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Working from Home: Heterogeneous Effects on Hours Worked and Wages

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Abstract

Working from home (WfH) has become much more common since the early 2000s. We exploit the German Socio-Economic Panel between 1997 and 2014 to investigate how such a work arrangement affects labour market outcomes and life satisfaction. We find that childless employees work an extra hour per week of unpaid overtime and report higher satisfaction after taking up WfH. Among parents, WfH reduces the gender gap in working hours and monthly earnings, as contractual hours increase more among mothers. Hourly wages, however, increase with WfH take-up among fathers, but not among mothers unless they change employer. This points to poorer bargaining outcomes for women compared to men when staying with the same employer. Controlling for selection into paid employment due to changes in unobserved characteristics or preferences does not affect the magnitude of the effects.

JEL codes: J2, J31, O33

Keywords: working from home, working hours, wages, gender, flexible work arrangements.

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1 Introduction

Over the past two decades, progress in information and communication technologies (ICT) has made it easier to perform tasks outside of the workplace because of better connectivity through broadband internet, as well as cheaper, more user-friendly computers. This made working from home (WfH) feasible for a wider range of tasks, and likely reduced the employer costs of providing such arrangements. Vazquez and Winkler (2017), for instance, present evidence that the share of people WfH in the EU increased by more than 15 percent in ICT intensive industries after a telecommunication reform reduced the costs of remote working. In line with decreasing costs of WfH during the past two decades, there has been a major expansion of WfH in many advanced economies such as the US, Nordic and Central European countries.[1] Among certain groups of workers, such as managers, working from home has become a mainstream practice (Bloom et al., 2015). In this context, more flexibility in where to work is expected to reduce the earnings gap between individuals with different private responsabilities, such as men and women (Goldin and Katz, 2011).

In light of the growing relevance of WfH, understanding how this work practice affects workers' wages, careers and well-being is highly relevant for policy makers who are responsible for designing the legal framework that may support or limit the diffusion of such work practices. Yet, while labour supply responses to WfH are expected to be positive, the theoretical expectations are far from clear-cut when it comes to wages. On the one hand, if WfH is costly to employers and mainly serves to reconcile work and family responsibilities on the side of workers, it is likely to go along with a wage penalty. If, on the other hand, the cost of providing WfH arrangements is low and WfH increases productivity due to a beneficial work environment at home, or due to workers' willingness to extend their availability beyond usual office hours, it may increase wages and career prospects. Hence, the effects of WfH are ambiguous and may be heterogeneous across individuals depending on the underlying motives.

This paper contributes to the limited and mixed evidence on labour market outcomes of WfH by providing new empirical evidence for Germany during a period of massive expansion of WfH.[2] In particular, our analysis provides comprehensive insights on how the take-up of WfH affects a whole set of related potential outcomes: namely, contractual hours, overtime hours, hourly wages, and monthly earnings. We also investigate the role of compensating wage differentials using information on job and life satisfaction, and take

[1] Evidence on high and rising shares of employees working at home at least occasionally can be found for the U.S. (Lister and Harnish, 2011), and for Nordic and Central European countries (see Welz and Wolf, 2010; Brenke, 2014; Vilhelmson and Thulin, 2016, among others) .

[2] See section 2 for a review of the existing literature.

into account other schemes used to compensate overtime such as time off. In that way, we complement earlier studies that focus on responses in working hours and disregard compensations for increased working hours other than wages. Moreover, we study the case of employees working from home at least once a month, hence departing from the older literature that focuses on the less common case of home being the only workplace (Edwards and Field-Hendrey, 2002; Oettinger, 2011).

As a second contribution, we examine the heterogeneity of these effects across groups of workers with a particular focus on differences between men and women, as well as parents and non-parents. The existing literature often fails to dig deeper into the heterogeneity of WfH effects across workers. Yet, as these groups tend to differ in terms of the opportunity costs of working and labour force attachment, the effects of WfH are expected to vary across these groups. By carving out the differences by gender and parental status, we thus also contribute to the debate on the role of schedule constraints as a source of gender differences in working hours and wages (Goldin and Katz, 2011; Goldin, 2014) and the role of flexible work arrangements and "family friendly" workplaces as a means of reconciling work and family responsibilities (see Allen et al., 2015; Hotz et al., 2017, among others) .

Thirdly, we address the potential endogeneity of WfH by accounting for time-invariant unobserved individual heterogeneity in abilities, preferences and working attitudes and by controlling for an extensive set of time-varying demographic and job-related variables. We also control for gender-specific industry and occupation fixed-effects to account for unobserved heterogeneity in the composition of the workforce across jobs. Still, this approach might not suffice to deal with selection biases if there are unobserved shocks that affect labour supply decisions as well as the decision to work from home. Hence, we also correct for sample selection biases due to changes in unobserved preferences or characteristics using a control function approach in a panel data setting. So far, most studies on the wage effect of WfH used cross-sectional data only (Schroeder and Warren, 2004; Weeden, 2005; Gariety and Shaffer, 2007; Leslie et al., 2012). Yet, these results likely suffer from an upward bias since WfH schemes are more often offered by high performance firms to workers who are positively selected among a firm's workforce (Osterman, 1995; Bloom and Van Reenen, 2006; Kelly and Kalev, 2006). Indeed, we show that OLS estimates are upwardly biased for both hours and wages when these concerns are not addressed.

Finally, we provide novel insights into the channels of the WfH effects by examining to what extent the take-up of WfH goes along with firm changes or job promotions. We are thus able to shed light on the role of such career movements in explaining part of the WfH effects. If there is, for instance, a wage premium for WfH, it is informative to understand whether this applies only to workers with simultaneous career movements or whether it

also applies to workers with otherwise unchanged jobs.

We find that the incidence of WfH in Germany increased by about 50 percent between 1997 and 2014. Moreover, men used to work from home more often than women at the start of the 2000s, but this gender gap in WfH reversed during the period considered. Our findings suggest that this take-up of WfH leads to an expansion of overtime hours among childless men and women by one hour a week and a weakly significant increase in job satisfaction despite no compensation in terms of wages or time-off. All things considered, these results suggest that childless employees value the increased flexibility that WfH allows. Among parents, WfH increases contractual hours by 0.4 hours a week among fathers and by 3.5 hours per week among mothers. This increase in working hours corresponds to an increase in monthly earnings of 16 percent for women and roughly 2 percent for men, thereby strongly reducing the gender gap in monthly earnings. In addition, hourly wages increase on average by 12 percent for mothers and 7 percent for fathers. Looking deeper into the factors driving this increase, we find that the hourly wage increase for mothers only applies to those who changed employer before, while for men, the wage gain also applies to those remaining with the same employer. Even though there is no clear evidence that WfH reduces the gender gap in hourly wages, our findings support the idea that WfH arrangements may help mothers to remain attached to the labour market, thereby reducing the gap in hours worked and monthly earnings with their male counterparts. Moreover, we find no significant effects on life satisfaction for parents, thus we cannot provide supporting evidence of a better work-life balance with WfH. Controlling for selection into paid employment due to time-varying unobserved preferences or characteristics does not affect the magnitude of the effects. Our results are robust to several robustness checks.

The rest of the paper is organized as follows. In section 2 we discuss the theoretical expectations regarding the effect of WfH on various outcomes and review existing findings. Section 3 describes the data and provides some facts and trends in WfH incidence and labour market outcomes across different groups of workers. We discuss the empirical strategy in section 4, and present the results in section 5. The last section concludes.

2 Labour Market Outcomes of WfH - a Review

2.1 Labour supply effects

From a theoretical perspective, there are two reasons why WfH may have positive effects on labour supply both at the extensive and intensive margin. Firstly, WfH can save on commuting time by avoiding daily commutes or by enabling employees to commute at different times outside rush hours. Secondly, WfH may reduce schedule constraints that

stem from private commitments, such as childcare, during standard working hours. With WfH, it may be possible to meet private needs during usual office hours without reducing the number of working hours. Moreover, WfH may allow couples to better synchronize work and leisure time. An increase in time flexibility for at least one spouse, for instance, has been found to increase the overlap hours at home by one hour per day (Bryan and Sevilla Sanz, 2014). In a standard labour supply framework, these advantages attached to WfH reduce the time cost of working, raise the utility level for a given number of working hours, and may thus result in positive labour supply responses both at the extensive and intensive margin (Cogan, 1981; Black et al., 2014). Moreover, employees with pronounced family responsibilities will be especially likely to increase labour supply when they gain flexibility in work location. Therefore, WfH is expected to be one potential means of narrowing the gender gap in working hours, including overtime, that has recently been considered a main source of the gender wage gap (Goldin, 2014; Cortes and Pan, 2019).

To the best of our knowledge, there are no empirical studies explicitly focussing on the effect of WfH on the extensive margin. However, Dettling (2017) demonstrates that access to broadband Internet significantly increases female labour supply on average by about 4 percentage points, and by 8 percent among high-skilled mothers. She considers telework and time saved in home production to be the channels which likely explain how internet access encourages women with strong schedule constraints to enter the labour market. Furthermore, if WfH reduces commuting time, empirical evidence on the link between commuting and labour supply also suggests that WfH may increase labour force participation. For instance, Black et al. (2014) show that U.S. metropolitan areas with larger increases in average commuting time between 1980 and 2000 experienced slower growth in married women's labour force participation.

Empirical evidence on the effect of WfH on the intensive margin of the labour supply is also quite limited, but tends to suggest a moderate extension effect of WfH on overtime rather than contractual hours. Evidence by Noonan and Glass (2012) point to a positive association between WfH and longer overtime hours in the US, although the use of cross-sectional analysis may give rise to an estimation bias, as workers who telecommute have been shown to be positive selected with regard to hours worked and other performance measures. Controlling for individual fixed effects, Possenriede et al. (2016) also find that teleworking results in an extension of overtime hours for both men and women in the Netherlands, and a marginally significant increase in contractual hours for women only. The channels driving these results are unclear though. These positive effects of WfH on working hours are unlikely to be mostly driven by the time and costs saved on commuting. Gutiérrez-i Puigarnau and van Ommeren (2010), for instance, show that, conditional on

labour force participation, longer commutes do not have a negative effect on weekly working hours. Even if employees with long commutes reduce the number of working days, they compensate with longer daily hours when at work. Moreover, commuting distance does not seem to be a major determinant of the number of hours worked at home relative to the office in the Netherlands (de Graaff and Rietveld, 2007). Hence, adjustments at the intensive margin are more likely to be driven by reduced schedule constraints rather than reduced commuting costs.

2.2 Wage effects

In contrast to the expected labour supply effects, the theoretical effects of WfH on wages are ambiguous, potentially giving rise to both a wage premium or a wage penalty. In particular, the wage effect of WfH can be related to a hedonic effect, a productivity effect, as well as a signalling effect.

The hedonic wage effect reflects a worker's willingness to pay for certain favorable job amenities or the need to be compensated for unfavorable job characteristics. Workers for whom WfH raises utility due to reconciling schedule constraints or saving on commuting time might trade WfH not only for leisure, but also for wages, hence giving rise to a compensating wage differential. In contrast, workers who do not value WfH but do it in response to employer needs, e.g. to work beyond usual office hours, or to save on office space, may be compensated by higher wages. The hedonic effect can thus potentially go in both directions depending on the reasons for WfH. Evidence from an experimental recruitment study, which randomly offered different job amenities to applicants for a call center job, suggests that, on average, both men and women attach a positive value to working from home, and are willing to pay for this option by 8 percent of their wage. Yet, women's willingness to pay for WfH exceeds that of men, especially among parents with young children, suggesting that WfH might actually increase the gender wage gap (Mas and Pallais, 2017). In line with this, a recent study by Lott and Chung (2016) finds that flexible work schedules result in increased overtime for both men and women that is compensated for by higher annual earnings only for men; hence reinforcing gender earnings gaps. While the latter paper controls for workplace positions and job authority, Viete (2018) finds that trust-based work time reduces the within-firm gender daily wage gap by allowing women to do more complex tasks and climb up the job ladder.

Moreover, the wage effects might not only depend on the actual motives to WfH, but on how these motives are perceived by the employer. Leslie et al. (2012), for instance, finds evidence within an experimental setting that whether flexible work arrangements result in career premia or penalties depends on whether managers attribute the use of such

arrangements to personal or job motives, irrespective of an employee's actual behaviour or attitude in the job. Hence, the (perceived) signal attached to the WfH decision may also affect workers' career prospects, and may result in gendered outcomes because WfH by female workers tends to be associated with private needs while WfH by male workers tends to be considered as mainly serving business needs.

In addition, WfH may have both a positive or a negative productivity effect. Positive productivity effects may arise if WfH increases motivation in response to less conflicting time schedules or comes with a more productive work environment, at least for certain tasks. On the other hand, monitoring a worker's effort at home is difficult and may result in shirking, especially when occasionally being interrupted by family members or other private responsibilities. In a competitive labour market, such productivity effects would be reflected in a worker's wage level. Evidence on the productivity effects of WfH is inconclusive, but seems to suggest positive effects more often than negative effects (Gajendran and Harrison, 2007). In an experimental setting, Bloom et al. (2015) find a 13 percent performance increase among call center employees that were allowed to work from home, while Dutcher (2012) suggests that positive performance outcomes may be limited to creative rather than routine tasks. de Graaff and Rietveld (2007) present evidence for the Netherlands that a wage penalty of 19 percent for working at home is almost reduced to zero once workers have access to the internet, suggesting that available technologies may affect the productivity of working from home. Similarly, Oettinger (2011) shows that the expansion of home-based work was strongest in occupations with a greater growth in IT use and that this expansion was accompanied by a declining wage penalty for home-based work.

Hence, WfH and similar work arrangements may theoretically give rise to both a wage premium and a wage penalty. Reflecting this ambiguity, empirical studies have found mixed evidence. While some studies suggest a wage penalty for WfH (Glass, 2004), others suggest positive wage effects (Schroeder and Warren, 2004; Weeden, 2005; Gariety and Shaffer, 2007; Leslie et al., 2012). Yet, most of these studies use cross-sectional data only and may thus be upwardly biased if the positive selection of WfH practices at the level of firms and workers is not taken into account. As an exception, Glass and Noonan (2016) exploit US individual panel data to control for individual fixed effects, as well as information on firms' characteristics, and find a wage penalty for WfH during overtime, but not during contractual hours. These average effects might hide heterogeneous responses across groups with different private constraints, as discussed earlier.

2.3 Job and life satisfaction

If WfH reduces schedule constraints and lowers the fixed costs of working due to reduced commuting costs, we would expect WfH to raise the utility associated with a given level of hours and wages. Since job satisfaction should capture the utility attached to job amenities, such as WfH, job satisfaction should be higher among those working from home than among otherwise comparable workers without WfH arrangements. Indeed, studies from the sociological or management literature support the view that an increased autonomy over when and where to work raises job satisfaction (Kröll and Nüesch, 2017; De Menezes and Kelliher, 2017; Wheatley, 2017). However, the value attached to flexible work arrangements such as WfH may differ across workers and may be particularly pronounced among women whose willingness to pay for such work arrangements has been show to exceed men's (Mas and Pallais, 2017). As discussed above, the value attached to WfH may give rise to a compensating differential in terms of increased hours and/or lower wages. Hence, wage and hours adjustments need to be taken into account in order to assess the uncompensated value that workers attach to such work practices.

Life satisfaction depends on both the satisfaction derived from the job and the private domain. Hence, life satisfaction is likely to be positively affected by WfH for individuals whose job satisfaction improves with WfH. In addition, however, WfH may exert either positive or negative effects on the private domain. This is because WfH may facilitate the reconciliation of family and job needs, but at the same time generate new sources of conflict and stress at home (Baines and Gelder, 2003; Sullivan, 2012; Song and Gao, 2018). Hence, WfH could be more or less favorable to overall life satisfaction depending on the interactions between private life and work. These interactions are likely to differ by gender and parental status, as illustrated by the paradox of the decline in female happiness (Stevenson and Wolfers, 2009). In spite of better access to the labour market and better control on family formation, women report lower well-being, both in absolute terms and relative to men, than four decades ago. One argument stresses that it is more difficult to achieve the same level of satisfaction on multiple domains, in the case of women or parents, not only from home and family, but also from work. While WfH is expected to increase labour supply, especially among women and parents, it is unclear whether this stronger labour market attachment will translate into better satisfaction or into new expectations and more pressure.

3 Data and descriptive statistics

3.1 The German Socio-Economic Panel

The German Socio-Economic Panel (SOEP) is a panel dataset for the years 1984-2014 consisting of around 20,000 individuals living in Germany.[3] It includes detailed individual and household-level characteristics and also provides information on working from home in five waves (1997, 1999, 2002, 2009 and 2014). In these waves, individuals were asked whether they sometimes work from home and, if so, whether they do it on a daily, weekly or monthly basis. Note that this information does not capture the actual intensity of WfH, as we do not have any information on the number of hours worked at home or whether WfH takes place during normal office hours or during overtime. We construct a dummy variable equal to one if the individual works from home at least once a month and test for the robustness of the results when using weekly WfH instead. Among those working from home at least once a month, 14% do it every day, 45% do it at least once a week, and 41% do it once every two to four weeks. Hence, we focus on occasional home-based work. Moreover, note that we exclude those whose main place of work is their home. We thus focus on WfH as a complement to on-site work.[4]

We use a sample of employees between 20 and 65 years old for whom we have information on whether or not they work from home in at least two waves. We exclude self-employed individuals, individuals whose main place of work is their home, individuals in formal education and training, and individuals in marginal employment (i.e. those earning less than 400-450 euros per month). We also exclude teaching and religious occupations from the sample, since the majority of individuals in these occupations have always been working from home.

Moreover, we focus on WfH take-up only, and drop individual observations after individuals stop working from home. The reason for this is that the effects of take-up and drop-outs are unlikely to be symmetric. The sample is thus composed of never-takers, always-takers and individuals who switch from not using WfH in the first wave(s) to using WfH later on. Hence, we estimate the effect of working from home by exploiting the take-up decisions only. We end up with an unbalanced panel of 7,602 individuals (21,392 observations), 46 percent of whom are women, who we observe for 2 to 5 waves over the period 1997-2014.[5]

[3] See SOEP (2013) and Wagner et al. (2007) for details on the SOEP data set.

[4] Besides, we do not identify telecommuting or teleworking, nor a broader definition of remote work.

[5] Table A.1 shows the number of observations by year, gender and WfH status. For those working from home, it also distinguishes between those already WfH in the previous wave and those who recently started WfH (156 women and 226 men).

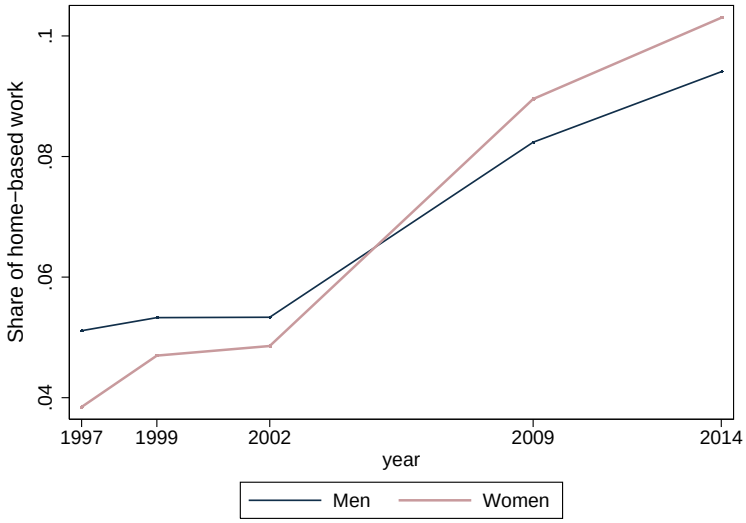
Concerning working hours, the data allows us to distinguish between contractually agreed weekly working hours and actual weekly working hours (i.e. the number of hours generally worked every week). Overtime hours are calculated as the difference between actual working hours and contractually agreed working hours. We trim overtime hours by excluding the 1st and the 99th percentile, which implies excluding observations with negative overtime hours and more than 23 overtime hours per week. Hourly wages are measured through the self-reported monthly gross earnings divided by actual monthly working hours. We calculate real wages based on the CPI deflator using 2010 as the base year. In order to ensure that outliers are not driving the wage results, we also trim hourly wages excluding the 1st and the 99th percentile (individuals receiving an hourly wage lower than EUR 4 or higher than EUR 50) and we employ the standard logarithmic form for the wage regressions. Job and life satisfaction are measured on an 11-point Likert scale.

3.2 Trends in working from home and descriptive statistics

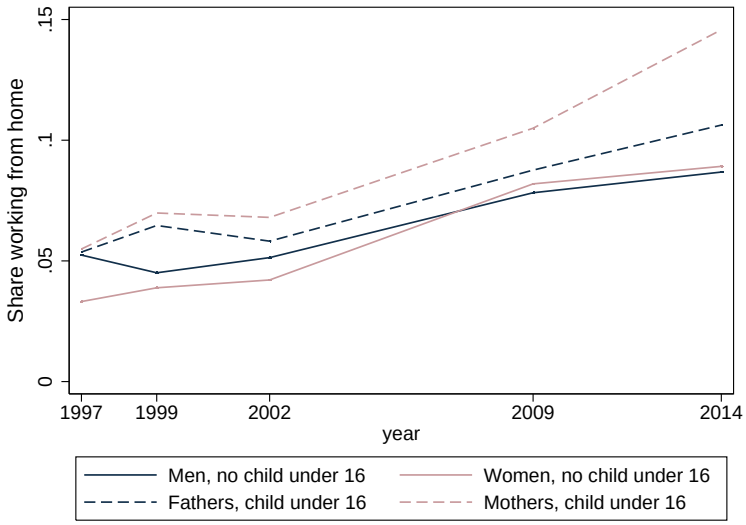
The share of individuals working from home has increased in Germany over the past 20 years (see Figure 1a). Among men, the share of employees working from home almost doubled from around 5 percent in the late 1990s to 9 percent in 2014. At the same time, the share of women working from home increased from 4 percent to more than 10 percent, which resulted in a reversal of the gender gap in the share of employees working from home. Moreover, this reversal seems to be driven mainly by mothers (see Figure 1b). While employees without children below age 16 experienced only a moderate increase of WfH, the incidence of WfH among mothers tripled from 5 percent to 15 percent in less than 20 years while the corresponding share among fathers only doubled during the same period. This suggests that the extension of the WfH decision is unlikely to be driven by firms' demands only, but also by supply-side motives of reconciling family and work responsibilities.

Table 1 provides summary statistics by gender and WfH status. It shows that individuals working from home differ from individuals working on-site only. On average, employees working from home are older, are more likely to have a university degree and are less likely to have a migration background (i.e. have migrated to Germany or have parents who migrated). When it comes to the household context, they are more likely to live in a couple and to have an employed partner with relatively high earnings. Individuals working from home also tend to commute longer distances, which confirms that WfH may be used to save on commuting costs. Moreover, a higher fraction of individuals working from home have children compared to pure on-site workers, particularly among women. This fact is consistent with the idea that WfH may be used to better combine work and

Figure 1: Trends in working-from-home by gender



(a) By gender



(b) By gender & parenthood

Source: SOEP. 1997, 1999, 2002, 2009 and 2014 waves. Individuals working from home at least once a month.

family responsibilities.

Turning to job characteristics, WfH is much more common in larger firms while firm tenure is not related to the WfH status. Finally, employees working from home earn higher wages and work longer overtime hours than employees working in the office only, suggesting that employees with this type of work arrangement are positively selected. Later on, we will consider this selectivity in our identification strategy.

Table 1: Summary statistics by working from home status and gender

	Female				Male			
	WfH	No WfH	Difference (t-stat.)		WfH	No WfH	Difference (t-stat.)	
Panel A: Outcome variables								
Actual working hours per week	36.06	35.13	0.94*	(1.66)	46.97	42.43	4.54***	(17.06)
Contracted working hours per week	31.66	32.82	-1.15**	(-2.31)	38.99	38.76	0.23	(1.54)
Overtime hours per week	4.40	2.31	2.09***	(10.43)	7.98	3.67	4.31***	(20.15)
Gross hourly real wages	18.47	13.48	4.99***	(16.43)	21.94	16.31	5.63***	(19.47)
Panel B: Main explanatory variables								
Migration background	0.15	0.19	-0.04*	(-1.79)	0.11	0.22	-0.11***	(-5.77)
Married (or cohabitating)	0.86	0.76	0.10***	(4.04)	0.88	0.81	0.07***	(3.84)
Age	43.51	42.30	1.21**	(2.05)	44.32	42.29	2.02***	(4.41)
Child aged 0-2	0.05	0.02	0.03***	(3.44)	0.08	0.09	-0.01	(-0.80)
Child aged 3-5	0.12	0.05	0.07***	(5.31)	0.10	0.08	0.02	(1.54)
Child aged 6-15	0.28	0.23	0.05*	(1.95)	0.28	0.24	0.04**	(2.13)
Child older than 15	0.31	0.40	-0.09***	(-3.05)	0.21	0.21	-0.01	(-0.30)
Tertiary education degree	0.48	0.19	0.29***	(12.66)	0.56	0.17	0.40***	(22.72)
Vocational qualification	0.47	0.68	-0.21***	(-7.75)	0.39	0.71	-0.32***	(-15.53)
Part-time work experience (in years)	5.19	4.88	0.31	(0.79)	0.92	0.39	0.53***	(7.45)
Full-time work experience (in years)	14.02	13.84	0.19	(0.32)	19.61	20.20	-0.59	(-1.23)
Urban region	0.70	0.66	0.05*	(1.72)	0.75	0.66	0.09***	(4.02)
Civil servant	0.31	0.35	-0.04	(-1.50)	0.27	0.22	0.04**	(2.33)
Large firm (>200 empl.)	0.58	0.47	0.10***	(3.58)	0.67	0.53	0.14***	(6.21)
Small firm (<20 empl.)	0.24	0.23	0.01	(0.51)	0.10	0.17	-0.07***	(-3.84)
Firm tenure (in years)	11.37	10.72	0.66	(1.23)	12.42	12.64	-0.22	(-0.45)
Commuting distance (in km)	28.78	14.59	14.20***	(7.48)	44.26	24.00	20.27***	(7.27)
Partner in paid employment	0.86	0.83	0.03	(1.10)	0.67	0.61	0.06**	(2.43)
Partner's earnings	4824.89	2915.43	1909.45***	(11.89)	2057.67	1598.92	458.75***	(7.01)
Observations	309	9,601			498	11,026		

Source: SOEP, sample of 7,602 employed workers (21,392 observations) from the 1997, 1999, 2002, 2009 and 2014 waves. Note: The table displays summary statistics on the main control variables by WfH status. The information on commuting distance is available only for a subset of 19,952 observations. The information on partner's employment and earnings is available only for a subset of 15,988 observations.

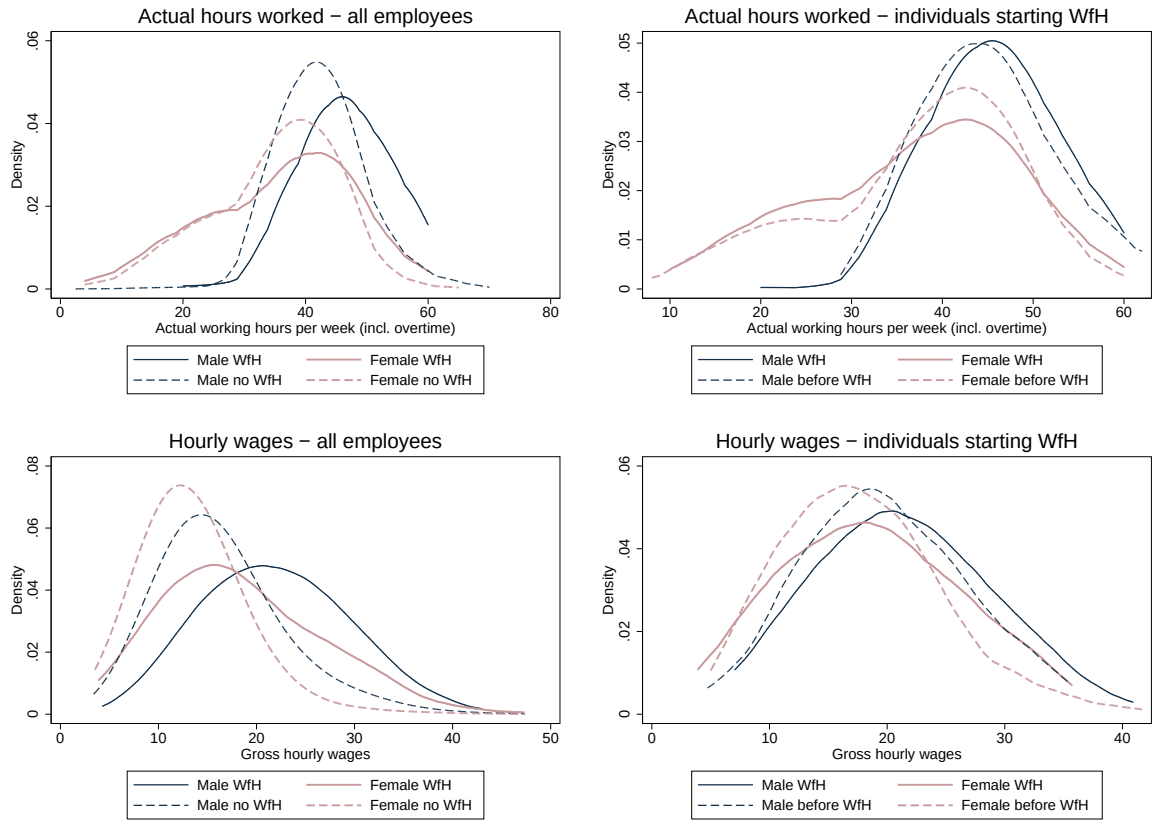
3.3 Distribution of working hours and working from home

The positive selection of individuals in WfH arrangements is also supported by Figure 2 which, on the left, displays the distribution of actual weekly hours worked and hourly wages by WfH status for men and women. Working from home is related to longer actual working hours and higher wages along the entire distribution for both men and women. However, as discussed previously, this might be driven in part by the selection of high-skilled, highly attached employees into WfH arrangements.

In order to deal with this selection issue, the right panels of Figure 2 show the individual difference in actual hours and hourly wages between the pre and post WfH take-up period. For men, the shift of the distribution of working hours to the right when working from home remains visible, albeit smaller than in the left panel. For women, the distribution becomes more dispersed. Some women who start working from home increase their actual working hours and others decrease their hours. This likely indicates that, especially for women, the outcomes of WfH might depend on the different reasons for women to start working from home. In particular, one potential issue is that the WfH take-up might be

related to specific life events such as having the first child or being promoted. In the first case, women are likely to simultaneously reduce their hours worked from full- to part-time while also taking up WfH. In the latter case, a promotion might both necessitate additional working hours and WfH.

Figure 2: Distributions of working hours and wages by WfH status



Source: SOEP. 1997, 1999, 2002, 2009 and 2014 waves

In order to shed some light on the potential simultaneity of WfH take-up and certain events, such as getting a child or changing job, we compare the likelihood of these events in the population of employees taking up WfH with the one in the population of employees who do not change WfH status. Table 2 shows the share of of individuals who i) have their first child, ii) change employer, iii) change position within the firm, or iv) change occupational status among those who take up WfH (columns (1) and (5)) compared to those who don't (columns (2) and (6)). Evidently, WfH take-up, especially for women, is often related to having a first child. Women taking-up WfH are 15 percentage points more likely to get their first child around that time compared to women who do not change WfH status. The difference is much smaller among men. Given that parents also experience other changes simultaneously, it might actually mask quite contradictory effects

when estimating the average effect of WfH take-up for all women jointly. As parents of young children are more likely to start WfH, and also differ in other aspects from childless employees, we will estimate the WfH effects separately for childless individuals, parents and individuals having a first child.

Table 2: Simultaneity of working from home take-up with family and job changes

	Female				**Male**			
	(1) WfH takeup	(2) No change	(3) Difference	(4) (t-stat.)	(5) WfH takeup	(6) No change	Difference	(t-stat.)
First child	0.20	0.05	0.15***	(8.41)	0.10	0.06	0.04**	(2.29)
New employer	0.24	0.15	0.09***	(3.10)	0.23	0.15	0.07***	(2.99)
New position within firm	0.10	0.03	0.07***	(5.46)	0.09	0.02	0.06***	(5.68)
Occupational promotion	0.26	0.14	0.12***	(4.28)	0.24	0.15	0.09***	(3.63)
Observations	164	6,132			234	7,260		

Note: The table displays the mean of the variables for the population of employees taking up WfH. Columns (1) and (5) show results for female and male employees who take up WfH, while columns (2) and (6) show results for women and men who do not change WfH status. For example, column (1) shows that 20% of women taking-up WfH got their first child at the same period. Changes in WfH status, employer, position and first child are computed using information from the previous wave. All waves are pooled which amounts to 13,790 observations for 7,602 individuals.

In addition, WfH take-up may be related to simultaneous career events. In fact, individuals might start working for another employer in order to get access to WfH practices, thus selecting into certain types of firms. Indeed, among individuals with a WfH take-up, there is a significantly higher share who experience a change of employer at the same time. The same also holds for career changes within the same firm such as a new position or a new occupational status. We will shed light on the impact of these parallel career shifts on the estimated effects of WfH take-up on hours and wages.

3.4 Determinants of working from home

Table 3 documents how individual and job characteristics are related to the probability of working from home using a regression setting. We first estimate a linear probability model with OLS and provide the results in columns (1) and (4). Overall, OLS results confirm the findings from the summary statistics. When adding individual fixed effects in columns (2) and (3) for men and columns (4) and (5) for women, most of the characteristics turn out to be insignificant. However, and in line with the previous discussion, women having children are significantly more likely to start working from home. Similarly, fathers are more likely to work from home, particularly when the children are in school age, but the impact is smaller in magnitude. Moreover, women are more likely to work from home when they get married, move in with their partner or when they move to a more rural area. This could be explained by the fact that couples tend to make their location decisions based on the job of the male breadwinner. Females might thus need to start working from home

Table 3: Determinants of working from home

	Male			Female		
	OLS	Fixed effects		OLS	Fixed effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration background	-0.025***			-0.007		
	(0.006)			(0.006)		
Married (or cohabitating)	0.013**	0.004	-0.000	0.014***	0.017**	0.017***
	(0.006)	(0.008)	(0.008)	(0.004)	(0.007)	(0.007)
Age	0.003	-0.014	-0.016	0.003**	0.004	0.004
	(0.002)	(0.010)	(0.011)	(0.001)	(0.005)	(0.005)
Child aged 0-2	-0.005	0.014	0.013	0.044**	0.071***	0.069***
	(0.008)	(0.011)	(0.011)	(0.018)	(0.024)	(0.024)
Child aged 3-5	0.010	0.024*	0.022*	0.041***	0.082***	0.083***
	(0.009)	(0.013)	(0.013)	(0.013)	(0.020)	(0.020)
Child aged 6-15	0.007	0.030**	0.029**	0.009	0.088***	0.090***
	(0.007)	(0.014)	(0.014)	(0.007)	(0.022)	(0.021)
Child older than 15	-0.007	0.021	0.020	-0.007	0.097***	0.099***
	(0.007)	(0.016)	(0.016)	(0.008)	(0.024)	(0.023)
Tertiary education degree	0.090***	0.033	0.026	0.062***	0.043	0.033
	(0.012)	(0.027)	(0.026)	(0.009)	(0.029)	(0.030)
Vocational qualification	-0.003	-0.000	0.000	0.005	-0.009	-0.011
	(0.006)	(0.006)	(0.006)	(0.005)	(0.010)	(0.010)
Part-time work experience	0.002	0.005	0.003	0.000	0.003	0.003
	(0.003)	(0.004)	(0.004)	(0.001)	(0.003)	(0.003)
Full-time work experience	-0.002*	0.008***	0.006**	0.000	0.003	0.004
	(0.001)	(0.003)	(0.003)	(0.000)	(0.003)	(0.003)
Urban region	0.013**	0.032	0.028	-0.002	-0.068***	-0.063***
	(0.006)	(0.021)	(0.021)	(0.005)	(0.025)	(0.024)
Civil servant	-0.006	-0.007	-0.005	-0.011**	-0.014*	-0.012
	(0.006)	(0.011)	(0.011)	(0.005)	(0.008)	(0.008)
Large firm (>200 empl.)	0.014***	-0.005	-0.004	0.017***	0.000	0.001
	(0.005)	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)
Small firm (<20 empl.)	0.001	0.005	0.002	0.013**	0.008	0.006
	(0.006)	(0.007)	(0.007)	(0.005)	(0.008)	(0.008)
Firm tenure	0.000	-0.000	-0.000	0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
New employer			-0.004			0.007
			(0.007)			(0.007)
New position within firm			0.033			0.007
			(0.020)			(0.017)
Occupation fixed effects	No	No	Yes	No	No	Yes
Occupational status FE	No	No	Yes	No	No	Yes
Industry FE	No	No	Yes	No	No	Yes
Observations	11512	11512	11512	9880	9880	9880
R-squared	0.058	0.046	0.068	0.041	0.062	0.087

Note: Linear probability model estimates with WfH at least once a month as the dependent variable. All equations include year fixed effects, federal state fixed effects, as well as age and tenure squared as further control variables. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

in response to being the geographically bound partner. There are thus a couple of factors affecting the take-up decision that we will also take into account in the subsequent analysis.

Finally, note that when keeping the occupation, occupational status and industry constant as shown in columns (3) and (6), the previous results do not change much. Moreover, controlling for other individual and job characteristics, changing the employer or job position at the same time are not related to WfH take-up. This suggests that the simultaneity between WfH take-up and such changes shown Table 2 are due to other observable characteristics measured in the set of control variables. Hence individuals seem to change employer and job positions for other reasons than for taking up WfH. Similarly, changes in commuting distances are not related to WfH take-up (results not reported here), even though the correlation between WfH and commuting distances is strong in the cross-section.

4 Empirical strategy

4.1 Specification

As discussed before, individuals differ substantially by WfH status. To identify the effects of WfH on hours worked and wages, we control for a rich set of time-varying observables on the employee and firm sides that may confound the effect of WfH. Moreover, we control for time-constant unobservable individual characteristics. Hence, we exploit WfH take-up, rather than WfH status, for identification. We are also able to estimate the effects of WfH on the sample of employees who remain in the same firm, and even same job. By doing so, we exploit variation in WfH that is likely driven by an exogenous shock to a firm's costs of offering WfH due to, for instance, computer-related technological progress and better Internet connectivity. We estimate the following regression on the pooled sample of men and women:

$$Y_{it} = \alpha + \beta_1 WfH_{it} \times Male_i + \beta_2 WfH_{it} \times Female_i + X'_{it}\lambda + \theta_t + \theta_{tf} + \theta_o + \theta_{of} + \theta_i + \mu_{it} \quad (1)$$

where the individual labour market outcome Y_{it} is the number of actual hours worked, the number of contractual hours and the wage of individual i at time t. WfH_{it} is a dummy variable indicating whether individual i works from home at least once every month in year t. X_{it} is a vector that includes individual time-varying characteristics such as education, actual experience, number of children in different age groups and the marital status, as well as job characteristics such as firm tenure, firm size, whether it is a public sector job, the region of work, the industry affiliation. These characteristics are interacted with a

female dummy to allow for gender differences in the returns to individual characteristics. Gender-specific year fixed effects θ_t and θ_{tf} are included. We also estimate equation (1) with gender-specific occupation fixed-effects θ_o and θ_{of} and exploit changes in individual WfH status within occupation only. μ_{it} is an unobserved and time-invariant individual specific effect.

Since the effect of WfH likely differs across groups of workers with different motives for taking up WfH, we will split the sample into more homogeneous sub-groups regarding potential reasons for WfH take-up and conduct separate estimations for these groups. In particular, we split the sample along demographic characteristics and differentiate between people with and without children under age 16. In addition, we will further disaggregate the group of women who had their first child as this group might actually be quite specific, as suggested by the previous descriptive statistics. Indeed, several studies show that men's and women's career paths are differently affected by childbirth (Kleven et al. (2018) and references therein). Moreover, Table 3 indicates that the presence of children is a robust determinant of WfH take-up for both men and women.

4.2 Identification

The take-up of WfH is determined by the employee's and the employer's willingness to use it and the state of the technology that makes it feasible. While advances in technologies are exogenous to individual outcomes, employees' and firms' characteristics that determine WfH take-up may generate endogeneity biases. We discuss here potential threats to identification and how we solve them. First, using the GSOEP, we are able to control for a large set of time-varying individual characteristics that may affect both the decision to WfH and labour market outcomes. Moreover, the panel dimension of the data allows us to control for unobservable time-invariant individual characteristics that may be linked to WfH decisions, and to working hours and wages. Hence, we identify the effect of WfH by those individuals who change WfH status. In that way, our baseline specification eliminates any endogeneity problem operating through the individual fixed-effects θ_i like time-invariant preferences and ability, or through the time-varying determinants of work decisions included in X_{it} like couple formation or childbirth. In other words, we first assume that selection into WfH is strictly exogenous conditional on the individual effect θ_i and on individuals' time-varying observable characteristics X_{it}. Later, in section 5.2, we relax this assumption in several ways.

We start testing the robustness of the results to addtional controls including commuting distances and more detailed information on the household structure using partner's characteristics. We then explore whether selection bias due to unobserved shocks to in-

dividuals' decision to (re)enter paid employment affects WfH estimates using a control function approach adapted to the panel data setting. Aside from any endogenous selection into paid employment, occupational choice may also be endogenous. If individuals choose certain types of occupations with a particularly high or low incidence of WfH for unobserved reasons, our estimates could be biased. To tackle this issue, we first condition on gender-specific occupation fixed-effects (using 86 groups). Related biases should be minimized as the identification stems from those taking up WfH while remaining in the same occupation. Moreover, occupational choice is likely to be driven by time-constant preferences and attitudes which we take into account by including individual fixed-effects. Finally, we control for occupational characteristics such as tasks composition and changes in computer use over time.

Another selection issue may arise if individuals select into certain firms to get access to WfH amenities and these firms also differ with respect to other outcome-relevant work practices. Indeed, we have only few employer-specific characteristics that we can control for. Therefore, we later condition on being with the same employer before and after WfH take-up as a robustness check, thus tackling potentially endogenous selection into certain types of firms.

Finally, WfH take-up may be related to other simultaneous career steps, such as a promotion, or a change in the occupational status. For instance, climbing up the career ladder may be simultaneously related to increased working hours, an increased demand for availability outside of normal working hours, and higher wages. This would induce an upward bias for the effect of WfH on our outcome measures. We will investigate the role of such simultaneous career steps in section 5.2 by comparing our baseline estimates with WfH estimates on the sample of job stayers.

The remaining threat to identification are related to unobserved firm-level changes or individual events that could be correlated to working hours and wages. Although, we have explored the most prominent examples (childbirth, promotion, firm change), there might remain other confounders. For example, if firms change other work practices when starting offering WfH arrangements, the unobserved firm-level changes may create a spurious correlation between WfH take-up and our outcome measures.

5 Results

5.1 Effect of working from home on hours worked and wages

In this section, we present the results on the effect of working from home as a complement to on-site work on actual hours, contractual and overtime hours, and hourly and

monthly wages. We look at the results for the overall sample first, before running estimations for sub-groups by parenthood status.

All employees. Table 4 compares OLS and FE estimates of the effect of WfH on actual hours, contracted hours and overtime hours for the overall sample. Moreover, we allow for a different impact of WfH for men and women, as shown in equation 1. Overall, the table shows that OLS estimates tend to be upward biased. Controlling for occupation, but not for individual fixed effects, column (1) shows that men with WfH arrangements work 3.7 hours a week more than men without WfH arrangements. Women with WfH arrangements work 1.3 hours more. When controlling for unobserved time-invariant characteristics by using a fixed-effects (FE) approach, column (2) shows that the hour-premium associated with WfH is strongly reduced. It reduces to about one hour a week for men and becomes statistically insignificant for women. The difference between OLS and FE results indicates that individuals selecting into WfH work longer hours. This type of positive selection remains an issue for OLS estimates even when controlling for occupational status (column (3) vs. column (4)).

Table 4: Effect of WfH on hours worked, all employees

	Actual hours				Contracted hours		Overtime hours	
	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
WfH (Male)	3.734***	1.085***	3.069***	0.913**	0.168	0.232	2.901***	0.681**
	(0.389)	(0.373)	(0.370)	(0.372)	(0.194)	(0.153)	(0.322)	(0.334)
WfH (Female)	1.284**	0.814	0.628	0.655	-0.890*	-0.385	1.518***	1.040***
	(0.573)	(0.653)	(0.565)	(0.645)	(0.463)	(0.567)	(0.294)	(0.388)
Occupation FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21392	21392	21392	21392	21392	21392	21392	21392
R-squared	0.499	0.159	0.515	0.172	0.549	0.219	0.182	0.046

Note: The table shows the estimates of OLS regressions and fixed effects regressions based on equation (1). The dependent variables are actual, contractually agreed and overtime weekly working hours. Control variables included are year fixed effects, demographic controls (age, age squared, migration background, marital status, children for four age-groups), human capital controls (highest qualification and actual work experience), job characteristics (tenure, tenure squared, public sector dummy, firm size, employer and position change), federal state and urban area dummies, 1-digit industry dummies, occupation fixed effects (95 dummies), occupational status fixed effects (15 dummies). All control variables are gender-specific (also interacted with a gender dummy). Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

The changes in actual hours in columns (3) and (4) are the sum of the changes in contractual and in overtime hours shown in columns (5) to (8). Comparing the OLS results with the FE results suggests that the positive selection of workers into WfH in terms of actual hours is mainly driven by overtime hours (column (7) vs. column (8)). For

contractual hours, there is no evidence of an upward bias in the OLS estimates for men, while for women the OLS estimates are downwardly biased (column (5) vs. column (6)). According to OLS results, women who use WfH have significantly lower contractual hours than women who do not use WfH. As we will see later, this negative effect on women's contractual hours seems to be driven by women who start working from home after having their first child, as these women tend to simultaneously switch from full-time to part-time employment. When focusing on the FE results, the previously discussed increase in actual hours comes from extended overtime hours rather than increased contractual hours, a result that holds for both men and women in the overall sample. Both men and women increase their overtime by 0.7 and 1.0 hours per week, respectively, when starting WfH (column (8)).

Since WfH has, on average, a positive effect on overtime hours, we may expect that it increases wages if it helps employees to signal job commitment or if it reflects employer's needs for availability. However, in a compensating differential setting, the extra hour may not receive any monetary compensation if employees value WfH. Table 5 provides the effect of WfH on monthly wages and hourly wages, calculated as the monthly pay divided by actual hours. The OLS estimates in column (1) show that both men and women using WfH arrangements earn higher hourly wages than employees who do not use WfH. However, the positive associations between hourly wages and WfH disappears for women when we control for individual time-invariant characteristics in column (2). For men, FE estimates in columns (2) and (4) show that the positive association between hourly wages and WfH is robust to controlling for individual time-invariant characteristics. Men starting WfH experience an increase in hourly wages of 5 percent on average.

Table 5: Effect of WfH on hourly and monthly wages, all employees

	Hourly wage				Monthly wage			
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WfH (Male)	0.061***	0.056***	0.010	0.051***	0.142***	0.080***	0.076***	0.072***
	(0.016)	(0.018)	(0.016)	(0.018)	(0.017)	(0.018)	(0.015)	(0.018)
WfH (Female)	0.076***	0.024	0.041*	0.019	0.094***	0.047	0.040	0.038
	(0.024)	(0.025)	(0.023)	(0.025)	(0.034)	(0.033)	(0.032)	(0.031)
Occupation FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	No	No	Yes	Yes	No	No	Yes	Yes
Observations	21392	21392	21392	21392	21392	21392	21392	21392
R-squared	0.549	0.154	0.585	0.158	0.609	0.187	0.650	0.202

Note: The table shows the estimates of OLS regressions and fixed effects regressions based on equation (1). The dependent variables are the log hourly wages (monthly gross wages divided by monthly actual working hours) and log gross monthly wages. Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

Turning to monthly earnings, we find no significant change of women's monthly earnings when taking up WfH in the FE results in columns (6) and (8). In contrast to men who get a sizeable compensation for their additional effort, in terms of a 7 percent increase in their monthly earnings, additional overtime provided by women who take up WfH is mostly uncompensated. Moreover, note that the increase in hourly and monthly wages for men is slightly smaller when controlling for job status, indicating that being promoted while taking-up WfH is one driver of wage growth following WfH take-up, but it does not explain it fully (column (2) vs. column (4) and column (6) vs. column (8) in Table 5). This gender difference in returns to WfH might imply that productivity when working at home is -or is perceived by employers to be- lower for women compared with men such that employers reward WfH differently for men and women. The finding might also reflect a different willingness to pay for WfH as well as gender-specific bargaining with the employer.

Yet, as we will see below, the average effects on the overall sample in Table 5 hide heterogeneous responses to WfH across sub-groups. In particular, the negative, though insignificant, coefficient on contracted hours for women in Table 4 indicate that some women may reduce their hours with WfH take-up which would put downward pressure on the average wage effect. The heterogeneous hours response of women to WfH take-up is also visible in the top left panel of Figure 2 where the female distribution of hours becomes more double-peaked after WfH take-up. As discussed in section 3.3, an important characteristic that is likely to affect the use of WfH is child birth. Indeed, women who have their first child are likely to reduce working hours. Moreover, parental status may influence the motives for taking up WfH, the corresponding signal given to employers and the actual productivity when working from home. Hence, in what follows, we explore how WfH impacts labour market outcomes for two different groups, parents who start WfH while already having children and childless individuals. Note that we separate individuals who become parents and start WfH at the same time from the other two groups.

Childless employees. Table 6 and 7 show that employees without children under the age of 16 (childless employees hereafter) experience different hours and wage effects in case of working from home than parents with children under the age of 16. Childless men and women starting WfH increase overtime by 0.9 and 1.2 hours, respectively, but do not increase contractual hours (columns (4) and (5) in Table 6). Moreover, they do not experience any significant wage increase (columns (6) to (8)). In contrast to results on the overall sample in Table 5, results for childless employees indicate that additional overtime while WfH is largely uncompensated, suggesting that neither positive, nor negative productivity or signaling effects of WfH dominate for this group. Hence, both men and women seem

to pay for the possibility to work from home occasionally by providing around one hour of additional overtime per week, indicating that these workers may value the option to work from home. This would be in line with recent evidence that workers are willing to pay for the flexibility to choose their place of work (Mas and Pallais, 2017; He et al., 2019).

Table 6: Effect of WfH on hours worked and wages, employees without children under 16

	Actual hours			Contracted hours	Overtime hours	Hourly wage		Monthly wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WfH (Male)	1.157*	1.066*	0.929	0.008	0.921*	-0.005	-0.009	0.010
	(0.617)	(0.613)	(0.617)	(0.299)	(0.528)	(0.033)	(0.033)	(0.032)
WfH (Female)	1.185	1.076	0.924	-0.367	1.292**	0.009	0.004	0.019
	(0.905)	(0.843)	(0.843)	(0.721)	(0.630)	(0.033)	(0.034)	(0.042)
Occupation FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	No	No	Yes	Yes	Yes	No	Yes	Yes
Observations	13722	13722	13722	13722	13722	13722	13722	13722
R-squared	0.034	0.061	0.075	0.082	0.059	0.154	0.162	0.182

Note: The table shows the estimates of fixed effects regressions based on equation (1) on the sub-sample of employees without children under 16 years old. Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

Parents. Given the findings for childless men, the positive wage effects for men in Table 5 must be driven by fathers. As Table 7 shows, this is indeed the case. Moreover, fathers with children under the age of 16 significantly extend their actual hours by 1.1 hours, of which 0.4 hours are additional contractual hours. Monthly wages increase by 9 percent which reflects both the slight increase in working hours, but also an increase in hourly wages by almost 7 percent. Hence, the results in Table 6 and 7 point out that WfH coincides with higher earnings only if it is used to increase contractual hours.

For mothers, the findings are similar, but of much greater magnitude. Mothers who start WfH increase their actual hours by 3.9 hours a week, driven by the increase in contractual hours of 3.4 hours (see columns (3) and (4)). This larger response of mothers' compared to fathers' contractual hours may be due to lower average contractual hours among mothers, and thus a greater margin for adjustment. Similarly to men, both hourly wages and monthly wages increase for mothers when starting WfH, even after controlling for hierarchical status in column (7). Yet, wage growth is much larger than for men. Monthly wage increases by almost 28 percent. Given the average actual hours of women, the increase in contractual working hours explains almost 16 percentage points of this increase in monthly earnings, while the hourly wage increase explains the remaining 12 percentage points. The findings thus support the idea that WfH arrangements may help

Table 7: Effect of WfH on hours worked and wages, employees with children under 16

	Actual hours			Contracted hours	Overtime hours	Hourly wage		Monthly wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WfH (Male)	1.276**	1.258**	1.065*	0.407**	0.658	0.071***	0.067***	0.092***
	(0.603)	(0.583)	(0.570)	(0.179)	(0.545)	(0.022)	(0.021)	(0.021)
WfH (Female)	4.427***	4.410**	3.943**	3.430**	0.513	0.117***	0.115***	0.279***
	(1.575)	(1.733)	(1.819)	(1.575)	(0.612)	(0.042)	(0.041)	(0.077)
Occupation FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	No	No	Yes	Yes	Yes	No	Yes	Yes
Observations	7670	7670	7670	7670	7670	7670	7670	7670
R-squared	0.067	0.159	0.178	0.211	0.098	0.163	0.172	0.237

Note: The table shows the estimates of fixed effects regressions based on equation (1) on the sub-sample of employees having children under 16 years old. Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

parents, and mothers in particular, to remain attached to the labour market by extending working hours. Moreover, opting for WfH actually pays off not only in terms of higher earnings, but also in terms of higher hourly wage rates. In fact, the growth in hourly wages appears to be quite large and we will later examine to what extent simultaneous job changes and promotions drive these results.

Finally, note that the results for the overall sample are not a weighted average of the results for the two sub-samples. This is because the sub-sample is defined based on parental status, but parental status can change simultaneously with the WfH status as discussed in section 3. Men and women who have their first child and start working from home within the same period are observed in the childless sample before WfH take-up and in the parents sample after WfH take-up. Hence, using the FE estimator, they neither contribute to the coefficient estimates for childless employees nor to the estimates for employees with children. Table A.2 in the appendix shows the results for men and women who have their first child. Since this is a small group, estimates are mostly insignificant, but they suggest that mothers reduce contractual hours, which may reflect mothers who give birth to their first child using WfH to return to work earlier but with fewer hours. For men, we find an insignificant increase in overtime hours and some significant wage increases.

5.2 Robustness checks

In this section, we test whether our main results are robust to addressing selection into paid employment, in addition to a number of further robustness checks.

Addressing selection into paid employment. We first investigate whether our estimates suffer from selection bias due to unobserved shocks to individuals' decision to (re)enter paid employment. Indeed, if the population that participates in the labour market is not representative of the overall population, the estimated effects of WfH might be biased. For instance, if women in paid employment are also willing to work longer hours and to use flexible working arrangements to do so, when compared to what women outside of the labour market would do, the effect of WfH on hours worked would be overestimated. Note that exploiting the panel data dimension, we control for any unobserved individual characteristics and preferences that remain constant over time. By doing so we already address an important aspect of this issue. However, if preferences and other determinants of working status evolve over time, for example with the occurrence of events like partner's unemployment, the selection bias is not corrected by controlling for individual fixed-effects.

In order to tackle the potential remaining selection bias, we control for selection bias due to time-varying unobservable characteristics using a control function approach adapted to the panel data setting, as in Wooldridge (1995). We present the econometric model in Appendix B. In brief, we estimate the effect of working from home on hours and wages using our benchmark equation but adding a control function computed in a first stage to correct for a potential selection bias (see equation (4) in the appendix). We use two sets of excluded variables that are assumed to affect selection into employment but not hours worked or wages. First, we use information on partner's employment status and educational level, a determinant of partner's earnings, and interact both with dummies for children in three age groups[6]. Secondly, we consider the case in which these partner characteristics may affect hours worked and wages through division of labour within the household and/or assortative mating. Instead, we use as excluded variables individual's mother's education or employment status when the respondent was aged 15. We interact these mother characteristics with dummies for children in three age groups. The first stage results are reported in Table B.1 and described in section B in the appendix. The results on hours worked and wages are reported in Table B.2 in the appendix.

Column (1) in Table B.2 displays the results of equation (1) estimated with the (fixed-effect) within-estimator on a smaller sample of individuals for whom information on the excluded variables used in the first stage is not missing. Column (2) displays the results of equation (1) estimated with the Chamberlain's approach to individual fixed-effects to show that the results are identical regardless of the estimator (see also Wooldridge, 2018). Column (3) displays the results of equation (4) estimated with the Chamberlain's approach

[6]This approach has been applied by Dustmann and Rochina-Barrachina (2007) to the estimation of wage returns to experience for women. The excluded restriction they use is based on partner's employment status, partner's income and other household income.

augmented with a control function to correct for the selection bias. We allow the effect of the control function to vary by gender and time. Comparing columns (2) and (3) in Panels A and B, the effect of WfH on contracted hours and wages are marginally smaller for fathers and larger for mothers when we correct for the selection bias, but the difference is not significant. We replicate this analysis on the sample of employees without children under the age of 16 in Panels C and D and find no significant differences in the estimated AfH effects when controlling for selection into the labour force. Overall, the effects of WfH on hours worked and wages, controlling for potential remaining biases due to selection into paid employment, remain similar to benchmark results . We conclude that individual fixed-effects and the vector of time-varying individual characteristics included in equation (1) control well for characteristics that may simultaneously determine labour supply decisions, wages and WfH, such that the WfH estimates are not affected by this type of selection bias.

Additional leave days. Additional hours in response to the possibility to work from home might be compensated with additional days off rather than a wage increase. Columns (1) and (2) in Table 8 show the results of a conditional logit regression with the dependent variable equal to 1 if at least some overtime hours are converted into vacation, which is referred to as compensatory time. Columns (1) and (2) show that starting WfH does not increase the likelihood to use compensatory time, irrespective of gender or presence of children. In columns (3) to (6), we replicate the hourly and monthly wage regressions controlling for the use of time-off to compensate overtime. The main results remain unchanged. Compensation of overtime with days off does not explain the absence of wage increases among childless individuals while the positive wage effects for parents remain in the same magnitude.

Further robustness checks We run a number of further robustness checks in Table A.3 in the appendix for the sample of childless employees (columns (1) to (4)) and the sample of parents (columns (5) to (8)). We start with exploring how a different intensity of working from home affects the results. Panel A reports again the benchmark results with WfH at least once a month, while Panel B shows results with WfH at least once a week. Employees working from home every week represent on average 60 percent of employees working from home every month during the period studied. The estimates turn out to be very similar, especially for women. For fathers, working from home on a weekly basis appears to have a much larger effect on overtime hours than on contracted hours. Because of this, the hourly wage estimate becomes smaller and insignificant, while the monthly wage estimate is still positive and statistically significant.

Table 8: Effect of WfH on overtime compensation

	All employees		W/o children under 16		With children under 16	
	Compensatory time Conditional Logit		Hourly wage FE	Monthly wage FE	Hourly wage FE	Monthly wage FE
	(1)	(2)	(3)	(4)	(5)	(6)
WfH (Male)	-0.148	-0.140	-0.007	0.014	0.066***	0.090***
	(0.269)	(0.277)	(0.034)	(0.033)	(0.022)	(0.021)
WfH (Female)	-0.006	0.013	0.001	0.019	0.119***	0.279***
	(0.297)	(0.301)	(0.034)	(0.042)	(0.041)	(0.077)
WfH (male)	-0.005	-0.086				
×child under 16	(0.384)	(0.390)				
WfH (female)	0.153	0.113				
×child under 16	(0.419)	(0.425)				
Time-off			-0.030***	0.002	-0.010	0.016**
			(0.007)	(0.007)	(0.008)	(0.008)
Time-off × Female			-0.004	0.006	-0.059***	-0.015
			(0.010)	(0.011)	(0.015)	(0.018)
Occupation FE	No	Yes	Yes	Yes	Yes	Yes
Occupational status	No	Yes	Yes	Yes	Yes	Yes
Observations	10224	10224	13541	13541	7579	7579
R-squared			0.168	0.185	0.183	0.240

Note: Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

Our results also turn out to be robust when conditioning on additional variables whose omission could lead to an omitted variable bias as shown in Table A.4 in the appendix. Panel A displays results controlling for state × year fixed-effects to control for any regional trends that might be influenced by regional policies or labour market conditions. In Panel B, we control for partner's employment status and earnings, as well as their interaction with a gender dummy, since WfH take-up might be a response to partner's employment changes. In Panel C, focusing on the sample of parents with children under 16, we add the number of childcare places at the federal state level for children aged 0-3 and 3-6, as well as places in after school programs for children in primary school, interacted with dummies for having children in the corresponding age group. We do so because the WfH effect on the extension of working hours might be stronger for parents who lack alternative institutional childcare. Yet, the estimated effects of WfH remain robust.

In Table A.5 we further control for commuting distance and commuting distance squared. While the baseline results on the sub-sample of individuals with information on commuting become less precise (Panel A), controlling for commuting distance does not affect the results (Panel B). In particular, the big positive effect of WfH on mothers' contractual hours remains unchanged. Moreover, we find that an increase in commuting distances reduces contractual hours for this group, just as predicted by theoretical models on the time

cost of working and the intensive margin of the labour supply.[7]

As a last robustness check, we take into account time-varying occupational characteristics. Indeed, occupational level differences in the feasibility of working from home may come together with other occupational characteristics that affect working hours and wages. For instance, changes in tasks and computer use across occupations may affect both productivity and the availability of WfH arrangements. We thus compute occupational level averages of computer use and five groups of job tasks from several employment surveys carried out by the Federal Institute for Vocational Education and Training (BiBB) and include these as further control variables.[8] The results turn out to be very similar to the baseline estimates.[9]

5.3 The role of career changes

Changing firm or changing job position within the firm may lead to simultaneous changes in wages, hours and the working from home status. For example, an individual may move to a more innovative and productive firm, and negotiate both a higher wage and the possibility to work from home. Similarly, a promotion within the firm might be associated with a change in tasks or responsibilities, including a higher probability of working from home and an increase in working hours and wages. Note that we already control for job change and job status in all regressions. However, this may not be sufficient to ensure that the results are not driven by changes of employer or position within the firm. We thus further explore this issue in Table 9. Panel A provides the benchmark results. In Panel B, we replicate the analysis on the sub-sample of employees who remain in the same firm, and in Panel C on those who remain in the same position in the same firm. The results on contracted and overtime hours, hourly and monthly wages are shown in columns (1) to (4) for childless individuals and in columns (5) to (8) for parents.

Comparing columns (1) to (4) in Panel A and Panel B, we see that the benchmark results for childless individuals remain unchanged when we exclude those who have changed employer. The increase in overtime hours remains significant for both men and women staying with the same firm when taking-up WfH. However, looking at the effect for those who remain in the same position within the firm in panel C, the positive effect on overtime hours loses precision for men. This suggests that a simultaneous change in position with

[7]However, when including interaction terms between WfH and commuting distance, we do not find that the WfH effects differ significantly across employees with different commuting distances.

[8]The BiBB employment surveys were collected approximately every five years. Given that the time periods of these surveys do not match the SOEP waves we use in the analysis, we exclude the 1999 wave from the analysis and merge waves from the BiBB survey carried out 2 to 5 years before the remaining four SOEP waves.

[9]Results available upon request.

Table 9: Effect of WfH on hours and wages excluding job changes

	Without children under 16				With children under 16			
	Contracted hours (1)	Overtime hours (2)	Hourly wage (3)	Monthly wage (4)	Contracted hours (5)	Overtime hours (6)	Hourly wage (7)	Monthly wage (8)
Panel A: Baseline regressions								
WfH (Male)	0.008	0.921*	-0.009	0.010	0.407**	0.658	0.067***	0.092***
	(0.299)	(0.528)	(0.033)	(0.032)	(0.179)	(0.545)	(0.021)	(0.021)
WfH (Female)	-0.367	1.292**	0.004	0.019	3.430**	0.513	0.115***	0.279***
	(0.721)	(0.630)	(0.034)	(0.042)	(1.575)	(0.612)	(0.041)	(0.077)
Observations	13722	13722	13722	13722	7670	7670	7670	7670
R-squared	0.082	0.059	0.162	0.182	0.211	0.098	0.172	0.237
Panel B: Excluding employer changes								
WfH (Male)	0.207	1.081*	-0.014	0.017	0.387*	0.928	0.091***	0.121***
	(0.270)	(0.564)	(0.037)	(0.035)	(0.213)	(0.683)	(0.029)	(0.027)
WfH (Female)	0.312	1.053*	0.020	0.052	4.670***	0.839	0.045	0.250***
	(0.603)	(0.631)	(0.026)	(0.033)	(1.601)	(0.836)	(0.044)	(0.086)
Observations	11670	11670	11670	11670	6419	6419	6419	6419
R-squared	0.086	0.071	0.158	0.170	0.258	0.086	0.178	0.244
Panel C: Excluding changes of employer and position within firm								
WfH (Male)	0.194	0.797	-0.016	0.009	0.446**	0.776	0.101***	0.129***
	(0.283)	(0.595)	(0.039)	(0.037)	(0.225)	(0.753)	(0.033)	(0.030)
WfH (Female)	0.285	1.104*	0.024	0.057*	4.202***	0.173	0.043	0.215**
	(0.608)	(0.628)	(0.026)	(0.032)	(1.628)	(0.772)	(0.048)	(0.091)
Observations	11437	11437	11437	11437	6277	6277	6277	6277
R-squared	0.083	0.071	0.155	0.164	0.258	0.085	0.172	0.239

Note: The table shows the estimates of fixed effects regressions based on equation (1). Panel B refers to the sub-sample of individuals not changing the employer compared to the previous observed wave. Panel C refers to the sub-sample of individuals not changing employer nor position within the firm. Control variables included are as in Table 4 and include occupational status and occupation fixed effects. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

WfH take-up explains part of the increase in hours worked for childless men. Childless women, however, also increase overtime hours with WfH while remaining in the same position.

Turning to the effect for parents, we see that the large increase in contractual hours, and thus monthly wages, is not driven by people who change employer or job position (columns (5) and (8)). However, the positive hourly wage effect for mothers is entirely driven by mothers who access WfH when changing employer (in column (7) the WfH effect turns insignificant for women in Panel B). Fathers still experience an increase in hourly wages with WfH when remaining in the same firm, and even in the same position

(column (7)). This may indicate that it is more difficult for mothers than for fathers to re-negotiate wages when remaining in the same firm. This might reflect that employers have gendered perceptions regarding the underlying motives for working from home and the implied productivity. This would be in line with corresponding experimental evidence by Leslie et al. (2012). In addition to gendered perceptions on WfH-related productivity, employers might also perceive mothers' fall-back options outside the firm to be poorer than fathers', hence reducing their bargaining power.

All in all, the results for employees taking up WfH without changing job are very similar to the baseline results. Only the effects on hourly wages of mothers are smaller and statistically insignificant. Hence, the positive effect of WfH for mothers may be partially driven by positively selected mothers who change employer and bargain both higher hourly wages and the possibility to work from home.

5.4 Effects on job and life satisfaction

If employees mainly work from home in response to job requirements, WfH is unlikely to raise life or job satisfaction. If, on the other hand, workers attach a positive value to WfH, we should find a higher job satisfaction once wage and hours adjustments are taken into account. The latter is important, as such adjustments might be compensating for the additional utility associated with WfH. Hence, we follow the literature and control for earnings, the number of hours worked and also allow for heterogeneous effects across gender (see e.g. Clark and Oswald, 1996). Moreover, as before, we account for individual fixed-effects which have been shown to be particularly important in the estimation determinants of satisfaction because of the influence of unobservable personality traits (Ferrer-i Carbonell and Frijters, 2004).

Table 10 provides the corresponding estimates for the effect of WfH on job and life satisfaction, as measured on a 11-point Likert scale. Columns (1) to (4) show the effect of WfH at least once a month for workers with and without children below age 16. While the OLS results, not reported here, show that, overall, job satisfaction tends to be higher among those WfH, the increase in job satisfaction for those who take-up WfH arrangements is not significant for men and women irrespective of the parental status, although point estimates are positive for all groups (columns (1) and (3)). The coefficients for wages and hours have the expected signs, and are mostly significant. Given the typical noise in measures of job satisfaction, effects may become clearer if WfH were to be done on a more regular basis. Hence, columns (5) to (8) replicate the analysis when working from home is done at least once a week. For childless employees, irrespective of gender, job satisfaction significantly increases when using the weekly WfH indicator. The effect corresponds to

a 10 percent increase in the average job satisfaction of childless women, and a 6 percent increase in the average job satisfaction of childless men. In contrast, the corresponding coefficients for parents with children below age 16 are not significant, albeit quite high for mothers.

Table 10: Effect of WfH on job and life satisfaction

	Monthly WfH				Weekly WfH			
	W/o children < 16		W. children < 16		W/o children < 16		W. children < 16	
	Job sat. (1)	Life sat. (2)	Job sat. (3)	Life sat. (4)	Job sat. (5)	Life sat. (6)	Job sat. (7)	Life sat. (8)
WfH (Male)	0.157	0.275**	0.146	0.152	0.405*	0.131	-0.031	-0.250
	(0.169)	(0.137)	(0.218)	(0.149)	(0.215)	(0.136)	(0.328)	(0.205)
WfH (Female)	0.323	-0.190	0.379	-0.124	0.724*	-0.105	0.633	0.084
	(0.301)	(0.198)	(0.357)	(0.241)	(0.382)	(0.260)	(0.401)	(0.325)
Log monthly wage	0.298*	0.391***	0.489**	0.279*	0.301*	0.392***	0.500**	0.295*
× Male	(0.172)	(0.121)	(0.219)	(0.152)	(0.172)	(0.121)	(0.219)	(0.152)
Log monthly wage	0.251	0.194	0.324	0.192	0.261	0.191	0.324	0.182
× Female	(0.165)	(0.123)	(0.239)	(0.165)	(0.165)	(0.123)	(0.238)	(0.165)
Contracted hours	-0.009	-0.009	-0.019	-0.014	-0.009	-0.008	-0.018	-0.014
× Male	(0.013)	(0.009)	(0.015)	(0.014)	(0.013)	(0.009)	(0.015)	(0.014)
Contracted hours	-0.010	-0.003	-0.027*	-0.014	-0.010	-0.003	-0.027*	-0.015
× Female	(0.009)	(0.006)	(0.014)	(0.009)	(0.009)	(0.006)	(0.014)	(0.009)
Overtime hours	-0.008	-0.014**	-0.006	-0.008	-0.009	-0.014**	-0.006	-0.007
× Male	(0.009)	(0.006)	(0.010)	(0.008)	(0.009)	(0.006)	(0.010)	(0.008)
Overtime hours	-0.023*	-0.017**	-0.008	0.004	-0.023*	-0.017**	-0.008	0.004
× Female	(0.012)	(0.008)	(0.020)	(0.016)	(0.012)	(0.008)	(0.020)	(0.016)
Occupation FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13651	13704	7640	7662	13651	13704	7640	7662
R-squared	0.066	0.062	0.106	0.101	0.066	0.062	0.106	0.102

Note: The table shows the estimates of fixed effects regressions based on equation (1). Columns (3) and (4) refer to the sub-sample without children under 16. Columns (5) and (6) refer to the sub-sample having children under 16. The dependent variables are job and life satisfaction measured on a 11-point Likert scale. Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

While we find conclusive evidence that workers, especially when childless, attach a positive value to WfH, effects for life satisfaction tend to be insignificant and often lower in terms of point estimates than the effects on job satisfaction. The only exception is childless men for whom working from home occasionally seems to increase life satisfaction. For all other groups no such effect can be found. Compared to the slightly positive effects on job satisfaction, this might indicate that WfH actually exerts some negative impact on the private domain, for instance, due to new conflicts between the job and the private sphere.

6 Concluding remarks

In the last two decades, working arrangements have become more flexible, opening up new options regarding when and where to work. Whether this predominantly serves workers' needs to better reconcile their private life with their career, or mostly serves firms' needs to extend a worker's availability outside the firm location and beyond usual office hours is not clear a priori. Neither is the extent to which WfH affects productivity. Furthermore, given that these effects my differ across groups of workers, working from home may thus give rise to both a wage premium and a wage penalty. Given the growing importance of working from home in the last two decades, there is remarkably little research on how WfH affects careers and on how it varies with workers' characteristics. Moreover, much of the literature suffers from unresolved endogeneity issues and has not sufficiently explored differences between groups that are likely to respond differently to the opportunity to work from home.

In order to close this research gap, this paper investigates how WfH affect men's and women's careers in terms of working hours and labour earnings and further distinguishes effects by parental status. Controlling for workers' observed and unobserved heterogeneity, we find that men and women without children below age 16 use WfH to increase overtime hours and experience a somewhat higher job satisfaction despite not obtaining any significant wage increase in the short to medium run. We thus find evidence suggesting that childless workers of both sexes attach a positive value to the flexibility attached to WfH. Moreover, life satisfaction significantly increases with WfH for childless men which reinforces this conclusion.

Among parents, WfH take-up comes with increased contractual hours, higher monthly earnings, and higher hourly wages. Moreover, this increase in contractual hours is much stronger among mothers than among fathers, corresponding to an increase in monthly earnings of almost 16 percent for mothers and about 2 percent for fathers. The growth in hourly wages of 12 percent for women, however, is driven by women who simultaneously change employers and take-up WfH. Fathers, however, also experience an increase in hourly wages of 7 percent even if they remain in the same firm. Despite strong and positive effects of WfH on wages, the response of job and life satisfaction to WfH take-up are insignificant among parents. This may indicate that WfH-related conflicts between the job and the private domain may be more severe for parents.

All in all, the results indicate that flexible work arrangements in the form of working from home is a means of raising mothers' labour force attachment. Yet, when remaining in the same firm, women, in contrast to their male counterparts, do not benefit from higher hourly wages, indicating that their bargaining power may be weaker than men's for re-

negotiating wages when adopting WfH. This might reflect employers acting on gendered preconceptions regarding the motives for WfH and the expected productivity effects or that actual productivity effects of WfH differ by gender. It might also indicate that mothers do not ask for an hourly wage increase when changing working arrangements while fathers do. Hence, to some extent, WfH can be a means to close gender gaps in terms of hours and monthly earnings, while the effect on the gender hourly wage gap is less clear.

From a policy perspective, promoting WfH may thus be helpful in strengthening women's careers. Yet, the findings may also indicate that the promotion of WfH practices should be accompanied by measures to increase wage equality, such as the need by employers to provide information on the wages of male colleagues with similar work-related characteristics. In Germany such a law was introduced in 2017. Hence, re-evaluating the effects of WfH after 2017 would be an interesting avenue of future research.

References

Allen, T. D., Golden, T. D., and Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, 16(2):40–68.

Baines, S. and Gelder, U. (2003). What is family friendly about the workplace in the home? The case of self-employed parents and their children. *New Technology, Work and Employment*, 18(3):223–234.

Black, D. A., Kolesnikova, N., and Taylor, L. J. (2014). Why do so few women work in New York (and so many in Minneapolis)? Labor supply of married women across US cities. *Journal of Urban Economics*, 79:59–71.

Bloom, N., Liang, J., Roberts, J., and Ying, Z. J. (2015). Does working from home work? Evidence from a Chinese experiment. *Quarterly Journal of Economics*, 130(1):165–218.

Bloom, N. and Van Reenen, J. (2006). Management practices, work – life balance, and productivity: A review of some recent evidence. *Oxford Review of Economic Policy*, 22(4):457–482.

Brenke, K. (2014). Heimarbeit: Immer weniger Menschen in Deutschland gehen ihrem Beruf von zu Hause aus nach. *DIW-Wochenbericht*, 81(8):131–139.

Bryan, M. L. and Sevilla Sanz, A. (2014). Flexible working and couples' coordination of time schedules. IZA Discussion Paper No. 8304, Institute for the Study of Labor (IZA).

Clark, A. and Oswald, A. (1996). Satisfaction and comparison income. *Journal of Public Economics*, 61(3):359–381.

Cogan, J. F. (1981). Fixed costs and labor supply. *Econometrica: Journal of the Econometric Society*, pages 945–963.

Cortes, P. and Pan, J. (2019). When time binds: Returns to working long hours and the gender wage gap among the highly skilled. *Journal of Labor Economics*, 37(2).

de Graaff, T. and Rietveld, P. (2007). Substitution between working at home and out-of-home: The role of ICT and commuting costs. *Transportation Research Part A*, 41(2):142–160.

De Menezes, L. M. and Kelliher, C. (2017). Flexible working, individual performance, and employee attitudes: Comparing formal and informal arrangements. *Human Resource Management*, 56(6):1051–1070.

Dettling, L. J. (2017). Broadband in the labor market: The impact of residential high-speed internet on married women's labor force participation. *ILR Review*, 70(2):451–482.

Dustmann, C. and Rochina-Barrachina, M. E. (2007). Selection correction in panel data models: An application to the estimation of females' wage equations. *The Econometrics Journal*, 10(2):263–293.

Dutcher, E. G. (2012). The effects of telecommuting on productivity: An experimental examination. The role of dull and creative tasks. *Journal of Economic Behavior & Organization*, 84(1):355–363.

Edwards, L. N. and Field-Hendrey, E. (2002). Home-based work and women's labor force decisions. *Journal of Labor Economics*, 20(1):170–200.

Ferrer-i Carbonell, A. and Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness? *The Economic Journal*, 114(497):641–659.

Gajendran, R. S. and Harrison, D. A. (2007). The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *Journal of Applied Psychology*, 92(6):1524–41.

Gariety, B. S. and Shaffer, S. (2007). Wage differentials associated with working at home. *Monthly Lab. Rev.*, 130:61–67.

Glass, J. (2004). Blessing or curse? Work-family policies and mother's wage growth over time. *Work and Occupations*, 31(3):367–394.

Glass, J. L. and Noonan, M. C. (2016). Telecommuting and earnings trajectories among American women and men 1989–2008. *Social Forces*, 95(1):217–250.

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, 104(4):1091–1119.

Goldin, C. and Katz, L. F. (2011). The cost of workplace flexibility for high-powered professionals. *The Annals of the American Academy of Political and Social Science*, 638(1):45–67.

Gutiérrez-i Puigarnau, E. and van Ommeren, J. N. (2010). Labour supply and commuting. *Journal of Urban Economics*, 68(1):82–89.

He, H., Neumark, D., and Weng, Q. (2019). Do workers value flexible jobs? A field experiment on compensating differentials. Working Paper 25423, National Bureau of Economic Research.

Hotz, V. J., Johansson, P., and Karimi, A. (2017). Parenthood, family friendly workplaces, and the gender gaps in early work careers. Working Paper 24173, National Bureau of Economic Research.

Kelly, E. L. and Kalev, A. (2006). Managing flexible work arrangements in US organizations: Formalized discretion or a 'right to ask'. *Socio-Economic Review*, 4(3):379–416.

Kleven, H., Landais, C., and Søgaard, J. E. (2018). Children and gender inequality: Evidence from Denmark. Working Paper 24219, National Bureau of Economic Research.

Kröll, C. and Nüesch, S. (2017). The effects of flexible work practices on employee attitudes: evidence from a large-scale panel study in Germany. *The International Journal of Human Resource Management*, pages 1–21.

Leslie, L. M., Manchester, C. F., Park, T.-Y., and Mehng, S. A. (2012). Flexible work practices: A source of career premiums or penalties? *Academy of Management Journal*, 55(6):1407–1428.

Lister, K. and Harnish, T. (2011). The state of telework in the US. *Telework Research Network*.

Lott, Y. and Chung, H. (2016). Gender discrepancies in the outcomes of schedule control on overtime hours and income in Germany. *European Sociological Review*, 32(6):752–765.

Mas, A. and Pallais, A. (2017). Valuing alternative work arrangements. *American Economic Review*, 107(12):3722–59.

Noonan, M. C. and Glass, J. L. (2012). The hard truth about telecommuting. *Monthly Lab. Rev.*, 135:38–45.

Oettinger, G. S. (2011). The incidence and wage consequences of home-based work in the United States, 1980–2000. *Journal of Human Resources*, 46(2):237–260.

Osterman, P. (1995). Work/family programs and the employment relationship. *Administrative Science Quarterly*, 40(4):681–700.

Possenriede, D., Hassink, W. H., and Plantenga, J. (2016). Does temporal and locational flexibility of work increase the supply of working hours? Evidence from the Netherlands. *IZA Journal of Labor Policy*, 5(1):16.

Schroeder, C. and Warren, R. S. (2004). The effect of home-based work on earnings. Mimeo, University of Georgia.

SOEP (2013). Socio-Economic Panel (SOEP), data for years 1984-2014, version 31.1, SOEP, 2016, doi:10.5684/soep.v31.1.

Song, Y. and Gao, J. (2018). Does telework stress employees out? A study on working at home and subjective well-being for wage/salary workers. IZA Discussion Paper No. 11993, Institute for the Study of Labor (IZA).

Stevenson, B. and Wolfers, J. (2009). The paradox of declining female happiness. *American Economic Journal: Economic Policy*, 1(2):190–225.

Sullivan, C. (2012). Remote working and work-life balance. In *Work and Quality of Life*, pages 275–290. Springer.

Vazquez, E. J. and Winkler, H. (2017). How is the internet changing labor market arrangements? Evidence from telecommunications reforms in Europe. Policy Research Working Paper No. 7976, World Bank.

Viete, S. (2018). Employee autonomy and the within-firm gender wage gap: the case of trust-based work time. Mimeo, ZEW Mannheim.

Vilhelmson, B. and Thulin, E. (2016). Who and where are the flexible workers? Exploring the current diffusion of telework in Sweden. *New Technology, Work and Employment*, 31(1):77–96.

Wagner, G. G., Frick, J. R., and Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP)–Scope, evolution and enhancements. *Schmollers Jahrbuch*, 127(1):139–169.

Weeden, K. A. (2005). Is there a flexiglass ceiling? Flexible work arrangements and wages in the United States. *Social Science Research*, 34(2):454–482.

Welz, C. and Wolf, F. (2010). Telework in the European Union. *Dublin: European Foundation for the Improvement of Living and Working Conditions*.

Wheatley, D. (2017). Employee satisfaction and use of flexible working arrangements. *Work, employment and society*, 31(4):567–585.

Wooldridge, J. M. (1995). Selection corrections for panel data models under conditional mean independence assumptions. *Journal of Econometrics*, 68(1):115–132.

Wooldridge, J. M. (2018). Correlated random effects models with unbalanced panels. *Journal of Econometrics*.

A Additional tables

Table A.1: Change in WfH status by year and gender

	WfH		No WfH	Total
	Take-up	No change		
Sample of Women				
1999	24	21	1451	1496
2002	18	13	1484	1515
2009	63	12	1649	1724
2014	59	39	1463	1561
Total	164	85	6047	6296
Sample of Men				
1999	48	36	1829	1913
2002	35	33	1921	1989
2009	83	46	1893	2022
2014	68	49	1453	1570
Total	234	164	7096	7494

Note: Changes in working from home are computed compared to the previous year for a sample of 13,790 observations (7,602 individuals).

Table A.2: Effect of WfH on worked hours and wages, employees getting the first child

	Actual hours			Contracted hours	Overtime hours	Hourly wage		Monthly wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WfH (Male)	0.881	1.450	0.998	0.086	0.912	0.118**	0.131**	0.155***
	(0.925)	(1.067)	(1.024)	(0.610)	(0.829)	(0.059)	(0.060)	(0.058)
WfH (Female)	-1.890	-0.724	-1.762	-2.079	0.316	0.041	0.049	-0.044
	(2.045)	(2.246)	(2.140)	(1.779)	(0.926)	(0.087)	(0.094)	(0.135)
Occupation FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational status	No	No	Yes	Yes	Yes	No	Yes	Yes
Observations	1629	1629	1629	1629	1629	1629	1629	1629
R-squared	0.623	0.688	0.709	0.741	0.359	0.384	0.428	0.589

Note: The table shows the estimates of fixed effects regressions based on equation (1) on the sub-sample of employees observed just before and after becoming parents for the first time. Control variables included are as in Table 4. Standard errors are clustered at the individual level, $*p < 0.10, **p < 0.05, ***p < 0.01$.

Table A.3: Effect of weekly WfH

	Without children under 16				With children under 16			
	Contracted hours (1)	Overtime hours (2)	Hourly wage (3)	Monthly wage (4)	Contracted hours (5)	Overtime hours (6)	Hourly wage (7)	Monthly wage (8)
Panel A: Baseline regressions								
WfH (Male)	0.008	0.921*	-0.009	0.010	0.407**	0.658	0.067***	0.092***
	(0.299)	(0.528)	(0.033)	(0.032)	(0.179)	(0.545)	(0.021)	(0.021)
WfH (Female)	-0.367	1.292**	0.004	0.019	3.430**	0.513	0.115***	0.279***
	(0.721)	(0.630)	(0.034)	(0.042)	(1.575)	(0.612)	(0.041)	(0.077)
Observations	13722	13722	13722	13722	7670	7670	7670	7670
R-squared	0.082	0.059	0.162	0.182	0.211	0.098	0.172	0.237
Panel B: Working from home at least once a week								
Weekly WfH (Male)	-0.354	1.082	-0.026	-0.015	0.283	1.681**	0.020	0.062**
	(0.398)	(0.673)	(0.038)	(0.038)	(0.238)	(0.711)	(0.027)	(0.025)
Weekly WfH (Female)	-0.248	1.686**	-0.057	-0.033	3.813*	0.372	0.129**	0.277***
	(1.068)	(0.817)	(0.047)	(0.062)	(2.123)	(0.747)	(0.062)	(0.108)
Observations	13722	13722	13722	13722	7670	7670	7670	7670
R-squared	0.082	0.059	0.162	0.182	0.210	0.100	0.171	0.233

Note: Standard errors in parentheses, $*p < 0.10, **p < 0.05, ***p < 0.01$. Control variables included are as in Table 4.

Table A.4: Effect of WfH on hours and wages, more controls

	Without children under 16				With children under 16			
	Contracted hours (1)	Overtime hours (2)	Hourly wage (3)	Monthly wage (4)	Contracted hours (5)	Overtime hours (6)	Hourly wage (7)	Monthly wage (8)
Panel A: Baseline regressions controlling for state×year effects								
WfH (Male)	0.073	0.458	-0.028	-0.012	0.390**	0.466	0.078***	0.098***
	(0.299)	(0.679)	(0.045)	(0.044)	(0.199)	(0.572)	(0.022)	(0.022)
WfH (Female)	-0.298	1.525**	0.002	0.029	3.221**	0.118	0.111**	0.274***
	(0.867)	(0.752)	(0.043)	(0.053)	(1.284)	(0.634)	(0.044)	(0.070)
Observations	9226	9226	9226	9226	6762	6762	6762	6762
R-squared	0.132	0.118	0.163	0.186	0.272	0.135	0.221	0.294
Panel B: Adding partner's characteristics								
WfH (Male)	0.089	0.490	-0.019	-0.001	0.420**	0.458	0.075***	0.096***
	(0.299)	(0.676)	(0.043)	(0.042)	(0.202)	(0.572)	(0.022)	(0.022)
WfH (Female)	-0.250	1.499**	0.000	0.028	3.329***	0.171	0.111**	0.280***
	(0.861)	(0.750)	(0.043)	(0.053)	(1.271)	(0.630)	(0.044)	(0.070)
Partner in employment	-0.160	0.102	-0.027*	-0.032**	-0.366**	-0.105	-0.016	-0.024*
	(0.197)	(0.321)	(0.016)	(0.015)	(0.159)	(0.246)	(0.013)	(0.013)
...×female	0.660*	-0.516	0.015	0.030	-0.255	0.382	-0.002	-0.026
	(0.343)	(0.384)	(0.021)	(0.023)	(0.933)	(0.481)	(0.034)	(0.049)
Partner's earnings	0.000	0.000	0.000***	0.000***	-0.000	0.000	0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
... ×female	-0.000	-0.000	-0.000***	-0.000***	-0.000	-0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	9226	9226	9226	9226	6762	6762	6762	6762
R-squared	0.133	0.119	0.166	0.190	0.276	0.135	0.223	0.297
Panel C: Adding child care availability depending on child's age								
WfH (Male)					0.419**	0.456	0.075***	0.096***
					(0.203)	(0.569)	(0.022)	(0.022)
WfH (Female)					3.322***	0.125	0.113**	0.281***
					(1.266)	(0.639)	(0.044)	(0.070)
Child care places per 100 children								
...below 3 yrs'					0.010	-0.019	0.001	0.000
					(0.012)	(0.016)	(0.001)	(0.001)
...between 3 to 6 yrs'					-0.003	0.009	-0.000	-0.000
					(0.005)	(0.006)	(0.000)	(0.000)
...between 6 to 10 yrs'					0.004	0.002	-0.000	-0.000
					(0.004)	(0.004)	(0.000)	(0.000)
Observations					6762	6762	6762	6762
R-squared					0.276	0.137	0.224	0.297

Note: Standard errors in parentheses, $*p < 0.10, **p < 0.05, ***p < 0.01$. Control variables included are as in Table 4.

Table A.5: Effect of WfH on hours and wages, controlling for commuting distance

	Without children under 16				With children under 16			
	Contracted hours (1)	Overtime hours (2)	Hourly wage (3)	Monthly wage (4)	Contracted hours (5)	Overtime hours (6)	Hourly wage (7)	Monthly wage (8)
Panel A: Baseline regressions, commuting sub-sample								
WfH (Male)	-0.035	0.718	-0.034	-0.021	0.306*	0.849	0.077***	0.103***
	(0.326)	(0.564)	(0.035)	(0.033)	(0.177)	(0.589)	(0.023)	(0.022)
WfH (Female)	-0.101	0.780	0.005	0.017	3.807**	0.136	0.128***	0.295***
	(0.694)	(0.608)	(0.033)	(0.040)	(1.669)	(0.668)	(0.048)	(0.082)
Observations	12882	12882	12882	12882	7070	7070	7070	7070
R-squared	0.087	0.062	0.165	0.184	0.217	0.097	0.183	0.252
Panel B: Adding commuting distance								
WfH (Male)	-0.038	0.738	-0.036	-0.024	0.282	0.817	0.074***	0.099***
	(0.328)	(0.557)	(0.035)	(0.034)	(0.180)	(0.591)	(0.022)	(0.022)
WfH (Female)	-0.093	0.777	0.006	0.018	3.808**	0.136	0.128***	0.295***
	(0.692)	(0.609)	(0.033)	(0.040)	(1.671)	(0.664)	(0.048)	(0.082)
Commuting distance (in km)	0.003	0.004	-0.000	-0.000	0.005	0.002	0.000*	0.001**
	(0.002)	(0.003)	(0.000)	(0.000)	(0.006)	(0.005)	(0.000)	(0.000)
...×female	0.009	0.003	0.000	0.001	-0.052**	0.013	0.000	-0.001
	(0.007)	(0.007)	(0.000)	(0.000)	(0.023)	(0.013)	(0.001)	(0.001)
Commuting distance squared	-0.000	-0.000	0.000**	0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
...×female	-0.000	-0.000	-0.000	-0.000	0.000***	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	12882	12882	12882	12882	7070	7070	7070	7070
R-squared	0.088	0.063	0.165	0.185	0.224	0.102	0.188	0.257

Note: Standard errors in parentheses, $*p < 0.10, **p < 0.05, ***p < 0.01$. Control variables included are as in Table 4.

B Model with correlated individual effects and correction for selection into work

Here we follow Wooldridge (1995) and present a model that accounts for correlated individual effects, as well as dealing with potential selection bias due to shocks to individuals' decision to work.

The model is composed of an outcome equation and a selection equation.

$$y_{it} = \boldsymbol{x}_{1it}\boldsymbol{\beta}_1 + \boldsymbol{x}_{2it}\boldsymbol{\beta}_2 + \theta_t + \alpha_i + u_{it} \qquad t = 1, ...T \tag{2}$$

$$h^*_{it} = \boldsymbol{x}_{1it}\boldsymbol{\gamma}_1 + \boldsymbol{z}_{it}\boldsymbol{\gamma}_2 + \eta_i + v_{it} \text{and } s_{it} = \mathbb{1}[h^*_{it} > 0] \tag{3}$$

where y_{it} is the outcome of individual i at time t, h^*_{it} is the hours worked by individual i in year t. Because h^*_{it} is unobserved for people who are not working in year t, we use an indicator variable s_{it} which is equal to one if individual i is working (i.e. has a strictly positive number of worked hours at time t) and to zero if individual i is not working. The vector $\boldsymbol{x}_1$ includes variables that appear in both the outcome and the selection equation, while the vector $\boldsymbol{x}_2$ appears only in the outcome equation. $\boldsymbol{z}$ is the vector of excluded variables that appear only in the selection equation. θ_t is a set of time fixed effects. In both equations we account for time invariant individual unobserved characteristics, α_i in equation (2) and η_i in equation (3).

We use Chamberlain's approach to panel data models to control for individual unobservable characteristics and at the same time deal with self-selection into the work force. In this setting we make the following assumptions. First, following Chamberlain (1984), Wooldridge (1995) and Wooldridge (2010), the conditional expectation of the individual effects in the outcome equation and in the selection equation are linear functions of the mean of the observable variables :

$$\eta_i = \overline{\boldsymbol{x}}_{1i}\boldsymbol{\delta}_1 + \overline{\boldsymbol{z}}_i\boldsymbol{\delta}_2 + e_i,$$

$$E(\alpha_i|\boldsymbol{x}_i, \boldsymbol{z}_i, \varepsilon_{it}) = \overline{\boldsymbol{x}}_{1i}\tilde{\boldsymbol{\phi}}_1 + \overline{\boldsymbol{x}}_{2i}\tilde{\boldsymbol{\phi}}_2 + e_i.$$

Second, the errors in the selection equation (3) $\varepsilon_{it} = e_i + v_{it}$ are independent of $\boldsymbol{z}_i$.

Third, the errors in the outcome equation (2) u_{it} are mean independent of $(\boldsymbol{x}_i, \boldsymbol{z}_i)$ conditional on the errors in the selection equation (3) ε_{it} ; and the conditional expectations

of u_{it} is linear in ε_{it} :

$$E(u_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, \varepsilon_{it}) = E(u_{it}|\varepsilon_{it}) = \rho_t \varepsilon_{it}.$$

As we do not observe h_{it}^* but only s_{it}, we use the selection indicator and transform the last expression into : $E(u_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1}) = \rho_t E(\varepsilon_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1})$.

Under the previous assumptions, we obtain:

$$E(\alpha_i + u_{it}) = E(c_i|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1}) + E(u_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1})$$

$$= \overline{\boldsymbol{x}}_i \psi + \rho_t E(\varepsilon_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1}).$$

We thus estimate the following model:

$$y_{it} = \boldsymbol{x}_{1it}\boldsymbol{\beta}_1 + \boldsymbol{x}_{2it}\boldsymbol{\beta}_2 + \overline{\boldsymbol{x}}_i \psi + \rho_t \lambda(s_{it}) + \theta_t + \mu_{it} \tag{4}$$

where $\lambda(s_{it}) = E(\varepsilon_{it}|\boldsymbol{x}_i, \boldsymbol{z}_i, s_{it=1})$. The vector $\boldsymbol{x}_1$ includes the educational degree, demographic characteristics, namely age and its square, marital status, migration background, and number of children in three age groups. Theses characteristics are interacted with a female dummy to allow for heterogenous effects across men and women. The vector $\boldsymbol{x}_2$ appears only in the outcome equation and includes the following job characteristics interacted with a female dummy: public sector, size of the firm, tenure in the firm and its square, full-time and part-time experience in years. We also control for gender-specific industry, occupation and occupational status fixed-effects.

To get estimates of $\lambda(s_{it})$ we first run the following probit model on a paid employment dummy s_{it} for each time period t and separetely for men and for women :

$$P(s_{it} = 1|\boldsymbol{x}_{1i}, \boldsymbol{z}_i, \eta_i) = \Phi(\boldsymbol{x}_{1it}\boldsymbol{\gamma}_1 + \boldsymbol{z}_{it}\boldsymbol{\gamma}_2 + \overline{\boldsymbol{x}}_{1i}\boldsymbol{\delta}_1 + \overline{\boldsymbol{z}}_i\boldsymbol{\delta}_2) \tag{5}$$

where $\boldsymbol{x}_1$ is defined as above and the vector of excluded variables $\boldsymbol{z}$ includes parnter's employment status and educational level, a determinant of partner's earning, both interacted with dummies for children in three age groups. In another specifiation, we consider the case in which these partner's characteristics may directly affect hours worked and wages and use instead, characteristics of the mother's surveyed individual when she/he was 15years old, such as education or employment status. We interact these mother's characteristics with dummies for children in three age groups. We then compute $\lambda(s_{it}) = \frac{\phi(s_{it})}{\Phi(s_{it})}$ where ϕ is the standard density function and Φ is the standard cumulative distribution function.

The results of this first step on the pooled sample of years are reported in Table B.1.[10] Column 1 and 2 report the results on the female probability of being in paid employment while column 3 and 4 report the results for men. The female probability of being in paid employment decreases significantly with the number of children, especially if the children are young (columns 1 and 2). The impact of children on men's probability of working is much smaller, and even positive for children under the age of 3 (columns 3 and 4). For women and men, the negative effect of young children on the probability of working is stronger if the partner is in paid employment. Column (2) and (4) show that having a mother with a higher level of education increases the probability of being in paid employment, in particular when the individual has children, for both women and men.

In a second step, we estimate equation 4 adding the control function $\lambda(s_{it})$ previously estimated. The results on the different samples are reported in Table B.2. The sample size is smaller here because we drop individuals with missing information on the excluded variables used in the first step. Results on the sample of parents with children under the age of 16 are reported in Panel A and B, while results for childless employees are reported in Panels C and D. Similarly to our main specification, the regressors include demographic characteristics, job characteristics, as well as gender-specific industry, occupation and occupational status fixed-effects. It is now augmented with a control function to correct for the selection bias. We allow the effect of the control function to vary by gender and time.

[10]Results by year are available upon request.

Table B.1: Probability to work, by gender

Excluded variables: characteristics of	Women		Men	
	Partner (1)	Mother (2)	Partner (3)	Mother (4)
Children under age 3	-1.511***	-1.630***	0.113*	-0.081
	(0.078)	(0.102)	(0.066)	(0.096)
Child aged between 3 and 6	-1.128***	-1.419***	-0.334**	-0.547***
	(0.119)	(0.142)	(0.145)	(0.171)
Children between 6 and 15	-0.761***	-0.987***	-0.010	-0.273**
	(0.076)	(0.105)	(0.084)	(0.118)
Has children aged 16 or older	-0.583***	-0.864***	-0.041	-0.483***
	(0.079)	(0.114)	(0.096)	(0.139)
Living with a partner/married	-0.040	-0.063	-0.096*	-0.071
	(0.053)	(0.057)	(0.058)	(0.062)
Partner in paid employment	0.180***	0.199***	0.187***	0.173***
	(0.059)	(0.062)	(0.053)	(0.056)
Partner in employment×children under 3	-0.445***	-0.466***	-0.440***	-0.448***
	(0.076)	(0.080)	(0.081)	(0.083)
Partner in employment×children aged 3-5	-0.249***	-0.290***	-0.142*	-0.130*
	(0.076)	(0.081)	(0.075)	(0.079)
Partner in employment×children aged 6-15	-0.150**	-0.141**	-0.159***	-0.209***
	(0.060)	(0.064)	(0.058)	(0.061)
Partner in employment×children above 16	-0.085	-0.091	-0.023	-0.017
	(0.052)	(0.055)	(0.057)	(0.060)
Partner has vocational degree	-0.063	-0.061	0.082*	0.101**
	(0.048)	(0.050)	(0.047)	(0.049)
Partner has teriary education degree	-0.032	-0.025	0.117	0.108
	(0.077)	(0.079)	(0.101)	(0.105)
Partner in employment×teriary educ	0.094	0.083	0.033	0.051
	(0.065)	(0.068)	(0.077)	(0.080)
Partner in employment×vocational educ	-0.028	-0.040	-0.051	-0.064
	(0.050)	(0.053)	(0.052)	(0.054)
Mother's years of education		-0.016		0.093***
		(0.024)		(0.023)
Mother's years of education×children under 3		0.086*		0.143**
		(0.050)		(0.060)
Mother's years of education×children aged 3-5		0.211***		0.191***
		(0.052)		(0.066)
Mother's years of education×children aged 6-15		0.151***		0.231***
		(0.055)		(0.070)
Mother's years of education×children above 16		0.212***		0.358***
		(0.065)		(0.088)
Observations	65442	60294	53784	50016

Note: Standard errors in parentheses, $*p < 0.10, **p < 0.05, ***p < 0.01$. Additional control variables included are age and its square, migration background, cohort fixed effects, regions and year fixed-effects and urban area. We also control for individual effects using Chamberlain approach and add the time average of all explanatory variables .

Table B.2: Effect of WfH controlling for selection into the labour force

	Contracted hours			Overtime hours		Hourly wage		Monthly wage	
	FE	CRE	CRE	CRE	CRE	CRE	CRE	CRE	CRE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: With children under 16, excluded variable partner's characteristics									
WfH × Male	0.436**	0.436**	0.400**	0.676	0.758	0.071***	0.065***	0.097***	0.091***
	(0.194)	(0.198)	(0.201)	(0.591)	(0.596)	(0.023)	(0.023)	(0.023)	(0.023)
WfH × Female	2.625*	2.625*	2.761*	0.399	0.372	0.089*	0.091**	0.223***	0.229***
	(1.408)	(1.435)	(1.449)	(0.716)	(0.707)	(0.045)	(0.045)	(0.074)	(0.077)
Selection correction	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	6967	6967	6967	6967	6967	6967	6967	6967	6967
Panel B: With children under 16, excluded variable mother's characteristics									
WfH × Male	0.443**	0.443**	0.419**	0.667	0.766	0.069***	0.060***	0.095***	0.087***
	(0.191)	(0.195)	(0.200)	(0.587)	(0.593)	(0.023)	(0.022)	(0.023)	(0.022)
WfH × Female	2.816**	2.816**	2.912**	0.535	0.501	0.082*	0.085*	0.229***	0.234***
	(1.396)	(1.425)	(1.438)	(0.723)	(0.714)	(0.044)	(0.045)	(0.073)	(0.075)
Selection correction	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	6461	6461	6461	6461	6461	6461	6461	6461	6461
Panel C: Without children older than 16, excluded variable partner's characteristics									
WfH × Male	0.040	0.040	0.058	0.583	0.628	-0.030	-0.030	-0.012	-0.011
	(0.298)	(0.302)	(0.304)	(0.680)	(0.678)	(0.045)	(0.044)	(0.044)	(0.044)
WfH × Female	-0.538	-0.538	-0.571	1.670**	1.668**	0.005	0.009	0.027	0.030
	(0.894)	(0.907)	(0.905)	(0.792)	(0.786)	(0.043)	(0.043)	(0.053)	(0.053)
Selection correction	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	9234	9234	9234	9234	9234	9234	9234	9234	9234
Panel D: Without children older than 16, excluded variable mother's characteristics									
WfH × Male	-0.052	-0.052	-0.034	0.600	0.643	-0.031	-0.031	-0.015	-0.014
	(0.313)	(0.318)	(0.320)	(0.732)	(0.729)	(0.048)	(0.048)	(0.047)	(0.047)
WfH × Female	-0.455	-0.455	-0.493	1.871**	1.866**	-0.016	-0.013	0.013	0.015
	(0.908)	(0.923)	(0.921)	(0.785)	(0.778)	(0.042)	(0.042)	(0.055)	(0.055)
Selection correction	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	8632	8632	8632	8632	8632	8632	8632	8632	8632

Note: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. Control variables included are gender-specific year fixed effects, gender-specific demographic controls (age, age squared, migration background, marital status, children), gender-specific human capital controls (highest degree and actual work experience), job characteristics (tenure, tenure squared, public sector dummy, firm size), macro-regions, urban area, gender-specific occupation fixed effects (95 occupation dummies) and gender-specific occupational status fixed effects (15 occupation dummies).

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