.

Both the firms' products and the workers' skills are fixed: we study the short period where the number of workers in each industry is given.

3.1 The equilibrium

It is simple to determine the equilibrium: we begin by determining the solution to the firms' profit maximization problem. For definiteness, we consider a standard convenient utility function $U(c) = \frac{c^\beta}{\beta}$.

Proposition 1. *The optimization of the firm's profit implies the following relation between the salary paid to the two types of workers:*

$$\widehat{w}_R(w_P) = \frac{\theta_R w_P^{\beta+1}}{\beta(\beta+2)\sigma_R\alpha_P} + \frac{\beta}{\beta+2}\frac{\sigma_R}{\theta_R}, \tag{5}$$

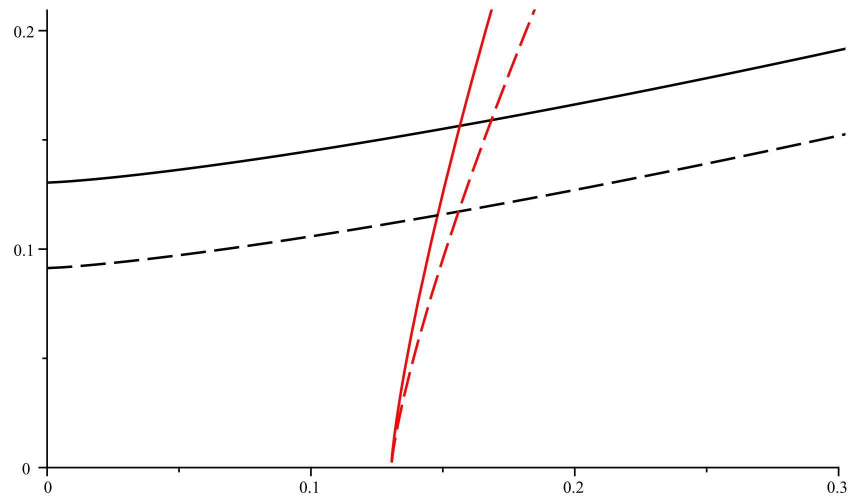
$$\widehat{w}_P(w_R) = \frac{\theta_P w_R^{\beta+1}}{\beta(\beta+2)\sigma_P\alpha_R} + \frac{\beta}{\beta+2}\frac{\sigma_P}{\theta_P}. \tag{6}$$

The proofs are straightforward algebraic manipulations and are relegated to the online appendix. The interpretation of (5) is the following: suppose that, for whatever reason, the firm is paying a salary w_P to the unskilled workers. Then $\widehat{w}_R(w_P)$ is the

[15] We also assume the parameters are positive. Allowing the parameter σ_i to take negative values would complicate the analysis with no benefit: our focus is on deviations following a small reduction of the firms' cost of RW starting from positive reference values.

[16] One can think of R workers being on average more skilled than P workers, but it is neither fully accurate, nor necessary to the internal logic of the model.

Figure 2: The profit maximizing choice of the firm.



Note: The "pseudo best reply function of the firm. The horizontal (vertical) axis measures the unskilled (skilled) workers' salary. The intersection of the solid (dashed) curve is the equilibrium prior to (following) a reduction of the cost of remote working for skilled workers.

best possible (that is profit maximizing) choice of w_R, the pay for skilled workers, given that the firm will then select the correspondingly optimal rates of remote working and the correspondingly optimal levels of employment for both types of workers. So in order for full profit maximization both (5) and (6) must hold. We define "pseudo" best reply functions since we can imagine a game with two players, both of whose payoff is the firm's profit: one player chooses the salary for the skilled workers, the other the salary for the unskilled ones. The expressions (5) and (6) can be analyzed graphically: their intersection is a point where the firm's three pairs of variables, $w_R, \lambda_R, n_R, w_P, \lambda_P, n_P$, jointly maximize its profit.

The best way to aid intuitive understanding of the effect of small comparative statics changes in exogenous parameters is a simple graphical analysis. For definiteness, we consider a standard convenient utility function $U(c) = \frac{c^{\beta}}{\beta}$. Figure 2 plots the loci of points on a (w_P, w_R) which satisfy (5), the black solid curve and (6), the red curve.[17].

[17]Note that $\frac{\partial \widehat{w}_s(w_u)}{\partial w_u} = \frac{(2-\rho)w_u^{1-\rho}}{\beta_u \alpha_u (1-\rho)(3-\rho)} > 0$, and $\frac{\partial^2 \widehat{w}_s(w_u)}{\partial w_u^2} = \frac{(2-\rho)w_u^{-\rho}}{\beta_u \alpha_u (3-\rho)} > 0$ and so the locus is increasing and convex. Its intercept is positive, as depicted. Conversely, for (6)

While total differentiation of (5) and (6) yields comparative statics results in a straightforward manner, the focus of the paper is on the effects of particular changes in the cost of remote working, changes moreover which are stronger for skilled workers than for unskilled workers. We consider the case where the only change is a decrease in the cost of remote working for skilled workers, formally a reduction in σ_R, with everything else remaining constant. We do so in the next proposition.

Proposition 2. *The effect on salaries of small changes in σ_R, the skilled workers' cost of remote working, is given by*[18]

$$\frac{\mathrm{d}w_R}{\mathrm{d}\sigma_R} = \frac{1}{\Delta}\left(\frac{\beta}{\beta+2} + \frac{\theta_R^3\left(1+\beta\right)w_R^{1+2\beta}}{\sigma_R^3\alpha_R^2\beta^2\left(\beta+2\right)^2}\right), \tag{7}$$

$$\frac{\mathrm{d}w_P}{\mathrm{d}\sigma_R} = -\frac{1}{\Delta}\left(\frac{\theta_R^2 w_R^{1+\beta}}{\sigma_R^2\alpha_R\beta\left(\beta+2\right)} + \frac{\theta_R\left(1+\beta\right)w_P^{\beta}}{\sigma_P\alpha_P\left(\beta+2\right)^2}\right). \tag{8}$$

From the observation that, in both expressions, the term in the brackets is positive (provided $\theta_R, \theta_P > 0$), the conclusion follows that a decrease in the cost of remote working for skilled workers leads to a *decrease* in the salary of skilled workers and to an *increase* in the salary of unskilled workers. Of course part of the compensation for skilled workers, comes in the in-kind benefit of RW. The model only aims at providing an example of possibly counterintuitive results. With the aim of highlighting a simple instance of this possibility, consider therefore the case where there are three industries, and where the parameters describing the simple economy are given initially by, $\sigma_P = 5.9$, $\sigma_R = 2.2$, $\theta_P = \theta_R = 0.5$, $\beta = 0.3$, and in the three industries considered $\alpha_p = \{1, 1.01, 1.02\}$ and $\alpha_R = \{3, 3.0667, 3.1333\}$. The Gini coefficient for the income distribution is 0.496, that for the utility distribution 0.3. The lower value of the Gini coefficient for utility is a natural consequence of decreasing marginal utility: utility levels are much less dispersed than incomes. If the cost of RW falls to a lower value of 2.18 (a

[18] Δ is the Jacobian of the function given by (5) and (6) evaluated at their intersection, $\Delta = 1 - \frac{\theta_R\theta\sigma_P(1+\beta)^2 w_R^{\beta} w_P^{\beta}}{\sigma_R\alpha_R\sigma_P\alpha_P^2\beta^2(\beta+2)^2}$. For the second order conditions to be satisfied, we require that, at the equilibrium, $\Delta < 0$.

1% decrease), then the Gini coefficients both fall to 0.462, and 0.285, respectively.

4 Remote Working and Wage Growth

We now test the prediction that RW is associated with a reduction in wages, and establish the magnitude of this reduction. Given nominal wages normally increase over time, and labor market frictions, we expect the reduction in wages predicted by the model, to manifest as lower wage growth rather than an absolute decline. To do so, we employ two different estimation strategies that compare the labor market before and after the pandemic and the rise of RW.

The first is a DD approach, which compares the wage growth of workers who can RW to those who cannot before and after the pandemic. The key treatment here is the unlocking of RW for those workers in jobs that can be done remotely, but not for those workers in jobs that cannot be done remotely. The second is an instrumental variable (IV) approach, with the Dingel and Neiman (2020) index as instrument for the ability to RW.

The data are taken from waves of the LFS, and covers the periods January 2018 to December 2019, and September 2021 to December 2023.[19]

The first set of estimates (Table 1, columns (1)–(3)) are based on the following regression:

$$w_{it} = \beta_0 + \beta_1 RW_{it} + \beta_2 PP_t + \beta_3 RW_{it} \times PP_t + \beta_4 OCC_i + \beta_5 X_{it} + e_{it}, \tag{9}$$

where w_{it} is the log of hourly wage for an individual i surveyed at time t. RW_{it} is a dummy variable equal to 1 if i reports *normally work from home*, and 0 otherwise. PP_t is a post-pandemic dummy variable equal to 1 if the year is 2020 or later and 0 otherwise, OCC_i is a vector of occupation dummies, and X_{it} is a vector of characteristics for individual i. e_{it} reflects all unobserved factors which cause w_{it} to vary.

[19]Note that during January 2020 to August 2021, the LFS working from home question on which we focus was changed, so we exclude this period.

For the coefficient of interest, β_3, to be attributable to RW, it must be the case that there are no unobserved factors which, for a given occupation, change both RW behavior in the labor market and wages between 2019 and 2021.

Estimates of the regression in (9) are reported in columns (1)-(4) of Table 1. Column (1) includes sex $\times$ age and occupation dummies only, and thus β_2 is identified. The estimate suggests that, as expected, there has been nominal wage growth for all workers post-pandemic of around just under 16%. However, the estimates of β_3 suggest that the growth of remote workers between the pre- and post-pandemic period, has been around 2% lower. Column (2) reports our preferred specification: in it we additionally control for full-time status, industry, region, and survey wave. The estimate of β_3 is only slightly larger and more precisely estimated. Columns (3) and (4) report separate regressions for men and women. These estimates are, as might be expected, less precise, but estimated coefficients are unchanged suggesting the effects have been similar for men and women.

Table 1: Wage Growth and Remote Work

	(1) All	(2) All	(3) Men	(4) Women	(5) All	(6) Men	(7) Women
Post-pandemic	0.147^{***}						
	(0.00533)						
Post-pandemic $\times$ RW	-0.0204^{**}	-0.0224^{***}	-0.0213^{*}	-0.0200^{*}			
	(0.00868)	(0.00841)	(0.0112)	(0.0119)			
RW					-0.0723^{**}	-0.0633^{*}	-0.0715
					(0.0290)	(0.0338)	(0.0458)
First Stage					.311	.34	.28
Observations	213,145	212,698	99,141	113,551	212,468	99,037	113,426
Clusters	369	369	369	350	369	369	350
R^2	0.0232	0.0001	0.0001	0.0001			
Estimator	OLS	OLS	OLS	OLS	IV	IV	IV

Note: Additional controls include: gender-specific dummies for each respondent's age and occupation as well as, in columns (2)-(7), dummies for full-time status, industry of employment, region, and survey wave. First Stage refers to the coefficient on the excluded instrument in the first-stage of the 2SLS regressions. Regressions weighted using LFS population weights. Standard errors (in parentheses) are clustered by Occupation. LFS waves included are April 2017 to December 2019 (pre-pandemic) and September 2021 to December 2023 (post-pandemic) Significance levels are: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

If reported RW and wage growth both reflect to some degree the unobserved individual characteristics such as drive and ambition, then our identifying assumption will be violated. In columns (5)–(7) of Table 1 we report the results of an instrumental variable regression designed to address this concern:

$$w_{it} = \alpha_0 + \alpha_1 RW_{it} + \alpha_4 OCC_i + \alpha_5 X_{it} + u_{it}. \tag{10}$$

In the first stage, the reported working from home, RW_{it}, is regressed on the interaction of the Dingel and Neiman 4-digit work from home index, DN_i, and the post-pandemic dummy:

$$RW_{it} = \gamma_0 + \gamma_1 PP_t \times DN_i + \gamma_4 OCC_i + \gamma_5 X_{it} + v_{it}. \tag{11}$$

For this to be a valid instrumental variable strategy it must be assumed that characteristics of each occupation which determine how amenable the job is to working from home only affect the post-pandemic wage change through actual working from home. Given we control for occupation, industry, survey wave, and region, as well as sex specific age dummies, this assumption is plausible. It is hard to imagine what other factor would have led to reduced wage growth in occupations as diverse as call-centres and computer programming but not in manufacturing or medicine. In particular, the UK labor market has witnessed fewer other changes, compared to the US where Autor et al. (2023) show there has been rapid growth in the wages of those on lower incomes in both real terms and relative to those on higher incomes post-pandemic. They attribute this increased labor market competition and consequent reductions in pay differences between similar jobs. In the UK, there has not been the same compression (Cominetti et al., 2022).

The IV estimates are larger than our DD estimates and indicate that post-pandemic remote workers see a 7.5% wage decrease overall. The decreases for men and women are similar at 6.1%, and 6.9% respectively, although the latter is not statistically significant.

5 Effects on inequality

The Gini coefficient of a population can be decomposed to obtain the contribution of different sources of variation e.g. income to overall inequality (Lerman and Yitzhaki, 1985). For example, these sources could be income from employment, self-employment, property, financial assets, and so on. The same decomposition can be applied in our case to the inequality of the monetary component of pay and the inequality of the monetary value of RW to understand the sources of inequality in overall compensation. We define G as the Gini coefficient of overall compensation:

$$G = \sum_{k=1}^{K} S_k G_k R_k = S_w G_w R_w + S_{wv'} G_{wv} R_{wv}, \tag{12}$$

where R_k is the correlation between the k-th component of compensation and the total compensation, G_k is the Gini coefficient of the k-th component of compensation, and S_k is the share of the k-th component of compensation in total compensation. Here, there are only two components, pay and the monetary value of RW.

Panel A of Table 2 reports resulting decomposition of inequality in total compensation y_i into its constituent components, the wage income w_i and the in-kind RW benefit $w_i v_i'$ as defined in (1) and (2).

The first two rows of panel A report the results for 2019, pre-pandemic, and the next two rows report for 2023, post-pandemic. We can see that in 2019, when RW was comparatively uncommon it only accounted for around 0.5% of total compensation (row 2, panel A). By 2023, this had increased eightfold to around 4% (fourth row in panel A). However, comparison of the total Gini coefficients for each period in column (4) suggests a remarkably small change in the Gini coefficient of 0.009 or 2.7% of its 2019 level. This reflects the fact that inequality in w_i fell by around 0.8 over the period, and this more than offsets the increase in inequality of $w_i v_i'$ because of its greater share in overall compensation.

We find equivalent results if we make alternative assumptions about the rise in RW.

Table 2: Gini decomposition results

		S_k	G_k	R_k	Total
		Panel A: $v_i' w_i$			
2019	w_i	0.9947	0.3140	0.9996	0.3157
	$v_i' w_i$	0.0053	0.9802	0.6622	
2023	w_i	0.9580	0.3008	0.9987	0.3071
	$v_i' w_i$	0.0420	0.5894	0.7795	
		Panel B: $v_i^{\dagger} w_i$			
2019	w_i	1	0.3140	1	0.3140
	$v_i' w_i$	0			
2023	w_i	0.9580	0.3008	0.9987	0.3071
	$v_i' w_i$	0.0420	0.5894	0.7795	
		Panel C: $\tilde{v} w_i$			
2019	w_i	0.9944	0.3140	0.9996	0.3157
	$v w_i$	0.0056	0.9861	0.6367	
2023	w_i	0.9142	0.3008	0.9939	0.3074
	$v w_i$	0.0362	0.6348	0.7733	

Note: The table reports the decomposition of the Gini coefficients of total compensation, defined as income plus the in-kind benefit of RW, for 2019 and 2023, obtained using the method from Lerman and Yitzhaki (1985). S_k is the share of each source of compensation in the total. G_k is the Gini coefficient of that source, and R_k is the correlation of that source with the overall Gini coefficient. v_i' is as defined in Equation (1). $v_i^{\dagger}$ assumes that the benefit of RW was 0 pre-pandemic. $\tilde{v}$ fixes the number of days RW as 2 for all those able to RW. Data are SWAA-UK with LFS weights as in Table 1.

First, in Panel B, we use instead $v_i^{\dagger} w_i$ which is 0 by assumption in 2019 and equal to $w' v_i$ in 2023. That is, here we are assuming that any benefit of RW pre-pandemic (2019) was either 0 or already factored into wages. This increases the potential changes to wages, but, because $w_i v_i'$ was already small in 2019, the impact is in fact minor: the small decline in inequality we found before is now even smaller at 2.2%.

As a second robustness test, in Panel C, we repeat our analysis holding constant the number of days RW at two days per week. That is, we replace the reported R in $\frac{1}{2.5}\min(R, 2.5)$ in (1) with a fixed value of $R = 2$ for all those who are able to RW. We denote this alternative measure, where by assumption everyone who RW does it the same two days a week, instead of using expected amounts, by $\tilde{v} w_i$ where

$\tilde{v}_i = v_i \times \frac{2}{2.5} = v_i \times 0.8$. The share of RW in overall compensation is now slightly smaller at 0.036, implying that those who value being able to RW most are more likely to be able to do so, or equivalently that those who dislike RW are less likely to have to do so, but that this correlation is weak. There is no meaningful impact on the total Gini coefficient in either period. In passing, we note that the similarity of these results to those in Panels A and B suggests that our results are not driven by workers' misperceptions of their employers' plans for RW.

To ensure that our results are not due to the sample characteristics of SWAA_UK we check that the extent of income inequality for our survey data is consistent with inequality found in other nationally representative datasets such as LFS. We construct a sub-sample of the LFS analogous to the sample in our data as described in Section 2. The Gini coefficient in the QLFS subsample is 0.33, compared to 0.32 in our data. We regard this difference as small given differences in survey questions and survey methodologies.

Taken together, these results suggest that, while the increase in the in-kind benefit of RW following the pandemic represents an *increase in overall compensation* of around 4%, it has been accompanied by at most a *negligible increase in overall inequality*. Our analysis suggests this follows from the coincident decline in wage inequality offsetting the increase in inequality due to the benefits associated with RW.

6 Conclusion

To date, all the available evidence suggests that widespread RW is here to stay (Barrero et al., 2021a; Aksoy et al., 2022). As we show in this paper, using a new survey dataset, for many of those who are able to, RW represents a substantial in-kind benefit, similar in nature to the use of a company car or workplace child care. Moreover, this perk is unequally distributed: some people do jobs that can be done remotely, others do not. In addition, we show that there is substantial variation in the valuation of this in-kind benefit among those who can work remotely. For these reasons, RW is a potential influence on labor market inequality.

Our analysis suggests that, in the UK, this potential did not translate into reality: inequality in compensation, properly adjusted to account for the in-kind benefit of RW available to some workers, did not increase with the massive increase in RW. At first glance, this appears counterintuitive: workers with the option to RW are better-off to begin with, and they receive an additional benefit. The inference that giving more to those who already have more must increase inequality is correct only in a partial equilibrium perspective, the one taken by the majority of previous studies. Our conceptual framework follows the entire chain of general equilibrium effects, and shows that the rise of RW determines an unambiguous fall in the wages of those who can RW, which, due to complementarities between remote and non-remote work which increases the demand for "in-person" workers, is accompanied by an increase in wage for the latter, those who cannot RW.

In the new equilibrium, following an exogenous shock which reduces the cost of RW for the workers who can RW, demand for both types of workers is higher, and, given increasing supply of labor, compensation is also higher for both types. For those who can RW, this increase in compensation is achieved by reducing their pay by less than the value of the increased in-kind benefit constituted by RW; for those who cannot RW, the entire increase in compensation is wholly in the form of increased pay. Since the total compensation increases for both types of workers, the effect on inequality is ambiguous. It depends, on elasticities, the share of the two types of workers in the workforce, and the specific shape of the compensation distribution. Our empirical analysis which uses the unique data from our SWAA-UK survey finds that these predicted changes in compensation do indeed occur in the UK labor market. The aggregate subjective value of the RW perk has increased from around 0.5% to around 4% of total compensation, pay has increase around 4% *more* for those who cannot RW. In practice, we find that

RW has not led to an increase in overall compensation inequality: the increase in inequality due to the RW perk has been almost entirely offset by a decline in wage inequality, a consequence of the faster wage increase for those who cannot RW between 2019 and 2023.

While our analysis only considers employees, and may lead to different conclusions in different countries, it highlights the importance of studying RW in a general equilibrium setup, to take into account the complementarities between different types of labor.

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Appendix

Proof of Proposition 1. The firm's maximization problem is

$$\max_{w_R,\lambda_R,w_P,\lambda_P,n_R,n_P} \left\{ n_R n_P - (w_R + \sigma_R \lambda_R)\, n_R - (w_P + \sigma_P \lambda_P)\, n_P \right\} \tag{A1}$$

$$\text{s.t.:} \quad (1 + \theta_i \lambda_i)\, U(w_i) = \alpha_i n_i, \qquad i = R, P. \tag{A2}$$

The constraint (A2) is derived assuming that a worker of type α_i has a cost of working equal to α_i and that the distribution of α_i follows a uniform distribution in $[0, \overline{\alpha}_i]$, for some sufficiently larger $\overline{\alpha}_i$. Therefore if a firm offers utility $(1 + \theta_i \lambda_i)\, U(w_i)$, then it will attract all the workers whose cost of work α_i is no higher than $(1 + \theta_i \lambda_i)\, U(w_i)$. Integration yields $\int_0^{(1+\theta_i\lambda_i)U(w_i)} \frac{1}{\alpha_i} dx = \frac{(1+\theta_i\lambda_i)Uw_i}{\alpha_i} = n_i$. The Lagrangean is ($\mu_i$ is the Lagrange multiplier for the constraint for type i workers):

$$L = A n_R n_P - \sum_{i=R,P} \left((w_i + \sigma_i \lambda_i)\, n_i - \mu_i \left((1 + \theta_i \lambda_i)\, U(w_i) - \alpha_i n_i \right) \right). \tag{A3}$$

$$A n_R n_P - \sum_{i=R,P} (w_i + \sigma_i \lambda_i)\, n_i + \sum_{i=R,P} \mu_i (1 + \theta_i \lambda_i)\, U(w_i) - \sum_{i=R,P} \mu_i \alpha_i n_i \tag{A4}$$

This has the following first order conditions:

$$\frac{\partial}{\partial n_i} = A n_j - (w_i + \sigma_i \lambda_i) - \alpha_i \mu_i = 0, \qquad i = R, P, \qquad j \neq i \tag{A5}$$

$$\frac{\partial}{\partial \lambda_i} = -\sigma_i n_i + \mu_i \theta_i U(w_i) = 0, \qquad i = R, P, \tag{A6}$$

$$\frac{\partial}{\partial w_i} = -n_i + \mu_i (1 + \theta_i \lambda_i)\, U'(w_i) = 0, \qquad i = R, P, \tag{A7}$$

$$(1 + \theta_i \lambda_i)\, U(w_i) = \alpha_i n_i, \qquad i = R, P. \tag{A2}$$

Substitute $\mu_i = \frac{\sigma_i n_i}{\theta_i U(w_i)}$, $i = R, P$, from (A6), and obtain λ_i, $i = R, P$, from the constraint.

$$\lambda_i = \frac{\alpha_i n_i}{\theta_i U(w_i)} - \frac{1}{\theta_i}, \qquad i = R, P.$$

Plug these values into the remaining first order conditions (A5) and (A6). This gives the following first order conditions in n_i and w_i:

$$\frac{\partial}{\partial n_i} = A n_j - \left(w_i + \sigma_i \left(\frac{\alpha_i n_i}{\theta_i U(w_i)} - \frac{1}{\theta_i} \right) \right) - \alpha_i \frac{\sigma_i n_i}{\theta_i U(w_i)} = 0, \qquad i = R, P, \qquad j \neq i \tag{A8}$$

$$\frac{\partial}{\partial w_i} = -n_i + \frac{\sigma_i n_i}{\theta_i U(w_i)} \left(1 + \theta_i \left(\frac{\alpha_i n_i}{\theta_i U(w_i)} - \frac{1}{\theta_i} \right) \right) U'(w_i) = 0, \qquad i = R, P. \tag{A9}$$

$$An_j - w_i - \frac{\sigma_i \alpha_i n_i}{\theta_i U(w_i)} + \frac{\sigma_i}{\theta_i} - \frac{\alpha_i \sigma_i n_i}{\theta_i U(w_i)} = 0, \qquad i = R, P, \qquad j \neq i \tag{A10}$$

$$-1 + \frac{\sigma_i n_i}{\theta_i U(w_i)} \frac{\alpha_i}{U(w_i)} U'(w_i) = 0, \qquad i = R, P. \tag{A11}$$

$$\frac{A\theta_j}{\alpha_j \sigma_j} \frac{U(w_j)^2}{U'(w_j)} - w_i + \frac{\sigma_i}{\theta_i} - \frac{2U(w_i)}{U'(w_i)} = 0, \qquad i = R, P, \qquad j \neq i \tag{A12}$$

$$n_i = \frac{\theta_i}{\alpha_i \sigma_i} \frac{U(w_i)^2}{U'(w_i)}, \qquad i = R, P. \tag{A13}$$

Now note that $U(c) = \frac{c^\beta}{\beta}$ implies $\frac{U(c)}{U'(c)} = \frac{c}{\beta}$ and $\frac{U(w_j)^2}{U'(w_j)} = \frac{c^{1+\beta}}{\beta^2}$, and plug this into the above, to obtain

$$w_i = \frac{A\theta_j}{\alpha_j \sigma_j} \frac{w_j^{1+\beta}}{\beta(\beta+2)} + \frac{\beta}{\beta+2} \frac{\sigma_i}{\theta_i}, \qquad i = R, P, \qquad j \neq i \tag{A14}$$

$$n_i = \frac{\theta_i}{\alpha_i \sigma_i} \frac{w_i^{1+\beta}}{\beta^2}, \qquad i = R, P. \tag{A15}$$

so the two (A14) determine (5) and (6). Their intersection are the "NE" levels of w_R, and w_P, say w_R^*, and w_P^*, obtained by substituting w_P into the other expression, and the solving

$$w_R = \frac{\theta_P}{\alpha_P \sigma_P} \frac{\left(\frac{A\theta_R}{\alpha_R \sigma_R} \frac{w_R^{1+\beta}}{\beta(\beta+2)} + \frac{\beta}{\beta+2} \frac{\sigma_P}{\theta_P} \right)^{1+\beta}}{\beta(\beta+2)} + \frac{\beta}{\beta+2} \frac{\sigma_R}{\theta_R} \tag{A16}$$

The equilibrium salary for R type workers can be obtained from (A16), a single equation in one variable, and from that w_P from (A14), and then n_i and λ_i are obtained from

$$n_i = \frac{\theta_i}{\alpha_i \sigma_i} \frac{w_i^{1+\beta}}{\beta^2}, \qquad i = R, P. \tag{A17}$$

$$\lambda_i = \frac{w_i}{\beta \sigma_i} - \frac{1}{\theta_i}, \qquad i = R, P. \tag{A18}$$

And analogously for the other variables, income and utility:

$$y_i = w_i n_i = \frac{\theta_i}{\alpha_i \sigma_i} \frac{w_i^{\beta+2}}{\beta^2}, \qquad i = R, P, \tag{A19}$$

$$(1 + \theta_i \lambda_i) U(w_i) = \frac{\theta_i w_i^{\beta+1}}{\beta^2 \sigma_i}, \qquad i = R, P. \tag{A20}$$

$\square$

Proof of Proposition 2. This is simple total differentiation of the pseudo best reply functions equations (5) and (6)

$$dw_R - \frac{(\beta+1)\,\theta_R w_P^{\beta}}{\beta\,(\beta+2)\,\sigma_R\alpha_P} dw_p = \frac{\beta}{\beta+2}\frac{d\sigma_R}{\theta_R}$$
$$-\frac{(\beta+1)\,\theta_P w_R^{\beta}}{\beta\,(\beta+2)\,\sigma_P\alpha_R} dw_R + dw_P = \frac{\beta}{\beta+2}\frac{d\sigma_P}{\theta_P}.$$

or, in matrix form:

$$\begin{bmatrix} 1 & -\frac{(\beta+1)\theta_R w_P^{\beta}}{\beta(\beta+2)\sigma_R\alpha_P} \\ -\frac{(\beta+1)\theta_P w_R^{\beta}}{\beta(\beta+2)\sigma_P\alpha_R} & 1 \end{bmatrix} \begin{bmatrix} dw_R \\ dw_p \end{bmatrix} = \begin{bmatrix} \frac{\beta}{\beta+2}\frac{d\sigma_R}{\theta_R} \\ \frac{\beta}{\beta+2}\frac{d\sigma_P}{\theta_P} \end{bmatrix}.$$

The results follow. □

A Data Sources

A.1 SWAA-UK

The first data source is a bespoke online survey. In January 2021, the SWAA-UK survey began collecting data from a randomly selected sample of UK working age adults who earned at least £10,000 in 2019. The sample consists of thirty-four monthly repeated cross-sections of around 1,800 respondents, from January 2021 to December 2023, for a total of 63,978 observations.[20] The survey asks respondents about their current working status, their preference for working remotely after the Covid lockdown period, and their employers' plans for employees to work remotely once the Covid emergency is over, their commuting patterns, their cost and mode of transport, their views on online and in-person meeting relative efficiency, and their demographics. A full set of summary statistics for the variables we use are reported in Table A1.

The SWAA-UK survey includes three questions from which we build our key variables of interest. These measure the *reported employer preference for* RW, and the *employee preference for* RW and the *employee willingness to pay* for the option to RW. Specifically, the first two questions are:

Q1 In 2022 and later, how often is your employer planning for you to work full days at home?

Q2 In 2022 and later, how often would you like to have paid workdays at home?

The answers to these questions are reported as being a) never, b) about once or twice per month, c) a number between 1 and 4 or d) 5 or more. Q1 also include the option of selecting e) *not discussed with employer*.[21] For respondents reporting a) we code a

[20] The survey was not run in October and November 2023.

[21] The precise wording of the questions changed from the July 2022 wave onwards. The exact questions asked before (a) and after (b) July 2022 were:

Q1a After COVID, in 2022 and later, how often would you like to have paid workdays at home?

Q1b Currently, how often would you like to have paid workdays at home?

value of 0, b) we code a value of 0.25, c) we code a corresponding value of 1–4, and d) we code a value of 5. For Q1 we code reported values of e) as missing. For our main variable of interest. we then transform these values to express RW variable as a percentage, between 0% and 100%, of a 5-day work week.

The third question of interest reflects reported willingness to pay of an employee for the option to remote work:

Q3 How much of a pay raise/cut (as a percent of your current pay) would you value as much as the option to work from home 2 or 3 days a week?[22]

Responses are constrained to a set of bands from which we use the midpoint of each band as the valuation in terms of percent of salary. The endpoints (minimum and maximum) of the bands are *more than (less than) a 35% pay raise (pay cut).* In both cases we take the value closer to 0, namely 35%. Summing up formally, we code individual i's reported valuation of RW, denoted v_i, as

$$v_i \in \{-0.35, -0.3, -0.2, -0.125, -0.075, -0.025, 0, 0.025, 0.075, 0.125, 0.2, 0.3, 0.35\} . \tag{A21}$$

A.2 LFS

We also use data from the LFS, which is conducted quarterly and covers all UK adults living in private residence.[23] For our analysis we use information from all waves conducted in 2017–2019 and 2022–2023. We restrict our sample to employed adults with an identified occupation and reported hourly earnings. To make the SWAA-UK sample representative of the UK population as a whole, we weight its survey responses by age bands (20-29, 30-39, 40-49, and 50-64), sex, education, and region to match the share of individuals in the Labour Force Survey from 2011 to 2020.[24] The main variables of interest from the LFS are occupation of employment (four-digit SOC) and hourly earnings. We further supplement our analysis with information on age, sex, education, and region of employment.

B Stylized Facts

Here we provide further evidence in support of the Stylized Facts we present in Section 2.

Q2a After COVID, in 2022 and later, how often is your employer planning for you to work full days at home?

Q2b Currently, how often is your employer planning for you to work full days at home?

[22]To be exact, there are two questions, one with “raise”, one with “cut”, which branch according to the answer given by the preceding question, which ask whether the respondent would feel positive, neutral, or negative about working from home 2 or 3 days a week.

[23]do we want or need this footnoteThis includes adults living in accommodation provided through the National Health Service our young adults living in student halls of residence or similar institutions. From March 2020 to September 2021, the LFS was conducted monthly. We exclude this period from our main analysis.

[24]Regions are defined as: North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East Anglia, London, South East, South West, Wales, Northern Ireland, and Scotland.

Table A1: Descriptive statistics of the full re-weighted data

Variable	Observations	Mean	Std Dev.
Male	63,978	51.8%	50.0%
Age *(years)*	63,978	42.6	11.9
Years of education after GCSE	63,978	3.09	2.55
Income per year	63,978	£32 795	£17 853
Commuting time *(minutes)*	23,414	30.52	20.44
Commuting cost	23,414	£8.66	£14.13
Hours worked per week *(before Covid)*	63,978	36.39	8.44
Hours worked per week *(currently)*	63,978	36.04	8.47
Employee's desire to WFH *(days)*	63,978	2.76	1.73
Employer's plan for employees to WFH *(days)*	46,968	1.93	1.84
Valuation of Option to WFH *(% of Salary)*	51,240	8.22	9.79

Note: The table reports the descriptive statistics of SWAA-UK (January 2021 - December 2023). The data has been re-weighted using the Labour Force Survey by age, gender, education, and region.

B.1 Stylized Fact 1

We illustrate the dynamics of RW in Figure A1, for employer planned RW (Q1). The vertical axis measures the average number of days employers plan for work to be done remotely, as reported by the respondents. The sold line shows the sample mean at each month, the dashed lines show the upper and lower bounds on the mean based on the possible range of responses for those who report that RW is *not discussed with employer*.[25] The size of the gap between the dashed lines reflects the uncertainty about employer plans. Notice that the average reported RW plans appear to have stabilized in early 2022 at between 2 and 2.2 days per week. Further, the uncertainty with respect to employer plans has decreased considerably.

B.2 Stylized Fact 2

Figure A2 provides further evidence that there is a strong correlation between employees' preferences to WFH and employers' plans. Moreover, it demonstrates that employees prefer to work more days from home than employers are planning for their employees in all industries (values lie below the 45 degree line).[26] The size of the bubbles in Figure A2 show the relative size of the industry by employment, with the larger industries, such as health care, education and retail trade, having larger bubbles than the smaller industries e.g., mining, real estate, utilities.

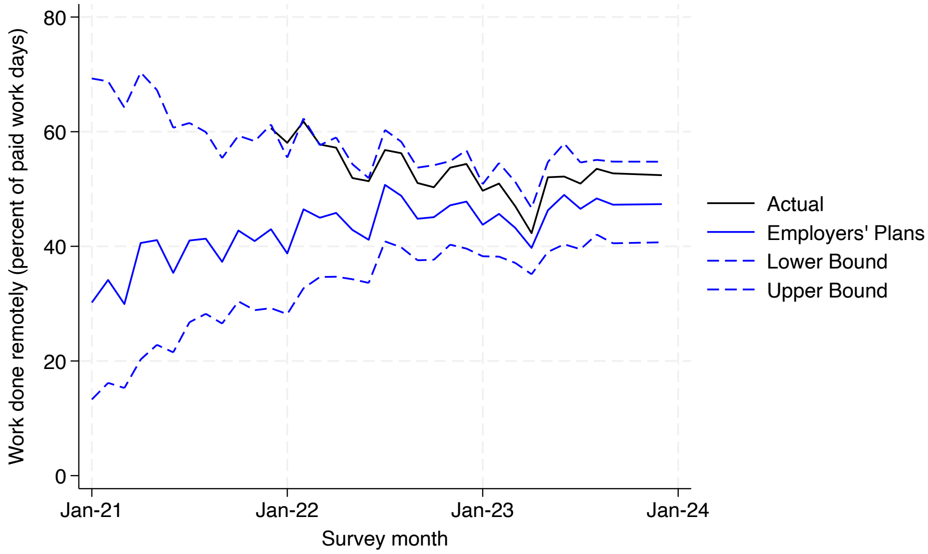
B.3 Stylized Fact 3

Here, we provide more detail on the regression analysis underpinning Stylized Fact 3. The results are reported in Tables A2 and A3 confirms this formally. It reports the

[25]For the upper bound all missing values are set equal to 5 (fully remote), for the lower bound all missing values are set equal to 0 (fully in office).

[26]The figure only shows the first name of the industry and not all the industries included in each category. For example, agriculture includes forestry, fishing and hunting.

Figure A1: Employers planned and actual remote working (% of days per week).



Note: The solid line is calculated excluding observations which have not discussed remote working plans with their employers. The upper dashed line shows the average assuming all such observations will work remotely five days per week. The lower dashed line shows the average assuming all such observations will not work remotely at all.

results of three different specifications of the following three regressions.

$$RW_{ij}^{q} = \alpha_0 + \alpha_1 \delta_{ij}^{RW} + \alpha_2 X_i + \alpha_3 Z_{ij} + e_{ij}, \qquad q = \text{Q1, Q2, Q3.} \tag{A22}$$

In the first three columns, the dependent variable, RW_{ij}^{Q1}, is individual i's *employer's planned proportion* of job j to be done remotely by individual i. In the next three, RW_{ij}^{Q2}, is individual i's *own desired proportion* of RW. And in the last group of three columns, RW_{ij}^{Q3}, is individual i's *willingness to pay for RW*, measured as the subjective value placed by the respondent on working remotely on job j for a couple of days a week, measured as a percentage of their current salary. These measures are obtained from the participants' answer questions Q1-Q3 above.

On the RHS of (A22), δ_{ij}^{RW} is a binary variable indicating whether job j can be done remotely at all, as reported by individual i.[27] As controls, $\mathbf{X}_i$ and $\mathbf{Z}_{ij}$ include a vector of individual characteristics, X_i, and characteristics of individual i specific to job j, Z_{ij}: gender, age, education, income, commute duration, cost of commuting, and industry fixed effects. e_{ij} reflects unobserved characteristics of individual i in job j that influence desired remote working.

Within each of these three groups, the first column reports the outcome of an OLS estimation of (A22) with no control for δ_{ij}^{RW}, which is instead included in the second

[27]Specifically, it is the yes/no answer to the survey question "Consider your current or most recent job. Are you able to do that job from home (at least partially)?"

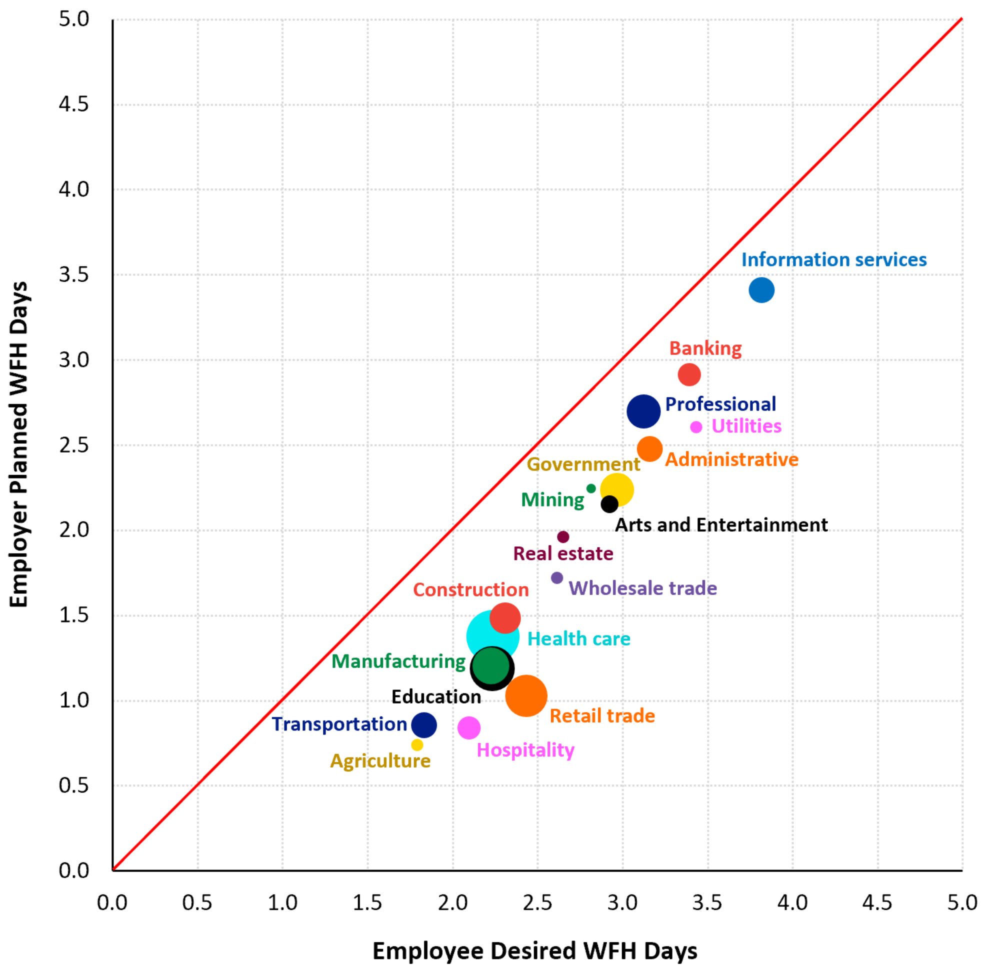


Figure A2: Average employee desired and employer planned working from home days, by industry.

column of each group, that is in columns (2), (5), and (8).

In the third of each group of columns, we report 2SLS estimates in which we instrument worker i's subjective judgement on whether their job can be done remotely with the occupation-specific work-from-home index proposed by Dingel and Neiman (2020). This instrument is very likely to be monotonically increasing in the actual remote workability of a specific job, and uncorrelated with any individual judgements, other things being equal, in whether a specific job can be done remotely. This IV strategy addresses two potential econometric issues. First, that individuals will sometimes misassess the potential for their job to be done remotely implying RW_{ij}, will be measured with error and thus attenuation bias in our estimate of α_1. Second, it is possible that individuals' assessments of RW_{ij} will be correlated with unobservable characteristics which influence both how much they wish to WFH, RW_{ij}^{Q2}, and their subjective assessment of how much they could δ_{ij}^{RW}, leading to endogeneity bias.

Formally, in columns (3), (6) and (9) of Table A2, we estimate (A22) using 2SLS with the predicted values for δ_{ij}^{RW} being obtained from this first stage regression:

$$\delta_{ij}^{RW} = \pi_0 + \pi_1 DN_j + \pi_2 X_i + \pi_3 Z_{ij} + u_{ij} \tag{A23}$$

where $DN_j \in [0, 1]$ is the value of the Dingel and Neiman (2020) index for job j which captures the remote workability of a job according to the four digit standard occupational classification (SOC), adapted for the UK by De Fraja et al. (2021).

Because, data on the duration and cost of respondents' commutes are only available for the period June 2022 to June 2023 we present a separate set of results including these variables in Table A3. The results for other variables are consistent with the main results in Table A2.

Table A2 suggests that younger, better educated, and better paid workers desire to work remotely more and are also better able to do so. This tallies with our intuition, as do the observations that men are less willing and able to do so, but this is reversed once we control for the remote workability of their job. The estimates for commuting in Table A3 suggest workers with longer commutes also appear to be more willing, and more able, to RW, though the association with commuting *cost* is weaker; this may reflect the fact that those with higher commuting cost are internalizing this in the salary. To get a handle on the size of the coefficients, take age as an example: given two workers identical in every respect except the first being ten years older than the second, the table suggests that the younger wants to work remotely 1.5 percentage points more than the older, and that employers plan for them to be working remotely between 1 and 0.5 percentage points more. The last group of columns suggests that women, younger and better educated workers and those who spend more time and money commuting are more wiling to pay to be allowed to RW. The coefficient on (log) income is negative suggesting that higher earners are willing to give up a lower proportion of their income to WFH. However, the coefficient is sufficiently small that it implies that their overall willingness to pay is increasing. For example, the largest coefficient we estimate, from the 2SLS specification in column (9) of Table A3, implies a salary twice as large is associated with a 1.24 percentage point $= 1.785 \times \log(2)$ lower willingness to pay, implying a large overall increase in the amount in pounds they would be willing to sacrifice. The estimation of the second and the third columns in each of the groups suggest that OLS and IV estimation are rather similar, indicating that any self-selection of workers into jobs is not due to the preferences for RW. This is not surprising, as most people in the survey will have chosen their job at a time when the potential for RW was minimal, and hence whether a given job could or could not be done remotely was unlikely to be a consideration when applying for a job or considering whether to accept a given job offer.

Table A2: Planned and desired working from home after Covid-19

	Employer's planned RW			Employee's desired RW			Willingness to pay for RW		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Able to RW		36.75***	56.97***		31.34***	48.57***		3.926***	5.369***
		(0.437)	(1.917)		(0.565)	(1.922)		(0.223)	(0.695)
Male	-1.819***	1.334**	3.068***	-0.0182	2.335***	3.628***	-1.000***	-0.712***	-0.606***
	(0.498)	(0.443)	(0.481)	(0.444)	(0.410)	(0.436)	(0.136)	(0.134)	(0.138)
Age	-0.0874***	-0.0423*	-0.0174	-0.172***	-0.161***	-0.155***	-0.0594***	-0.0597***	-0.0599***
	(0.0202)	(0.0182)	(0.0192)	(0.0187)	(0.0176)	(0.0182)	(0.00574)	(0.00569)	(0.00570)
Education	1.757***	0.935***	0.482***	1.246***	0.572***	0.201*	0.323***	0.260***	0.237***
	(0.107)	(0.0998)	(0.112)	(0.0938)	(0.0879)	(0.0968)	(0.0303)	(0.0292)	(0.0304)
(log) Income	10.46***	5.634***	2.977***	5.674***	2.342***	0.511	-0.765***	-1.126***	-1.259***
	(0.540)	(0.483)	(0.552)	(0.464)	(0.433)	(0.471)	(0.157)	(0.156)	(0.169)
$\overline{Y}$	37.06	37.06	37.06		54.30	54.30	8.30	8.30	8.30
σY	36.82	36.82	36.82		34.80	34.80	9.71	9.71	9.71
First Stage			.422			.389			.353
Observations	33,112	33,112	33,112	44,680	44,680	44,680	35,689	35,689	35,689
R^2	0.23	0.38		0.14	0.26		0.03	0.05	
Estimator	OLS	OLS		OLS	OLS	2SLS	OLS	OLS	2SLS
Industry FE	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes

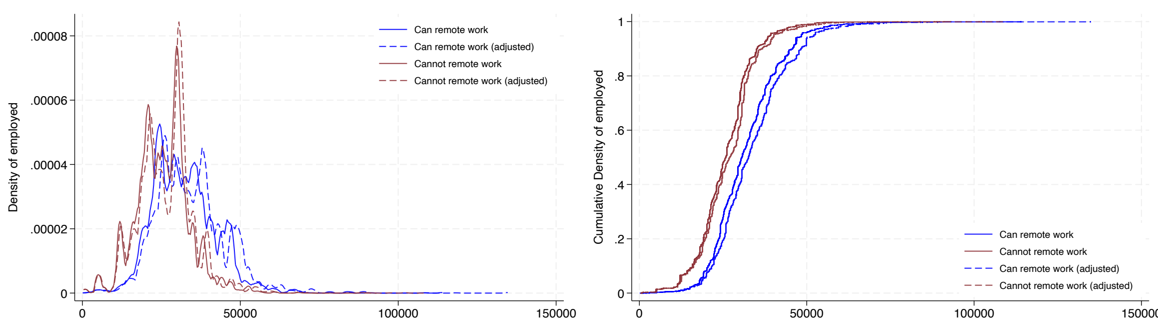
Note: The dependent variable in columns (1)–(3) is the answer to Q1 "After COVID, how often is your employer planning for you to work at home?" (in percentage, 0-100%). The dependent variable in columns (4)–(6) is the answer to Q2 "After COVID, how often would you like to have paid workdays at home?" (also in percentage points). Heteroscedasticity robust standard errors are shown in parentheses. In columns (3) and (6), the variable δ_{ij}^{RW}, the ability to work remotely, as reported by the worker, is instrumented with the Dingel and Neiman (2020) index. Results are weighted to match the Labour Force Survey by age, gender, education, and location. Significance levels are: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table A3: Planned and desired working from home after Covid-19: Commuting Variables

	Employer's planned RW			Employee's desired RW			Willingness to pay for RW		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Able to RW		37.71***	57.71***		31.71***	45.55***		3.603***	4.571***
		(0.682)	(3.108)		(0.904)	(2.949)		(0.341)	(1.040)
Male	-0.390	2.231**	3.622***	0.702	2.895***	3.853***	-0.794***	-0.546*	-0.479*
	(0.764)	(0.680)	(0.723)	(0.693)	(0.639)	(0.670)	(0.223)	(0.220)	(0.226)
Age	-0.101**	-0.0374	-0.00372	-0.193***	-0.167***	-0.156***	-0.0518***	-0.0506***	-0.0503***
	(0.0308)	(0.0277)	(0.0298)	(0.0295)	(0.0270)	(0.0275)	(0.00939)	(0.00929)	(0.00931)
Education	1.503***	0.795***	0.420*	1.099***	0.523***	0.271	0.262***	0.216***	0.204***
	(0.165)	(0.153)	(0.169)	(0.150)	(0.139)	(0.150)	(0.0500)	(0.0489)	(0.0502)
(log) Income	7.226***	3.515***	1.546	3.303***	0.507	-0.713	-1.441***	-1.712***	-1.785***
	(0.842)	(0.749)	(0.821)	(0.770)	(0.705)	(0.735)	(0.269)	(0.265)	(0.279)
Commuting time (mins)	0.200***	0.122***	0.0801***	0.214***	0.156***	0.130***	0.0361***	0.0305***	0.0290***
	(0.0201)	(0.0181)	(0.0190)	(0.0175)	(0.0163)	(0.0169)	(0.00580)	(0.00571)	(0.00580)
Commuting cost (£100)	10.68***	9.638***	9.084***	4.315	3.629	3.330	0.907	0.868	0.857
	(2.411)	(2.198)	(2.235)	(2.291)	(2.207)	(2.232)	(0.695)	(0.688)	(0.687)
$\overline{Y}$	39.37	39.37	39.37		55.86	55.86	8.58	8.58	8.58
σY	37.07	37.07	37.07		34.80	34.80	9.75	9.75	9.75
First Stage			.409			.4			.371
Observations	13747	13747	13747	16368	16368	16368	13104	13104	13104
R^2	0.25	0.40		0.18	0.29		0.03	0.05	
Estimator	OLS	OLS		OLS	OLS	2SLS	OLS	OLS	2SLS
Industry FE	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes

Note: See note for Table A2

Figure A3: Income distribution before and after remote working benefit adjustment.



Note: Densities (left hand side) and cumulative distributions (right hand side) of incomes from employment and overall compensation, including the monetary valuation of realized RW. The solid curves are monetary payments only, the dashed curves include RW; the blue curves are those describing the workers who can RW, the red curve those who cannot. **Source:** Data are from the LFS (Office for National Statistics, 2023)