Working from home, job satisfaction and work–life balance – robust or heterogeneous links?

Article *in* International Journal of Manpower · August 2020

DOI: 10.1108/IJM-10-2019-0458

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ISSN: 2365-9793

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ABSTRACT

Job Satisfaction and Work-Life Balance: Differences between Homework and Work at the Workplace of the Company*

Working remotely can complement and sometimes completely substitute conventional work at the workplace of the company. Until the COVID-19 crisis the share of remote workers was relatively low and empirical investigations show inconsistent results. The recent work has highlighted a dramatic shift toward working from home The objective of this contribution is to empirically analyze the relationship between working remotely and job satisfaction on the one hand, as well as between working remotely and work-life balance on the other hand, based on three waves of the German Linked Personnel Panel. Our control variables are personality traits, skills, employment and job characteristics. We present average effects and demonstrate under which conditions remote work is advantageous for employees. Work-life imbalance may be induced by job-related causes. A private life can reduce work-life balance under specific conditions, namely, if remote work takes place outside of contracted working hours and during the first phase of remote work. On average, remote work has no significant impact on work-life balance, which is conditioned by private interests. However, the termination of remote work causes a clear imbalance. In contrast, the introduction of remote work increases job satisfaction, although only temporarily. When we compare employees working from home with those who want to work at home, we find that the former are happier. If we consider remote workers only, our results reveal that job satisfaction is higher, and work-life balance is not worse under a strict contractual agreement than under a nonbinding commitment.

JEL Classification: J22, J29, M54, M55

Keywords: telecommuting, remote work, effects on employees, job satisfaction, work-life balance, COVID-19

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* We thank John T. Addison, Michael Beckmann, Thomas Cornelissen, Knut Gerlach, Philipp Grunau, Ute Leber und Stephan Thomsen for helpful comments.

Introduction

The increasing acceptance of working from home may be led by management, because reduced labor costs and increasing productivity and profitability are expected. This development also relates to concerns over deteriorating work-life balance and the potential of remote work to help address this, but thus there is a lack of systematic evidence or consensus. Even within a single industry, practices vary considerably. Many employers still insist on compulsory presence at the workplace. Unions were reluctant to support remote work in the past. For their part fearing that establishments would use an extension of remote work to save costs and that the employees would have to work under precarious conditions. This attitude has changed. For example, on Labor Day 2018, the German Confederation of Trade Unions (DGB) insisted a legal claim on working from home in case it is not an impediment to the operation. The German Labour and Social Affairs Minister intends introducing in the autumn a bill to a right to home office. The President of the Association of German Employers has strongly criticized this idea. Since 2016, employers in the Netherlands have been obligated to check whether it is possible to allow remote work if an employee express a preference for such work.

Using a large matched employer-employee panel-data set for Germany 2012-2016, this paper reveals a heterogeneous influence of home office use on job satisfaction and work-life balance. Thus, we conclude that only if certain conditions are fulfilled working from home is to be advocated. The findings of studies based on restrictive samples and variables may be misleading both for firms and employees, who wish to use home office, but are not always well advised to do so. Based on SOEP data, Brenke (2016) reports that in 2014 only 12 percent of all employees in Germany work primarily or occasionally from home, although this practice would theoretically be possible for 30-40% of the jobs (Brenke 2016). In April 2020 the percentage was higher than 35 (Arntz et al. 2020). Grunau et al. (2020) demonstrate that the occupation and the economic sector are relevant. Furthermore, the COVID-19 crisis can be regarded as a “game changer”: According to an online survey of employees interviewed in the Linked-Personnel Panel (LPP): 19.6 percent of those employees who did not used mobile work in 2019, adopted this work during April and May 2020 (Frodermann et al. 2020). Analyses conducted with the daily online surveys of the Mannheim Corona Study (2020) reveal that while at the beginning of the shutdown in March 2020 every fourth employee was working predominantly from home, after the shutdown in July 2020 only 5 percent are working solely from home, whereas 23 percent work partially from home, partially at the work place.

Alipour et al. (2020) find that working from home is feasible for roughly 56 percent of the overall German workforce, while less than half of this potential was exploited in the pre-pandemic economy. Further results point at a permanent increase in the number of employees using home-work options. Forbes (2017) reported that a growing number of Americans are working from home: nearly 4 million work are away from a home office at least 50 percent of their work, either at home or some location other than their office. Although this figure is expected to rise in the next five years, 56 percent of the American jobs are telecommute-compatible, only. Bloom (2020) reports that, during 21-25 May 2020, 52 percent of U.S. workers were working from home full time.

Home-based workers span a wide spectrum of jobs with a correspondingly wide range of incomes. Usually, workers with high earnings it is more often allowed to work from home than others. Home offices are relatively widespread in the service sector and among managers (Arnold et al. 2015, 2016). Of utmost importance seems to be whether managers work at home during regular working hours or exclusively during leisure time. The latter group comprises 15% of all white-collar workers of all employees working in private companies with more than 49 employees. The share of managers in the United States, the United Kingdom, and Germany who are allowed to work from home during normal hours is almost 50%, it as a mainstream practice for this group. Their share in many developing countries is surprisingly high, at 10% or 20%, due to rising traffic congestion and the spread of laptops and cell-phone connectivity (Bloom et al. 2014).

In this paper, we focus on the effect of remote work on job satisfaction and work-life balance as these two aspects are most important for determining the conditions under which employees want to work from home. Despite employees' who use a home office reporting its advantages, it remains questionable whether this result can be generalized with respect to all employees. An extension of home office use may not be advantageous for some employees. A better work-life balance is mentioned quite often as the most important advantage of home offices. However, it is not clear whether working from home improves the work-life balance. For example, some people will use hours intended as leisure for a prolongation of working time at home because otherwise they might feel overburdened to complete work tasks at the formal workplace. Therefore, we are going to focus our analyses on this variable. Furthermore, we also more comprehensively consider remote work's impact on job satisfaction. We go beyond the existing literature in a number of ways: First, a wide range of personality traits, skills, employment properties and job characteristics are incorporated as determinants. Second, the problem of causality is investigated.

Third, we analyze whether the use of alternative control and treatment groups lead to different results. The empirical investigation is based on a new German data set with three waves.

Our results are important because they show under what conditions remote work increases job satisfaction, that work-life balance is not improved by remote work, and that home offices are not a good alternative to working in the office or do not lead to improvements in welfare for wide ranges of workers.

The remainder of the paper is structured as follows. Section 2 summarizes the pros and cons of remote work and the central fields in the remote work literature. Section 3 outlines the data and some descriptive results. In Section 4, our empirical strategy is sketched. Section 5 reports the econometric results, and section 6 briefly concludes.

2 Public discussion and related literature: advantages and disadvantages of remote work, central subjects and hypotheses

The public discussion stresses many advantages of remote work compared with traditional office work, including reduced commuting. However, disadvantages are also mentioned, so there is no clear conclusion about whether remote work should generally be preferred.

On the one hand, the arguments for remote work are: employees have a private working environment and autonomy, employees are their own bosses, employees have flexible working hours, employees do not have to deal with unpleasant colleagues, employees are more comfortable, employees' health is improved, employees can prepare their own meals and eat healthier, employees sleep better, employees can follow their own biorhythm, employees experience reduced stress, employees can spend more time with family, employees are closer to their private life, employees enjoy greater childcare facilities, employees save time, employees have not to commute, employees do not have to crowd into buses and trains, employees' productivity increases, employees endure fewer interruptions, employers have reduced overhead, employers enjoy greater employee loyalty, employers' reputation improves, and employees have greater work satisfaction and less "work exhaustion"(Baruch 2000, Bellmann/Widuckel 2017, Gregory 2016, Grunau et al. 2019, Johnson 2015, Shamir/Salomon 1985).

On the other hand, there are a number of counterarguments: employees lack productivity, employees lack motivation, unhealthy lifestyle, employers provide offices with ergonomic chairs, employers develop a bad reputation, employees

are exposed potential distractions (e.g., watching the newest episodes of their favorite Netflix series), employees find it hard to separate private and business life, requires a lot of discipline, employees have no human interactions, employees lack social interactions, employees are more often sick, employees can still work at home are too ill to go into the office, employee supervision is difficult, employees lack opportunities to learn on the job from colleagues, employees cannot engage in teamwork, employees engage in less brainstorming, employees work longer hours, employees work unpaid overtime, employees are expose to more safety hazards, and employees experience a trend toward constant accessibility (Noonan/Glass 2012, Song/Gao 2018). Obviously, some of the above claims are contradictory, and these inconsistencies can also be found in the empirical literature.

Two topics from the remote work literature are of special relevance for our study. That is to say, some analyses emphasize the positive remote work's effects on job satisfaction (Gajendran/Harrison 2007, Gimenez-Nadal et al. 2018, Hill et al. 2003, Paulin et al. 2017, Standen/Omari 2011, Wheatley 2012, 2017). Others see the work–family interface as a more convincing research subject (Crosbie/Moore 2004, Dex/Bond 2005, Dockery/Bawa 2017, Gimenez-Nadal et al. 2018, Golden et al. 2006, Hill et al. 2003, Moore 2006, Russell et al. 2007). Some papers evaluate remote work as a good idea that leads to greater integration between the work and family roles, as well as more job satisfaction (Sullivan/Lewis 2001, Dubrin 1991). However, again others show that telecommuting reduces job satisfaction and intensifies the conflict by increasing the permeability of work and family boundaries. Song and Gao (2018) find that working at home is associated with a higher probability of having unpleasant feelings relative to working in the workplace. Bringing work home on weekdays results in less happiness. Noonan and Glass (2012) argue that working from home is not helpful in reducing work-family conflicts. Certainly, job satisfaction and work-life balance are worthwhile outcome variables that can reveal whether remote work should be preferred by employees.

In the literature we also find discussions of telecommuting's potential for relational impoverishment at work (Gajendran/Harrison 2007). The reduction in face-to-face interactions, as well as the lower frequency and richness of communication between telecommuters and other members of the organization, have weakened the interpersonal bonds they have with their coworkers or supervisors (Daft/Lengel 1986). These are obvious disadvantages of remote work for the employees. We consider these ideas by the incorporation of job characteristics in our estimates.

Further empirical studies investigate autonomy, which is a key feature of any work arrangement (Gajendran/Harrison 2007), as well as productivity, performance, effort and intrinsic motivation (Boerma et al. 2017, Dutcher 2012, Gajendran/Harrison 2015, Gimenez-Nadal et al. 2018, Rupietta/Beckmann 2018, Standen/Omari 1997). And again others concentrate on the effects of remote work on job changes and role stress (Gajendran/Harrison 2007), commitment (Standen/Omari 1997), the decision of women to participate in the labor market (Edwards/Field-Hendrey 2002), work volume (Giminez-Nadal et al. 2018, Wheatley 2012), cyberslacking (O'Neill 2015), health (Olsen et al. 2015) and comparisons between remote work and commuting (de Vos et al. 2017, Gimenez-Nadal et al. 2018). We test whether productivity, commitment and gender should be incorporated as control variables.

Taken together, these themes hint at a "remote work paradox" of mutually incompatible consequences for employees. If telecommuting is used in order to enhance perceived autonomy and lower work–family conflict, this would mean, in turn, an enhancement of job-related attitudes, improved performance, and reduced stress. However, if telecommuting also damages vital work relationships and hampers career advancement, this implies that outcomes in the work and non-work domains come at the expense of outcomes in the relationship or social domains (Gajendran/Harrison 2007).

We restrict our investigations to remote work's effects on job satisfaction (JS) and work-life balance (WLB). Empirical studies of these two topics usually do not take into account the specific conditions of remote work that lead to different outcomes and ignore causality problems. They neglect personality traits and job characteristics. This may have the consequence that a seemingly influence of remote work on JS and WLB is revealed although this is attributable to one of the mentioned variables. We demonstrate this with two examples. First, assume that people who are emotionally unstable tend to have less satisfaction than others, on the one hand, and do not prefer work from home because they need help at their work from colleagues, on the other hand. Then a positively statistical influence of remote work (RW) on JS is revealed even if no causal link exists between RW and JS. Second, assume that those who have a strong commitment to the firm are happier than others and do not prefer remote work because they want to help colleagues so that the firm positively develops. In this case we obtain a negative statistical influence of RW on JS. If the causal relationship between JS and RW is positive then this correlation is weakened or will become negative if the commitment influence is not considered as a control variable. There are many examples of non-causal relationships between RW and WLB via personality traits or job characteristics that are excluded as control variables. For instance, conscientiousness may be positively related to job satisfaction and WLB on the

one hand and to RW on the other hand. If conscientiousness is neglected, the positive impact of RW on JS and WLB is overestimated.

Based on our brief literature survey, we formulate two major hypotheses (H) concerning the relationship between remote work and job satisfaction, on the one hand, and between remote work and work-life balance, on the other hand.

H1: **Working from home instead of at the office improves job satisfaction.**
Reasons might include increased time flexibility and more time sovereignty. Therefore, if hypothesis 1 can be confirmed, we also expect to find an association between working from home and work-life balance:
H2: **Working from home is related to a better work-life balance.**
As stated before, working at the place the family lives eases the coordination of job and private life. These hypotheses may apply in particular for managers and highly qualified employees.

More specific hypotheses are formulated and tested in Section 5 using a large number of control variables. In order to account for the influence of unobserved factors both the introduction and termination of home work arrangements are considered. We distinguish between home work that takes place within and outside contracted hours. Furthermore, we compare employees with home work with those who want to work remotely. Home work can be specified by an explicit contract or only by loose agreements. We analyze whether these two forms induce different effects on job satisfaction and work-life balance.

3 Data and descriptive statistics

3.1 Data and definition of variables

We use three waves of the Linked Personnel Panel (LPP – Broszeit and Wolter, 2015; Broszeit et al., 2016). This new data set is representative of private sector establishments with at least 50 employees in the manufacturing and services industries and provides information at the employee and company level. We focus on the former. The survey was started in 2012/2013 (N=7,508). Information from the second wave, 2014/2015 (N=7,282) and the third wave, 2016/2017 (N=6,779) is also available. Not all information is provided in the three waves. The employee level of the LPP considers demographic, qualification, employment and job characteristics. Furthermore, home office, job satisfaction and work-life balance information is recorded, among other categories. Remote work is measured by a dummy variable (=1, if the employee works occasionally or regularly at home; =0 otherwise). Furthermore, we know whether working from home or teleworking is contractually-based. More detailed information is delivered

in the second wave. For example, the second wave asked why the employee does not work at home or why he/she wants to work at home. Job satisfaction is determined by a scale variable of 0, … , 10 (=0, if completely dissatisfied, …, =10, if completely satisfied). Work-life balance is measured by different questions about the degree of imbalance. Six items are compiled:

A: The demands of my work interfere with my home and family life.
B: The amount of time my job takes up makes it difficult to fulfill family responsibilities.
C: My job produces strain that makes it difficult to fulfill family duties.
D: I have to postpone job activities because my private demands take up too much time.
E: Professional activities remain unsettled due to the demands of my family or my partner.
F: My private life hampers my professional responsibilities (e.g., arriving to work on time, handling day-to-day tasks or working overtime).

Employees have stated to what degree each imbalance statement (noWLB_A, noWLB_B, noWLB_C, noWLB_D, noWLB_E and noWLB_F) applies to them – fully applies, largely applies, undecided, does not largely apply, does not apply at all – and their answers were measured on a scale of 1,…,5. We use an aggregated indicator (WLB) calculated for all six items so that a range follows from 6 to 30. The larger the value, the more work-life balance applies. Alternatively, we form and apply two dummies, namely
no WLB induced by a job feature (=1 if (noWLB_A>=1 & noWLB_A<=2); =0 if (noWLB_A>=4 & noWLB_A<=5);
no WLB induced by a private feature (=1 if (noWLB_F>=1 & noWLB_F<=2); =0 if (noWLB_F>=4 & noWLB_F<=5).

In contrast to other data sets, many job characteristics (JC), commitment information (COM), items related to collegiality (COL) and personal attitudes, measured by the Big5, are collected in the LPP. Nine items related to job characteristics are available, but we use only the seven that are collected in all three waves (JC1-JC7):

JC 1: I can decide independently in many situations.
JC 2: I have to do many different activities.
JC 3: The work of other colleagues depends directly on whether my work is good or bad.
JC 4: My tasks depend on the work of other employees.
JC 5: My work is physically demanding.
JC 6: Unpleasant environmental conditions are typical for my job.

JC 7: I often feel pressure if deadlines are critical or if I have to execute multiple tasks simultaneously.

We recognize commitment using six items (COM1-COM6):

COM 1: I want to work the rest of my professional life at my current firm.
COM 2: This firm holds great importance for me.
COM 3: I consider the problems of the firm as my own problems.
COM 4: I do not feel a strong affiliation to the firm.
COM 5: I do not feel an emotional commitment to the firm
COM 6: I do not feel like part of the family in this firm.

As with work-life balance, the employees have to evaluate the job characteristics and the commitment items and determine whether they apply to them within a range from 1 to 5. A low value for items COM4, COM5 and COM6 means no commitment, in contrast to items COM1-COM3.

Collegiality is measured by three questions (COL 1–COL 3):

COL 1: How often do you need help from your colleagues?
COL 2: How often do colleagues offer you their support?
COL 3: How often do you feel that colleagues and supervisors unfairly criticize you?

Respondents have five possible answers to choose from: always, often, sometimes, rarely, never/nearly never. This categorical attribute is transformed into a scale of 1 to 5, where a low value for COL1 and COL2 means a high degree of collegiality, while a low value of COL3 is interpreted as no collegiality.

Interviewees were questioned in relation to a total of 16 areas of personality traits. Based on five categories (fully applies, largely applies, undecided, does not largely apply, does not apply at all), the respondents gave their subjective assessment of their individual personality and whether the items apply to them or not. Again, the categorical variable is transformed into a scale of 1,…, 5. The Big5 factors – openness, extraversion, conscientiousness, agreeableness and neuroticism – are determined as the sum of the scores generated from answers to three questions. This means the minimum score for each factor is equal to three, and the maximum score is equal to 15. Openness characterizes people who are original, have new ideas, have artistic and aesthetic experiences and are imaginative. Extraversion describes people who are communicative, talkative, outgoing and sociable and who are not reserved. Typical traits for people with conscientiousness are that they are thorough workers, that they are not lazy and

that they are effective and efficient in completing tasks. The fourth characteristic, agreeableness, expresses that people are not rude to others, that they can forgive and that they are considerate and kind to others. Individuals who are easily worried, who are nervous in many situations and who are not easily relaxed and cannot deal with stress strongly exhibit the fifth property, neuroticism (emotional instability).

3.2 Descriptive results

First, empirical evidence of the development of our central variables, namely, remote work (RW), job satisfaction (JS) and work-life balance (WLB), is presented in Table 1.

We find an increase in the share of employees with home offices and WLB is improved, while JS is decreasing. These are only average developments that cannot be used for a detailed analysis based on individual levels. Kendall's tau-b (see Agresti 1990, p.28 and 34) measures ordinal association, when one variable is ordinal (JS and WLB) and the other is nominal but has only two categories (home office). Kendall's tau-b and the asymptotic standard error in parentheses show us that the association between JS and RW is positively significant in all three waves. The association between WLB and RW is negatively significant.

Table 1: Summary statistics of working from home, job satisfaction and work-life balance

RW	N	Mean	Std. dev	Kendall's tau-b
2012/13	7,507	0.1741	0.3792	
2014/15	7,280	0.1880	0.3907	
2016/17	6,427	0.2142	0.4103	
JS				
2012/13	7,501	7.5555	1.7493	0.0362 (0.010)
2014/15	7,107	7.5158	1.6805	0.0380 (0.010)
2016/17	6,425	7.5117	1.6757	0.0525 (0.011)
WLB				
2012/13	7,467	24.4483	4.2680	-0.1163 (0.009)
2014/15	7,086	24.4981	4.2386	-0.1461 (0.010)
2016/17	6,404	24.5157	4.1566	-0.1362 (0.010)

Source: Linked Personnel Panel (LPP), wave 1-3.

In Table A1, we have presented the descriptive statistics (mean and standard deviation) for individual characteristics that might be relevant for our analysis of

the relationship between JS, WLB and RW. We have split the sample by workers with and without home offices. Except for service sector, manufacturing, COM1, COM4 and COL2, we find significant differences at the 5% level for all variables in Tab A1 between workers with and without home offices. Based on the t-test statistics of mean differences between the two worker groups, we can say that home workers are characterized, on average, by a better qualification, longer working hours, higher wages and more participation in training. Furthermore, they differ fundamentally from other workers by most job characteristics.

A hint regarding the differences in JS and WLB between workers with and without home offices is given by the histograms in Figures 1 and 2. At first glance, the two representations in Figure 1 look similar, with a peak at JS level 8 within the range (0,…,10) and very few values in the lower part of the histogram. However, around the part with the most observations (7-9), the proportion of workers with home offices is higher than that for others. Thus, we can suppose that there is a link between remote work and job satisfaction.

Figure 1: Histogram of job satisfaction for workers with and without remote work

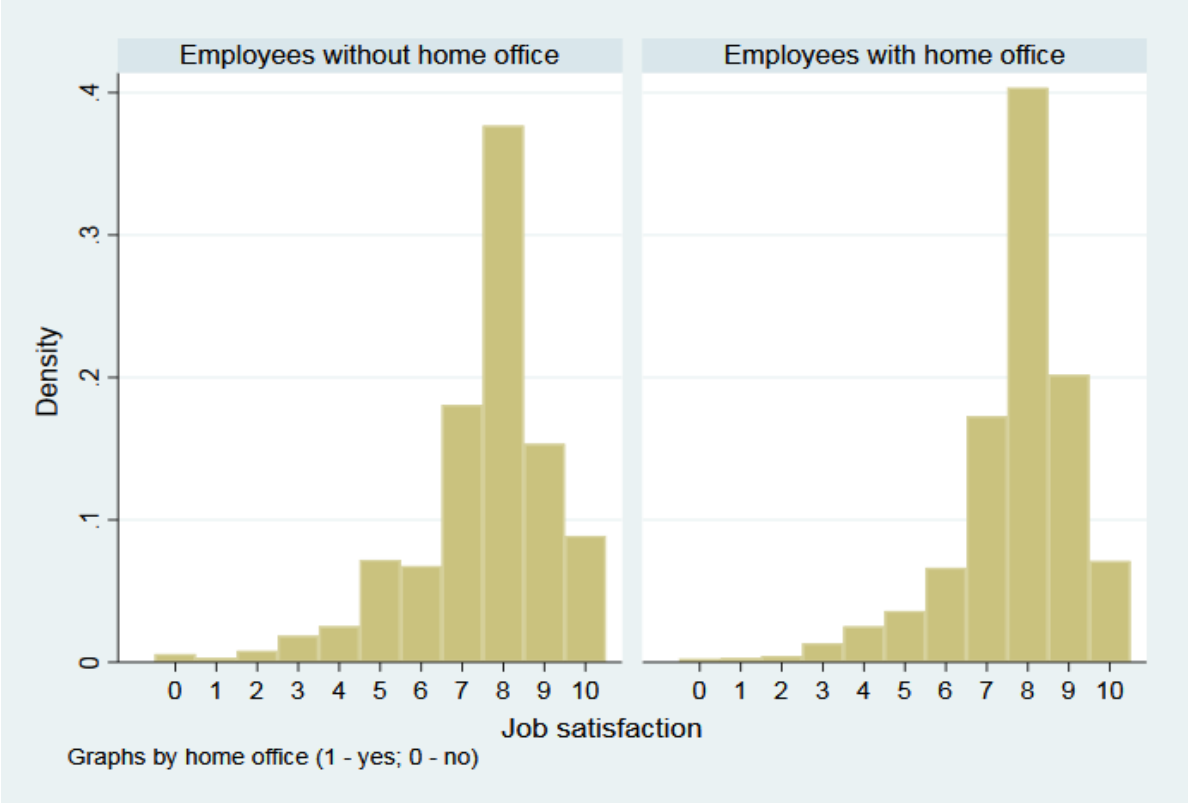
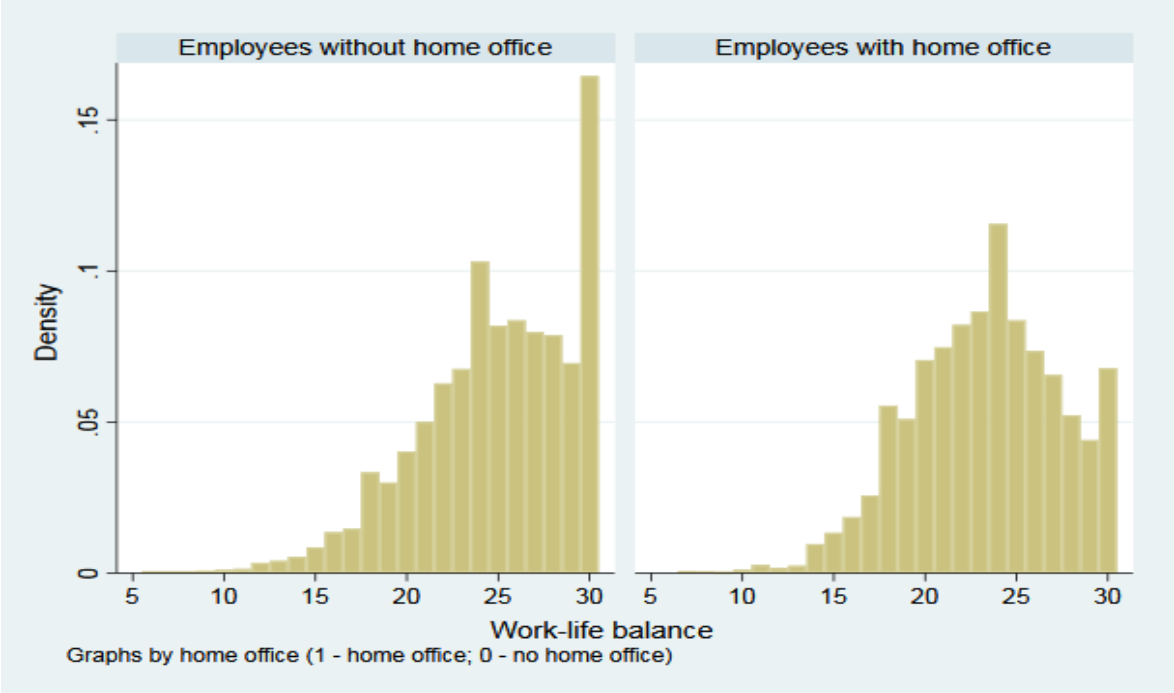


Figure 2 does not show strong imbalances (WLB<12) but contains obvious outliers at WLB levels 24 and 30 for both worker groups. This means that a disproportionately high number of workers have answered all six items by saying

that imbalance does not occur at all. Employees without home offices have emphasized more often than others that no imbalance between work and private life exists. At this stage, we can speculate that the existence of a home office has no influence on individual JS, while WLB differs between the two worker groups.

Figure 2: Histogram of work-life balance for workers with and without remote work



Additional descriptive results are only based on the second wave of the LPP. The reasons that employees do not want to work from home are recorded. Presence in the office is important for the supervisor (69 percent) and the employees' specific activities cannot be done from home (76 percent). Bad career opportunities are only mentioned by 7 percent of the respondents – see also Arnold et al. (2015, 2016).

4 Empirical strategy

We start with a search for a framework in which the analysis of the relationship between RW, on the one hand, and JS and WLB, on the other hand, should be embedded. In other words, which control variables are helpful to avoid biased estimates of the links in which we are interested? We distinguish three blocks of influences: (i) personality traits, (ii) skills and employment properties and (iii) job characteristics. A clear separation between these strands is not always possible.

In empirical analyses of RW, control variables that can be assigned to (i) or (ii) dominate - see Bloom et al. (2015), Brenke (2016), Crosbie/Moore (2004), Dex/Bond (2005), Økland/Saha (2018), Song/Gao (2018). Big5 traits are not taken into consideration, although in other contexts their importance is stressed. So far, job characteristics have rarely been incorporated into the remote work discussion. In our investigation, we consider the following variables for the three explanation patterns:

(i) age, gender, schooling, nationality, risk attitude, openness, extraversion, conscientiousness, agreeableness and neuroticism (eastern Germany, partner, number of household members, number of children in the family younger than 14 years old, domestic care);

(ii) unskilled worker, craftsman, foreman, master craftsman, part-time, working time, permanent contract, train activities, gross monthly wage, 7 job characteristics, 6 commitment variables and 3 definitions of collegiality – see section 3.1., (collective bargaining, works council, number of employees in the firm, apprentice, manager, productivity, 14 industries);

(iii) 7 job characteristics, 6 commitment variables and 3 definitions of collegiality – see section 3.1.

We begin with the presentation of separate estimates and then the three blocks are combined, and only significant influences of the first stage are considered. Variables in parentheses are excluded in our presentation because their influence was already insignificant in preliminary investigations. As an alternative selection procedure, we use the least angle regression (LARS) developed by Efron et al. (2004). A parsimonious set of the available covariates is selected for the efficient prediction of response variables. Few steps are required. The procedure begins with all coefficients being set equal to zero and identifying the predictor most correlated with the response variable, say x1. The largest step in the direction of this predictor is taken until some other predictor - say x2 - has an equal amount of correlation with the current residual. LARS proceeds in a direction equiangular between the two predictors, x1 and x2, until a third predictor, x3, earns its way into the “most correlated” set. LARS proceeds equiangular among x1, x2 and x3 that is along the “least angle direction” until a fourth variable, x4, enters, and so on. As is common practice, Mallows’s Cp criterion is used as the stopping rule (i.e., no more regressors are incorporated when Cp reaches its smallest value). As Cp is an unbiased estimator of prediction error, Cp minimization can be regarded as an unbiased estimator of the optimal stopping point.

Up to this stage it is unclear whether the estimates present a pure statistical relationship that is determined by unobserved influences or by causality. A reverse causality induced by observed and unobserved characteristics and dependencies among each other are possible.

Instrumental variables approaches and matching procedures are usually applied to solve the causality task. The problem with the former is finding external instruments that break the correlation between endogenous explanatory variables and unobserved variables affecting the response variable. The latter only takes into account observed determinants. Especially, the propensity score matching techniques are criticized by King et al. (2011) and King/Nielsen (2016). Therefore, we present estimates based on entropy balancing, as suggested by Hainmueller (2012). This means reweighting of the untreated observations. The weights are chosen by minimizing the entropy distance metric. The advantage of this approach is that information about the known sample moments are directly incorporated in the reweighting scheme, and no distributional assumption is necessary. Nevertheless, we have to emphasize that endogeneity remains an issue that has plagued the literature and, to date, remains unresolved. We cannot be sure that the estimated coefficients based on entropy balancing have a causal interpretation. We can only demonstrate whether conventional regressions and those based on the reweighted sample differ substantially. If this is not the case, we suppose that in our contextual endogeneity is not the biggest problem.

A further issue is the heterogeneity problem. Here, we follow different ideas. First, we ask whether some subgroups are more successful than others, and whether they are happier and have a better WLB. We suppose that it makes a difference whether imbalances are determined by private or job influences. We also distinguish whether remote work takes place during the agreed working hours or outside of them, whether employees started with remote work, whether they have been working remotely for a long time or whether remote work was terminated.

The results may also change if the group working remotely is not compared with all those who do not work from home. We can restrict the control group to those who have a permission to work from home but do not or who want to work from home but do not. In both cases, information on the restriction is only available in waves 2 and 3 and we suppose that the treatment and control groups are more similar than in other estimates where the control group covers all employees who do not work at home.

Finally, we assess the impact of firm-specific regulations concerning telecommunication at the firm level. To the treatment group belong those who work from home based on a specific contract. The control group includes those for whom remote work is allowed and only this allowance is based on a general

agreement: among other factors, the employees can decide at which time and to what extent they work from home.

5 Estimation results

5.1 Personality traits, skills, employment and job characteristics

In Table 2, line 1, where only personality traits are accounted for – see section 4 (i) – we find a positively significant influence of working at home on JS, but WLB and remote work (RW) are negatively associated. This is in accord with the results of Table 1, Kendall's tau-b. We should emphasize that the influence of Big5 variables on JS and WLB is significant – this result is not in the Tables. Extraversion, conscientiousness and agreeableness are positively associated with job satisfaction and WLB, while the relationship with neuroticism seems to be negative. Strong agreeableness strengthens JS but contributes to a worse WLB.

The second module with skills and employment characteristics as control variables – see section 4(ii) – leads in Table 2, line 2 to an insignificant influence of RW on JS. This result is especially produced by the income variable. If this variable is removed – not in the Tables – then the RW effect remains positively significant. The effect on WLB is smaller than that in line (i), but it is furthermore negative and significant.

The estimates of the third module with job characteristics as control variables – see section 4(iii) – present similar results in Table 2, line 3 as those of the second module, but the coefficients are larger. The job characteristics, commitment and collegiality variables are strongly correlated with JS and WLB. If, however, some of the characteristics are suppressed in the regression, the RW effect is again positively significant – not in the Tables.

Line 4 of Table 2 combines all significant influences of the estimates in lines 1-3. The effects on JS are dominated by the third module, while the effects on WLB are mainly influenced by the variables of the first module. In contrast to other empirical investigations (Gajendran/Harrison 2007, Wheatley 2017), we find that remote workers have a worse WLB than other workers, and no difference between these two worker groups are revealed with respect to JS. This means that H1 cannot be rejected – see Section 2. Positive and negative effects of personality traits on JC are effective with the consequence of an insignificant result. Nevertheless, the negative coefficient in column 1, line 4 is a hint that home work goes hand in hand with a worse job satisfaction than conventional work at the workplace of the company The results in column 2 reject H2.

As a robustness check of the specification of line 4 in Table 2, we use LARS to select relevant influences on JS and WLB. The results of the selection for JS can

be found in Table A2. The first variables including those with the smallest Cp (Mallows 1973) are selected for further analysis. Analogously, control variables for WLB are determined. The estimates of the home office effect on JS under the control of the LARS selected regressors in line 5, Table 2 broadly confirm those of line 4. Cluster robust standard errors are determined, where the cluster variable is the personal identification number. The complete estimates for JS can be seen in Table A3.

Table 2: Ordered probit estimates of remote work's effects on job satisfaction (JS) and work-life balance (WLB)

	(1) JS			(2) WLB		
	Coef.	Std. Err.	N	Coef.	Std. Err.	N
(1) Personality traits	0.1366***	(0.0274)	10,632	-0.3700***	(0.0269)	10,611
(2) Skills and employment features	-0.0280	(0.0291)	10,632	-0.2964***	(0.0287)	10,611
(3) Job characteristics	-0.0347	(0.0283)	10,546	-0.4636***	(0.0277)	10,527
(4) Significant features	-0.0386	(0.0300)	10,605	-0.3855***	(0.0285)	10,601
(5) Lars selection	-0.0392	(0.0291)	10,605	-0.3247***	(0.0277)	10,527
(6) Entropy balance	-0.0637	(0.0549)	10,546	-0.2748***	(0.0700)	10,527
(7) RW within contracted hours	0.0829	(0.0551)	4,550	-0.3519***	(0.0539)	4,519
(8) RW outside contracted hours	-0.0028	(0.0454)	4,878	-0.4093***	(0.0448)	4,846
(9) Introduction of RW	0.1337**	(0.0684)	9,840	-0.0018	(0.0771)	9,770
(10) Termination of RW	-0.1412	(0.0912)	9,840	-0.0233	(0.0872)	9,770
(11) Actual RW vs no RW but allowed	0.0125	(0.0434)	4,074	-0.3115***	(0.0433)	4,048
(12) Actual RW vs desired RW	0.1290**	(0.0560)	2,744	-0.1708***	(0.0519)	2,729
(13) Contracted vs not contracted RW	0.1105**	(0.0551)	1,962	0.0226	(0.0541)	1,947

Notes: Significant determinants in JS estimates of lines 1-3 are besides remote work control variables of JS estimates in line 4, namely age, schooling, openness, extraversion, conscientiousness, agreeableness, neuroticism, foreman, master, working hours, training, log(wage), JC1, JC6, JC7, COM2, COM3, COM4, COM5, COL1, COL2, COL3. Analogously, the control variables of WLB estimates in line 4 are remote work, age, man, schooling, German, risk, extraversion, agreeableness, neuroticism, master, part time, working hours, JC1, JC4, JC5, JC6, JC7, COM5, COL1, COL3.

Source: Linked Personnel Panel (LPP), wave 1-3.

The entropy balancing procedure uses all variables mentioned in section 4 (i)-(iii), which are reweighted for observation in the control group to balance the first three moments of the treatment and control groups – see Table A4. Based on this new

sample, we find in line 6 results comparable to those in lines 4 and 5, where the estimated coefficient of home offices on JS is absolutely larger and that on WLB is absolutely smaller.

5.2 Heterogeneity of subgroups, alternative control and treatment groups

5.2.1 Private or job-induced reasons for work-life imbalance

So far, we have measured WLB by six items – see section 3.1 – and in all our empirical results WLB is negatively correlated with RW, while other empirical investigations have found the reverse outcome. This might be due to different assumptions, to different measurement of WLB, to different control groups, or to different incorporated control variables. It is possible that only some of our regressors neglected in other studies induce the negative WLB effects of home offices, which dominate the other positive effects.

Table 3: Probit estimates of remote work's effects on work-life imbalance due to a job or private feature

	(1) no WLB induced by a job feature			(2) no WLB induced by a private feature		
	Coef.	Std. Err.	N	Coef.	Std. Err.	N
(1) Personality traits	0.3556***	(0.0410)	8,761	0.0133	(0.0554)	10,046
(2) Skills and employment features	0.3068***	(0.0441)	8,761	0.0649	(0.0591)	10,046
(3) Job characteristics	0.5278***	(0.0447)	8,689	0.0530	(0.0574)	9,964
(4) Significant features	0.4322***	(0.0467)	8,751	0.0898	(0.0597)	10,036
(5) Lars selection	0.3941***	(0.0466)	8,739	0.0828	(0.0597)	9,980
(6) Entropy balance	0.2669***	(0.0894)	8,689	-0.0835	(0.1866)	9,964
(7) RW within contracted hours	0.2986***	(0.0921)	3,931	0.1055	(0.0982)	4,232
(8) RW outside contracted hours	0.4746***	(0.0735)	4,182	0.1392*	(0.0798)	4,528
(9) Introduction of RW	-0.2283*	(0.1246)	7,972	0.2345*	(0.1382)	9,319
(10) Termination of RW	0.0091	(0.1325)	7,972	0.3037**	(0.1419)	9,319
(11) Actual vs. no RW but allowed	0.4409***	(0.0753)	3,339	-0.0736	(0.0863)	3,811
(12) Actual vs desired RW	0.2879***	(0.0903)	2,175	-0.0599	(0.0966)	2,567
(13) Contracted RW or not	-0.0887	(0.0969)	1,486	0.0446	(0.1148)	1,835

Notes: see Table 2. Definitions of the dummies no WLB induced by a job feature and no WLB induced by a private feature see section 3.1.

Source: Linked Personnel Panel (LPP), wave 1-3.

Three of our items that can lead to work-life imbalance are caused by work conditions (items A-C – see section 3.1) and the others by private life (items D-F

– see section 3.1). Our hypothesis is that the former contribute to the negative WLB effects of home offices. We suppose that the latter improve WLB or have no effect for workers when they switch from working in the office to working at home. If employees are overstrained with the work assignments, this problem concerns them also during leisure, and they cannot achieve a healthy WLB. When they work at home, this problem might intensify because they can work longer to solve the problem and nobody within the firm notices the excessive demand. If imbalance is due to private reasons, an unobserved substitution of leisure by working time or a temporal shift is more possible when working from home. This may improve WLB.

Our empirical investigations reveal negatively significant effects of home offices on work-life balance if the distortion of WLB is induced by reason A - see Table 3, column (1) and lines (1)-(6). These results are confirmed if reason A is substituted by reason B or C – this outcome is not in the Tables. The estimates with reason F show also a positive sign in lines (1)-(5) – see Table 3, column (2) but all these effects are insignificant. Our estimates support the hypothesis that job and private interests are competing goals. This is only partially supported if reason F is substituted by reason D or E – again not in the Tables.

5.2.2 Remote work during or outside of the contracted working hours

A further subgroup analysis should be focused on the question of whether work from home takes place during the contracted working hours or outside of them. The results are presented in lines 7 and 8 of Tables 2 and 3. With respect to WLB, no remarkable differences are revealed in comparison to the outcome of the entire sample. One exception is that now weakly significant effects of working from home outside of contractual working hours are also induced on WLB if private-life reasons are responsible for an imbalance – see column (2), line 8 of Table 3.

5.2.3 Introduction and termination of remote work

So far, we cannot be sure that the estimated effects of working from home on JS/WLB are truly due to working from home or whether people who work from home can be distinguished from others due to unobserved influences and whether the determined effects are permanent. Our hypothesis is as follows: if unobserved factors but not remote work affect JS or WLB , then the introduction of remote work makes the differences between the two groups transparent, which may be also revealed after a termination of remote work. To test this idea, we discriminate between two situations – introduction and termination of remote work. The results of interactions between remote work and time dummies on JS and WLB, respectively, from difference-in-differences estimates (DiD) are

presented in Table 2, lines 9 and 10, where the effects between wave 1 and 2 is considered. The DiD estimates eliminate unobserved influences that do not change over time. This is an advantage compared with other methods applied in the former estimates but DiD react sensitively to temporary fluctuations that affect the treatment and the control group in a different way. We find that the introduction of remote work in wave 2 improves JS, while after the termination the estimates show no significant differences. This speaks in favor of the causal remote work effects. Nevertheless, unobserved variables (e.g., learning effects during the remote work period) may also be a reason that we could not find significant effects on JS in line 10. The influence on WLB is insignificant – Table 2, column 2, lines 9 and 10. This supports the presumption of the mutual importance of unobserved factors. We should note that, in lines 9 and 10, the Big5, risk and schooling variables are suppressed because in waves 2 and 3 these items are only surveyed for workers that are interviewed for the first time. If we incorporate these variables, perfect collinearity between the time dummy, remote work introduction and termination is the consequence.

5.2.4 Employees who can or want to work at home as a control group

Not all employers allow their employees to work at home and not all employees are ready to work at home. Perhaps they do not have an appropriate room or other residents will disturb them at work. Therefore, the employees not working from home do not necessarily form the best control group. In this subsection, we discuss two alternative control groups:

(1) Individuals who do not work from home but remote work is permitted. Employers evaluate advantages of RW higher than the disadvantages but the employees do not want to work from home.

(2) Individuals who do not work from home but who desire to do so (remote work lover). Employees evaluate the advantages higher than the disadvantages, but (currently) they cannot realize remote work.

In the first case, the results in Table 2, line 11 do not differ from that in line 4 or 5. The effect on JS is insignificant and that on WLB negatively significant. In the second case, remote work opponents are excluded. Our hypothesis is: remote work lovers feel worse than remote workers, and even worse than remote work deniers. In comparing these three groups, the former has more difficulty realizing their preferences than others. Indeed, our estimates demonstrate that remote workers are obviously more satisfied than remote work lovers – see Table 2, line 12. The complete estimates of JS are presented in Table A5. Not so clear are the

results for WLB. Remote workers also have a worse WLB compared with remote work lovers.

5.2.5 Working from home agreed to by contract or not

It seems to make a difference whether working from home is based on a detailed contract or not. Our hypothesis is: explicit contracts, instead of loose agreements, on remote work contribute to more job satisfaction and better WLB. A precise contract helps to avoid unpaid overtime working. Employees have a better understanding of what they have to do and what is not necessary. Therefore, we compare remote work with and without an explicit contract. This means we now have different treatment and control groups than hitherto. The results of remote work's effects can be seen in Table 2, line 13 following the specification of LARS selection. The complete estimation is presented in Table A6. We find that the estimates are partially in accord with the hypothesis. Contracts improve the job satisfaction of remote workers. WLB is not significantly improved by an explicit contract, but the positive sign in column (2) indicates the expected direction. Imprecise estimates hinder clearer signals. Furthermore, the different signs of the coefficients in line (13), columns (1) and (2), Table 3 suggest that imbalance due to job factors seems attenuated under contracted RW compared with loose agreements. That, caused by private factors seems to be strengthened.

5.2.6 Further robustness results

The results of five specific estimates should be mentioned. First, we have added individual and family characteristics and interaction variables to specification line 5 in Table 2, namely dummies, whether children younger than 14 years old live in the family (CHILD_14), whether the individual has to take care of sick or old family members (CARE). Furthermore, interactions between these two dummies and the remote work dummy (RW) are incorporated (RW*CHILD_14, RW*CARE). The estimates to job satisfaction (JS) lead to the following results for the most interested influences

We have to say that all interaction effects of remote work are insignificant. We find the same for the pure CARE effect, while the pure GENDER (=1, if man; =0, if woman) and CHILD_14 effects are weakly significant (standard errors in parentheses).

JS = 0.0605 RW - 0.0729 RW*CHILD_14 + 0.0068 RW*CARE
(0.0801) (0.811) (0.1222)
- 0.0683 RW*GENDER + 0.0784 CHILD_14 - 0.0540 CARE
(0.0853) (0.0403) (0.0511)

- 0.0789 GENDER + …
(0.0413)

Second, we have considered additional to line 5 of Table 2 a dummy that documents, whether an employee has a leading position in the company who is a supervisor (BOSS) and the interaction with HOME (HOME*BOSS) and we do not find a significant interaction effect

JS = - 0.0163 RW – 0.0284 BOSS – 0.0637 RW*BOSS + …
(0.0386) (0.0286) (0.0544)

Third, we have checked whether the number of working hours per week from home instead of the binary remote work information changes the previous results. This is not the case when we use the same specification as in Tables 2 and 3, line 5. The signs of the coefficient estimates are the same, except for the JS. There, we find a positive but furthermore insignificant relationship:

JS = 0.0020 RW_hours + ….
(0.0029)

For estimates of RW_hours on the dummy No WLB due to private features the effect is significant

No_WLB = 0.0121 RW_hours + …
(0.0049)

in contrast to Table 3, line 5, column 2.

Fourth, we have verified that singles evaluate JS and WLB different from married people. Also for this robustness check we do not find fundamental differences. Signs and significance are in accord for both groups. Systematic deviations cannot be shown. For JS we obtain the largest differences:

JS = - 0.0284 RW_single + …
(0.0309);

JS = - 0.1268 RW_married + …
(0.0862).

Fifth, we have tested whether the results are robust if SUR estimates are applied instead of single equation estimates for JS and WLB. We find for SUR estimates

JS = - 0.0675RW + … and WLB = -1.4202RW + …
(0.0392) (0.1034)

The estimated coefficients are absolutely larger than in Table 2, lines 4 and 5 but the signs are the same and the degree of significance is comparable.

6 Conclusions

In this paper, we assess the heterogeneity in the effects of working from home on job satisfaction and work-life balance. Based on our empirical strategy, we show the importance of personal traits, as well as employment and job characteristics, on remote work's effects. If these factors are neglected, then positive job satisfaction is overestimated. In the context of work-life balance, the direction of remote work's effects is not changed. The entropy balancing procedure leads to comparable results to those of conventional ordinary least squares estimates, where the estimated coefficient of home offices on job satisfaction is absolutely larger and that of work-life balance is absolutely smaller.

We document substantial heterogeneity that depends on the causes of work-life imbalance. Job-conditioned reasons, but not private ones, are decisive for the outcome that telecommuting has negative effects on work-life balance. The introduction of remote work raises job satisfaction. This is a hint that not only unobserved characteristics but also remote work itself contribute to higher satisfaction in the beginning. However, this effect is not permanent. Neither the introduction nor the termination of remote work reveals a significant, specific influence on work-life balance, while permanent remote work and work-life balance are negatively associated. Therefore, we conclude that unobserved characteristics are mainly responsible and not causal remote work effects. In other words, these unobservable variables determine the preference for working from home and, coincidentally, work-life imbalance. For job satisfaction it is relevant whether a strict contract exists for remote work. In this case, remote work and job satisfaction are positively correlated. It does not make a statistically significant difference whether remote work is performed within or outside of the contracted working hours, although the signs of the coefficients are not the same – the former is positive and the latter is negative. This seems plausible. Longer working hours are accompanied by less job satisfaction.

These results raise the question, which policy might be helpful to nudge those employees to work from home that are more satisfied and have a better work-life balance under this type of work? Firms should extend the possibilities of remote

work and supply strict contracts under which remote work is allowed. They should restrict remote work outside of the contracted working hours to a minimum. They should recommend that their remote workers discuss the advantages of remote work with those who want to work from home. Firms should reduce job-conditioned factors that contribute to work-life imbalances. For instance, they should not make timing too tight so that the tasks can be handled by employees within the prescribed timeframe without resulting in job strain. More job satisfaction increases work motivation and leads to higher performance.

Further research requires more detailed information concerning remote work. Longer time series are necessary demonstrating the development and changes of home office effects. Although the consideration of job conditions has given us new insights avoiding biased estimates, detailed information on the assignment of personal skills to tasks required at the workplace are helpful. A more specific analysis of job characteristic, commitment, and collegiality effects can reveal conditions that are advantageous for employers and employees. Further interaction effects between remote work and job conditions, as well as between personal and job features should be studied. If home-office information on employer-employee level is available, if a comparison before, during and after the corona crisis is possible, we can learn whether COVID-19 has contributed to a substantial structural change.

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Table A1: Summary statistics

	(1) RW=0		(2) RW=1		(3) t-test
	Mean	SD	Mean	SD	
JS	7.489	1.739	7.696	1.535	-6.95
WLB	24.782	4.211	23.248	0.052	20.95
Age	45.432	10.735	45.965	9.362	-2.91
Man	0.698	0.459	0.780	0.415	-10.39
Schooling	10.002	1.643	11.382	1.672	-38.13
German	0.947	0.224	0.966	0.182	-4.97
Risk	5.624	1.872	5.881	1.771	-6.32
Openness	7.535	2.229	7.319	2.096	4.45
Extraversion	6.939	2.215	6.687	2.109	5.55
Conscientiousness	4.830	1.453	5.083	1.449	-7.94
Agreeableness	5.755	1.752	5.963	1.688	-5.45
Neuroticism	9.788	2.365	10.154	2.188	-7.12
Permanent job	0.937	0.243	0.968	0.176	-7.72
Unskilled	0.151	0.358	0.007	0.086	25.32
Craftsman	0.237	0.425	0.023	0.149	31.56
Foreman	0.039	0.194	0.010	0.101	9.15
Master	0.016	0.126	0.008	0.091	3.67
Manager	0.2532	0.0033	0.5077	0.0078	-32.48
Part time	0.140	0.347	0.099	0.298	7.04
Working hours	40.455	10.512	44.884	10.21	-23.85
Training	0.350	0.477	0.547	0.498	-23.37
Log(wage)	7.942	0.493	8.477	0.498	-56.74
Service sector	0.4392	0.0037	0.4352	0.0077	0.46
Manufacturing	0.2575	0.0033	0.2588	0.0030	-0.17
JC1	2.105	1.056	1.685	0.733	23.94
JC2	1.840	0.983	1.541	0.706	18.28
JC3	2.262	1.280	2.120	1.108	6.49
JC4	2.654	1.326	2.719	1.218	2.81
JC5	3.464	1.500	4.522	0.891	-43.10
JC6	3.033	1.544	4.109	1.237	-41.33
JC7	2.544	1.261	1.915	0.920	29.90
COM1	2.164	1.019	2.186	0.946	-1.27
COM2	2.405	1.209	2.447	1.117	-2.01
COM3	2.199	1.029	2.118	0.871	4.82
COM4	2.410	1.058	2.444	0.922	-1.86
COM5	2.264	1.010	2.137	0.826	7.43
COM6	2.191	1.089	2.274	0.987	-4.40
COL1	1.711	0.884	1.662	0.794	3.16
COL2	1.770	0.790	1.765	0.705	0.36
COL3	4.332	0.862	4.444	0.734	-7.57

Source: Linked Personnel Panel (LPP), wave 1-3.

Table A2: LARS selection of variables for job satisfaction (JS), indicating Cp, R-squared and Actions along the sequence of models

step	Cp	R-square	Action
1	1577.4089	0.0000	
2	1544.0320	0.0076	+COM3
3	1366.2664	0.0462	+COM5
4	1101.4022	0.1035	+COM4
5	629.4212	0.2052	+COL3
6	615.2660	0.2087	+JC1
7	487.6212	0.2365	+COM2
8	438.6796	0.2475	+COL1
9	318.6690	0.2736	+Neuroticism
10	224.6827	0.2942	+JC6
11	218.0217	0.2961	+COM1
12	194.1069	0.3017	+Log(wage)
13	149.8189	0.3116	+Schooling
14	130.0550	0.3163	+Training
15	113.9241	0.3202	+COL2
16	107.7526	0.3219	+Conscientiousness
17	66.0710	0.3313	+JC7
18	67.6275	0.3314	+Working hours
19	60.6047	0.3333	+Age
20	41.3373	0.3379	+Risk
21	38.4563	0.3389	+Extraversion
22	39.1612	0.3392	+Part time
23	40.9098	0.3393	+Man
24	36.6794	0.3406	+Master
25	37.8304	0.3408	+JC5
26	29.5375*	0.3430	+Foreman
27	30.4086	0.3433	+German
28	31.9659	0.3433	+JC2
29	32.2383	0.3437	+Craftsman
30	32.2954	0.3441	+JC4
31	33.6159	0.3443	+Openness
32	34.1926	0.3446	+JC3
33	32.3681	0.3454	+Unskilled
34	31.9930	0.3459	+Agreeableness
35	33.6065	0.3460	+Permanent contract
36	35.0363	0.3461	+COM6
37	37.0000	0.3461	+Remote work

Note: * indicates the smallest value for Cp. Variables in lines 27-37 are excluded in estimates that are based on LARS except remote work.

Source: Linked Personnel Panel (LPP), wave 1-3.

Table A3: Estimates of remote work effects on job satisfaction (JS) based on LARS selection

Ordered probit regression — Number of obs = 10,605; Wald chi2(26) = 3327.93; Prob > chi2 = 0.0000; Log pseudolikelihood = -16651.248; Pseudo R2 = 0.1253

JS	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Remote work	-.0392267	.0291706	-1.34	0.179	-.0963999	.0179466
Extraversion	-.0250991	.0052768	-4.76	0.000	-.0354414	-.0147568
Conscientiousness	-.0615994	.0081221	-7.58	0.000	-.0775184	-.0456805
Neuroticism	.0442537	.0050324	8.79	0.000	.0343904	.0541169
JC1	-.135319	.0119471	-11.33	0.000	-.158735	-.1119031
JC5	.0102438	.0095201	1.08	0.282	-.0084152	.0289028
JC6	.0689281	.0087237	7.90	0.000	.05183	.0860262
JC7	.0884772	.0098424	8.99	0.000	.0691865	.1077679
COM1	-.0720043	.0134887	-5.34	0.000	-.0984417	-.0455669
COM2	-.0661213	.0111485	-5.93	0.000	-.0879719	-.0442707
COM3	-.1501526	.0150889	-9.95	0.000	-.1797264	-.1205788
COM4	-.1316232	.0146772	-8.97	0.000	-.1603901	-.1028563
COM5	-.1348885	.0158432	-8.51	0.000	-.1659406	-.1038363
COL1	-.1353089	.015818	-8.55	0.000	-.1663116	-.1043061
COL2	-.0602325	.0165863	-3.63	0.000	-.0927411	-.0277239
COL3	.1882595	.0144256	13.05	0.000	.1599858	.2165332
Foreman	.102133	.0600732	1.70	0.089	-.0156082	.2198742
Master	.1718118	.0920588	1.87	0.062	-.0086201	.3522438
Man	-.0779116	.0282815	-2.75	0.006	-.1333423	-.0224809
Age	.0058735	.0009976	5.89	0.000	.0039184	.0078287
Part time	-.0699487	.0419686	-1.67	0.096	-.1522057	.0123082
Training	.1001012	.0214657	4.66	0.000	.0580292	.1421731
Risk	.0275185	.0065379	4.21	0.000	.0147044	.0403327
Schooling	-.0625353	.006758	-9.25	0.000	-.0757807	-.0492898
Working hours	-.0053892	.001275	-4.23	0.000	-.0078881	-.0028903
Log(wage)	.220272	.0298112	7.39	0.000	.1618431	.2787009
/cut1	-2.673621	.2570319			-3.177395	-2.169848
/cut2	-2.462112	.2531632			-2.958303	-1.965921
/cut3	-2.156811	.2505089			-2.6478	-1.665823
/cut4	-1.730506	.2497456			-2.219999	-1.241014
/cut5	-1.36	.248989			-1.84801	-.8719911
/cut6	-.8366159	.2488007			-1.324256	-.3489754
/cut7	-.451825	.2486938			-.9392559	.035606
/cut8	.2784222	.2487804			-.2091784	.7660227
/cut9	1.527062	.2493759			1.038294	2.01583
/cut10	2.366612	.2505015			1.875638	2.857586

Source: Linked Personnel Panel (LPP), wave 1-3.

Table A4: Comparison of the mean, variance and skewness of the treatment group with that of the control group after entropy balancing

	Treatment group			Control group		
	Mean	Variance	Skewness	Mean	Variance	Skewness
JC1	1.643	.5209	1.3	1.643	.4996	1.206
JC2	1.51	.4982	1.625	1.51	.5316	1.777
JC3	2.069	1.202	1.087	2.069	1.287	1.103
JC4	2.681	1.532	.3043	2.681	1.557	.3352
JC5	4.528	.806	-2.218	4.528	.8542	-2.281
JC6	4.106	1.572	-1.241	4.106	1.569	-1.262
JC7	1.885	.8239	1.15	1.885	.8682	1.17
COM1	2.171	.9273	.7618	2.171	1.01	.7447
COM2	2.495	1.289	.5178	2.495	1.434	.483
COM3	2.147	.7839	.7921	2.147	.9035	.8306
COM4	2.463	.8463	.5085	2.463	.9569	.5616
COM5	2.164	.6921	.7499	2.164	.7982	.7681
COM6	2.297	.9975	.6225	2.297	1.074	.6543
COL1	1.662	.5997	1.324	1.662	.6417	1.359
COL2	1.755	.5004	.9587	1.755	.5233	1.024
COL3	4.405	.5781	-1.148	4.405	.5979	-1.267
Openness	7.333	4.355	.1365	7.333	4.594	.121
Extraversion	6.699	4.451	.377	6.699	4.682	.4059
Conscientious	5.142	2.124	.5686	5.142	2.221	.4893
Agreeableness	5.942	2.869	.4318	5.942	2.918	.3588
Neuroticism	10.16	4.879	-.4145	10.16	4.873	-.2873
Unskilled	.008167	.008105	10.93	.008242	.008175	10.88
Craftsman	.02144	.02099	6.608	.02145	.021	6.606
Foreman	.009188	.009109	10.29	.009188	.009104	10.29
Master	.006636	.006595	12.15	.006635	.006592	12.15
Man	.7754	.1742	-1.32	.7754	.1742	-1.32
Age	45.36	91.59	-.4231	45.36	113.2	-.503
German	.9607	.03778	-4.742	.9607	.03778	-4.741
Part time	.09597	.0868	2.743	.09597	.08677	2.743
Training	.5227	.2496	-.09096	.5227	.2495	-.09085
Schooling	11.4	2.788	-.5016	11.4	2.741	-.4672
Log(wage)	8.457	.2344	-.3172	8.457	.5128	2.382

Source: Linked Personnel Panel (LPP), wave 1-3.

Table A5: Estimates of remote work's effects on job satisfaction (JS) based on LARS selection and employees who want to work at home as control group

Ordered probit regression — Number of obs = 2,744; LR chi2(26) = 1317.56; Prob > chi2 = 0.0000; Log likelihood = -4174.9234; Pseudo R2 = 0.1363

JS	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Remote work	.1290	.0526	2.45	0.014	.0258	.2322
Extraversion	-.0304	.0102	-2.97	0.003	-.0506	-.0103
Conscientiousness	-.0337	.0148	-2.28	0.023	-.0627	-.0047
Neuroticism	.0490	.0097	5.03	0.000	.0299	.0681
JC1	-.1623	.0253	-6.41	0.000	-.2119	-.1127
JC5	-.0090	.0213	-0.42	0.672	-.0509	.0328
JC6	.0593	.0175	3.38	0.001	.0249	.0937
JC7	.1208	.0213	5.66	0.000	.0789	.1626
COM1	-.0888	.0259	-3.42	0.001	-.1397	-.0379
COM2	-.0745	.0216	-3.44	0.001	-.1170	-.0320
COM3	-.1887	.0283	-6.67	0.000	-.2443	-.1332
COM4	-.1285	.0268	-4.79	0.000	-.1811	-.0759
COM5	-.0939	.0294	-3.19	0.001	-.1517	-.0361
COL1	-.1394	.0296	-4.71	0.000	-.1975	-.0814
COL2	-.0490	.0313	-1.57	0.117	-.1104	.0122
COL3	.2789	.0276	10.08	0.000	.2247	.3332
Foreman	-.1990	.1771	-1.12	0.261	-.5461	.1481
Master	.1049	.2087	0.50	0.615	-.3041	.5140
Man	-.0915	.0553	-1.65	0.098	-.2000	.0169
Age	.0097	.0021	4.49	0.000	.0055	.0140
Part time	-.1291	.0853	-1.51	0.130	-.2964	.0381
Training	.0375	.0414	0.91	0.365	-.0436	.1187
Risk	.0255	.0120	2.12	0.034	.0018	.0491
Schooling	-.0765	.0133	-5.74	0.000	-.1027	-.0504
Working hours	-.0043	.0026	-1.65	0.098	-.0096	.0008
Log(wage)	.1415	.0559	2.53	0.011	.0318	.2513
/cut1	-2.9449	.4648			-3.8560	-2.0338
/cut2	-2.7001	.4594			-3.6005	-1.7996
/cut3	-2.4419	.4554			-3.3345	-1.549
/cut4	-1.9401	.4515			-2.8251	-1.0552
/cut5	-1.4879	.4499			-2.3698	-.60607
/cut6	-1.0484	.4492			-1.9289	-.16783
/cut7	-.61020	.4492			-1.4906	.27024
/cut8	.16730	.4496			-.7139	1.0485
/cut9	1.4464	.4503			.5636	2.3291
/cut10	2.4742	.4506			1.5909	3.3576

Source: Linked Personnel Panel (LPP), wave 1-3.

Table A6: Estimates of contractual remote work's effect on job satisfaction (JS) based on LARS selection – employees without contractual remote work as a control group

Ordered probit regression		Number of obs	=	1,962
		Wald chi2(26)	=	622.87
		Prob > chi2	=	0.0000
Log pseudolikelihood = -2869.4491		Pseudo R2	=	0.1387

JS	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Contractual RW	.1105	.0551	2.00	0.045	.0024	.2185
Extraversion	-.0450	.0128	-3.51	0.000	-.0702	-.0198
Conscientiousness	-.0311	.0190	-1.63	0.102	-.0685	.0062
Neuroticism	.0665	.0122	5.42	0.000	.0424	.0905
JC1	-.1871	.0400	-4.67	0.000	-.2656	-.1087
JC5	-.0794	.0323	-2.45	0.014	-.1429	-.0159
JC6	.0510	.0234	2.17	0.030	.0049	.0970
JC7	.1308	.0286	4.57	0.000	.0746	.1870
COM1	-.1083	.0338	-3.20	0.001	-.1746	-.0420
COM2	-.0849	.0287	-2.95	0.003	-.1413	-.0284
COM3	-.1521	.0407	-3.74	0.000	-.2319	-.0722
COM4	-.1323	.0352	-3.75	0.000	-.2015	-.0631
COM5	-.0951	.0397	-2.40	0.017	-.1730	-.0173
COL1	-.1892	.0390	-4.85	0.000	-.2657	-.1127
COL2	-.0052	.0405	-0.13	0.897	-.0847	.0742
COL3	.3280	.0356	9.19	0.000	.2581	.3980
Foreman	-.4051	.3104	-1.30	0.192	-1.013	.2033
Master	-.2289	.2389	-0.96	0.338	-.6971	.2393
Man	-.0504	.0670	-0.75	0.452	-.1819	.0809
Age	.0122	.0026	4.60	0.000	.0070	.0174
Part time	-.0241	.1106	-0.22	0.827	-.2409	.1926
Training	.0391	.0486	0.80	0.421	-.0561	.1343
Risk	.0293	.0158	1.85	0.064	-.0016	.0604
Schooling	-.0648	.0154	-4.20	0.000	-.0950	-.0345
Working hours	-.0021	.0029	-0.73	0.468	-.0079	.0036
Log(wage)	.0878	.0663	1.33	0.185	-.0420	.2178
/cut1	-3.2890	.6297			-4.5233	-2.0548
/cut2	-3.0096	.5968			-4.1793	-1.8398
/cut3	-2.7101	.5832			-3.8534	-1.5669
/cut4	-2.1919	.5795			-3.3277	-1.0561
/cut5	-1.7001	.5771			-2.8314	-.56891
/cut6	-1.3282	.5787			-2.4625	-.19398
/cut7	-.8609	.5788			-1.9956	.2736
/cut8	-.0917	.5794			-1.2273	1.0439
/cut9	1.2441	.5818			.1036	2.3845
/cut10	2.3107	.5872			1.1597	3.4618

Source: Linked Personnel Panel (LPP), wave 1-3.