Alexandra Mergener | Lisa Mansfeld

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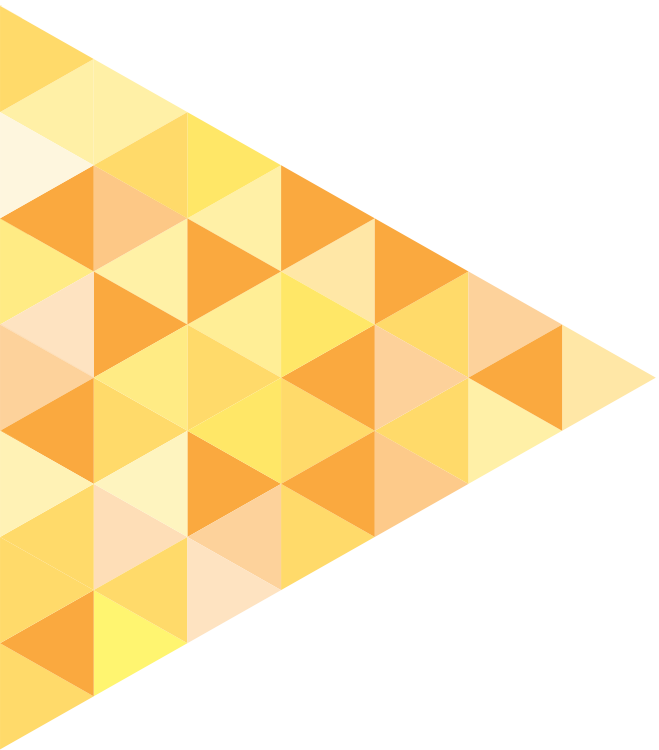

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Being spatially mobile without daily commuting?

How Working from Home patterns relate to company-home distances

Alexandra Mergener[1], Lisa Mansfeld[2]

Abstract

Given the widespread use of information and communication technologies (ICTs) and the current Covid-19 pandemic, both prevalence and importance of Working from Home (WfH) have increased. Similarly, company-home distances have been on the rise. By decreasing the frequency of commuting, WfH as a substitute for working at the employer's premise might be especially interesting for employees with long commuting distances. To assess this relationship, we use data on 14,928 employees in Germany stemming from the BIBB/BAuA Employment Survey 2018. We find a positive link between recognized WfH and company-home distance. Moreover, higher WfH intensity corresponds to higher company-home-distance. This link appears to be stronger for men and WfH users with vocational education (compared to highly qualified WfH-users). We conclude that WfH might imply increased spatial independence between employers' premises and employees' place of residence, which in turn can translate into positive effects, e.g. regarding reconciliation of work and family commitments or job satisfaction.

Zusammenfassung

Angesichts der zunehmenden Nutzung von Informations- und Kommunikationstechnologien (IKT) und der aktuellen Covid-19-Pandemie hat sich die Relevanz und Häufigkeit der Homeoffice-Nutzung erhöht. Ebenso ist seit einiger Zeit eine Tendenz zu immer weiteren Distanzen zwischen dem Betriebs- und Wohnort der Beschäftigten zu beobachten. Homeoffice als Ersatz für die Arbeit im Betrieb kann die Häufigkeit von zurückzulegenden Pendelstrecken verringern und daher insbesondere für Beschäftigte mit weiten Pendeldistanzen interessant sein. Unsere Analysen von 14.928 Beschäftigten aus der BIBB/BAuA Erwerbstätigenbefragung 2018 zeigen einen positiven Zusammenhang zwischen Homeoffice, bei dem die Arbeitszeit anerkannt wird, und der Strecke der Arbeitswege fest. Darüber hinaus weisen Beschäftigte, die Homeoffice häufiger nutzen, weitere Entfernungen zwischen Betriebs- und Wohnort auf. Dieser Zusammenhang ist bei Männern und Personen mit Berufsausbildung stärker als bei Frauen und Beschäftigten mit Hochschulabschluss. Wir schließen daraus, dass Homeoffice zu einer größeren räumlichen Unabhängigkeit zwischen Betriebs- und Wohnort und dadurch bspw. zu einer besseren Vereinbarkeit von Beruf und familiären Verpflichtungen oder auch höherer Arbeitszufriedenheit führen kann.

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Content

1 Introduction

Due to the widespread use of information and communication technologies (ICTs) and the transition to a post-industrial economy including the expansion of knowledge-based activities, access to work content and virtual interactions with colleagues are increasingly possible from different locations. Thus, possibilities to work outside employer's premises and instead from home are becoming more attractive and important, especially in occupations with a high extent of cognitive tasks (Mergener, 2020a). Additionally, the Covid-19 pandemic led to a substantial increase in Working from Home (WfH) in Germany, as the number of both WfH users (Frodermann et al., 2020) and job advertisements for remote jobs (Alipour, Falck, & Schüller, 2020) doubled in early 2020 when the first lockdown was imposed. WfH, also called telecommuting or telework, can lead to a significant change in the geography of labor markets if employees are less tied to company's location. Geographical mobility can be very beneficial as it allows access to employment opportunities in a wider geographical area and thus, in contrast to moving, enables people to reconcile work and family or private commitments within their time and space constraints (Green, Hogarth, & Shackleton, 1999; Lück & Ruppenthal, 2010). In Germany, the tendency for longer distances between home and company is already apparent (Borowsky, Drobnič, & Feldhaus, 2020; Dauth & Haller, 2018). Still, the relationship between WfH and company-home distance remains under-explored.

So far, especially highly qualified employees in management and full-time rather than in part-time positions have worked from home (e.g. Arnold, Steffes, & Wolter, 2015; Bellmann & Widuckel, 2017; Brenke, 2014, 2016; Noonan & Glass, 2012). Moreover, we know that the opportunity to work from home increases with the extent of cognitive tasks at the workplace (e.g. processing emails, researching or consulting), while manual tasks (e.g. accommodating, cleaning or caring) reduce this opportunity (Mergener, 2020a). Furthermore, WfH patterns are very heterogeneous and differ in terms of WfH intensity and recognition of home working hours. The majority of German teleworkers work rarely or sometimes from home, more than half of them do not have a contractual agreement on their WfH arrangement and for about one third of WfH users, home working hours are not or only partially recognized (Mergener, 2020b). This proportion of unrecognized home

working time is, however, lower for employees with long commuting distances (Alipour, Falck, Mergener, & Schüller, 2020).

It is well studied that commuting activities are exhausting and costly for employees, not only financially. It causes, for example, higher perceived stress level, lower well-being or poorer health (e.g. Künn-Nelen, 2016; Rüger & Schulze, 2016; Stutzer & Frey, 2008). WfH as a substitute for working at the employer's premise can reduce these costs by decreasing the frequency of commuting. Are WfH users therefore more likely to increase their spatial mobility because they do not have to commute long distances every day?

As only little is known about the relationship between WfH and company-home distance in Germany, the goal of this paper is to describe differences in distances between non-WfH use and recognized or non-recognized home working time as well as concerning WfH intensity. Given that men and women as well as employees with vocational and academic qualifications possess different mobility patterns, we assess whether these differences also occur regarding the link between WfH and company-home distance. Our analysis is based on data from the German BIBB/BAuA Employment Survey 2018. After a brief summary of the current state of research on commuting and WfH and a description of the data, we report our results and conclude with a short summary.

2 Empirical evidence on commuting and WfH

The spatial mobility of employees in Germany is on the rise, as indicated by increasing commuting distances in recent years (Dauth & Haller, 2018). For instance, expensive housing prices in city centers, short-term contracts and different work locations for dual-earner couples make it impossible or unattractive for employees to move close to their employers' place (Schneider & Meil 2008, Urry 2012). Thus, commuting can be an alternative to moving, which is additionally being promoted through tax concessions (see e.g. Heuermann, Assmann, vom Berge, & Freund, 2017 on commuting subsidies in Germany). The underlying idea is that by accepting longer distances between the employees' current residence and the employer's location, the number of possible jobs might be increased, in turn improving the likelihood of matching job vacancies and searches (e.g. Abel & Deitz, 2015; Petrongolo & Pissarides, 2006).

However, this link appears not to be universal as research points to gender- and education-specific differences in employees' mobility behavior. In many developed countries, the average trip to work is markedly shorter for women than for men (e.g. Crane, 2007 for the U.S.; Dauth & Haller, 2018 for Germany; de Vos, Meijers, & van Ham, 2018 for the Netherlands; McQuaid & Chen, 2012 for the UK; Sandow & Westin, 2010 for Sweden). Particularly women with young children are reluctant to accept long distances to the job (Rouwendal, 1999). Regarding couples, women's lower willingness to commute can partly be explained by a gender-specific division of labor, which continues to assign more responsibility for unpaid work to women and more responsibility for gainful employment to men (Van der Lippe, Ruijter, Ruijter, & Raub, 2011). Even in dual-earner couples, women still take on a larger share of household and childcare responsibilities (Pailhé, Solaz, & Souletie, 2019). Often, this results in women working part-time and, thus, in higher relative costs of commuting, e.g. in terms of time and energy. Regarding education-specific differences in commuting behavior, people with higher qualifications can usually recoup the costs of commuting more easily, as they can expect higher wages than less qualified people. Hence, on average, employees with a university degree accept longer distances between company and home than those with vocational education (Dauth & Haller, 2018). However, especially for the highly qualified people, commuting often serves as a stepping-stone to relocation (Melzer & Hinz, 2019), while for people with vocational education, the commuting distance has increased most in recent years in Germany (Dauth & Haller, 2018).

Even if work-related geographical mobility is positively associated with wage and career achievements (e.g. Cooke, 2008; Dauth & Haller, 2020; Lehmer & Ludsteck, 2011; Mulder & Van Ham, 2005), there are non-negligible costs of commuting. The costs of commuting are well researched and include social and environmental as well as individual costs. On the one hand, commuting enhances traffic, increases costs of infrastructure, and air pollution (e.g. Muñiz & Galindo, 2005; Travisi, Camagni, & Nijkamp, 2010). On the other hand, commuting causes higher perceived stress levels, poorer health and lower well-being (e.g. Chatterjee et al., 2020 for an overview of commuting's impact on subjective wellbeing; Künn-Nelen, 2016; Rüger & Schulze, 2016; Stutzer & Frey, 2008). Rüger and Schulze (2016) additionally point out that women and people with children are especially likely to suffer from negative health effects.

WfH can be a way to reduce the costs of commuting by decreasing the frequencies of trips to the workplace. The possibility of substituting working time typically spent at the employer's premise with working time spent at home can increase employees' tolerance of long distances and reduce the number of residential relocations. Although this does not necessarily lead to less traffic and air pollution but only shifts in time when compared to short commuting distances without WfH opportunities (Ravalet & Rérat, 2019), it allows employees to enhance their geographical mobility without causing more traffic and more individual stress. This argument is supported by the findings of Mokhtarian, Collantes, and Gertz (2004), who stated that, even if teleworkers have longer company-home distances than non-teleworker, their total commuting activity is lower compared to non-teleworkers.

Given data restrictions, it appears difficult to establish the direction of causality: do WfH opportunities increase the likelihood of further distances between company and home, or do people with long distances rather tend to work from home? However, while the use of WfH seems to be more dependent on age, education or sex of the individuals than on (changes in) commuting distance or time (de Graaff & Rietveld, 2007), various international studies show that WfH increases commuting distance (e.g. de Vos, Meijers, & van Ham, 2018 for the Netherlands; Helminen & Ristimäki, 2007 for Finland; Ravalet & Rérat, 2019 for Switzerland; Zhu, 2013 for the U.S.). In contrast, in their analysis of the temporal order of telecommuting engagement and residential relocation, Ory and Mokhtarian (2006) found that people who first started teleworking and moved afterwards tend to relocate closer to employer's premises, whereas people who moved before starting WfH relocated farther from the company's location.

So far, little is known about the relationship between company-home distance and the use or non-use of WfH in Germany. In their recent report , Wöhrmann, Backhaus, Tisch, and Michel (2020) pointed out that medium-distance commuters and especially long-distance commuters agreed to telework more often than other employees. In order to expand the knowledge of the relation of WfH and geographical mobility in Germany, we assess company-home distances for WfH users and non-users. As we know that both WfH use and non-use are very heterogeneous (Alipour, Falck, Mergener, & Schüller, 2020; Mergener, 2020b), we describe differences in distances between reasons of non-use and recognition of home working hours as well as WfH intensity. In addition,

given gender- and education-specific differences in employees' mobility behavior, we consider the link between WfH and company-home distance separately for men and women as well as for employees with vocational and academic qualifications.

3 Data and variables

Data stems from the German Employment Survey 2018, carried out by the Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety and Health (BAuA) (BIBB/BAuA Employment Survey 2018, doi 10.7803/501.18.1.1.10). This representative survey of more than 20,000 persons with a minimum of 10 working hours per week includes detailed information on workplace characteristics, occupations, education, employment history and personal characteristics. As the recent wave of the BIBB/BAuA Employment Survey contains differentiated information on both WfH and employees' distances between their place of residence and the company's location, it offers unique potential regarding our research. Analyses are based on 14,928 employees (i.e. no freelancers, assisting family members or self-employed), aged 18-65.

Variables

We measure *WfH* in three steps. First, employees were asked whether they work for the company from home, even if only occasionally. Second, WfH users were asked to indicate to what extent the hours they work from home are counted as working time. Recognized WfH includes those who reported full or partial home working time recognition, whereas non-recognized WfH includes those who reported no recognition of their home working hours. WfH non-users can be divided into those who do not have WfH potential (i.e. their work cannot be performed from home), those who have potential but the employer does not allow WfH or those who have potential but decided themselves not to work from home. Third, WfH users were asked about the intensity of their WfH use. The response categories include always, frequently, sometimes and rarely (to find more information about WfH intensities among German employees, e.g. detailed WfH hours or days, see Mergener (2020b)).

Company-home-distance is calculated using the distance in kilometers between the central point of the district ("Gemeinde") in which the company is located and the central point of the district

(“Gemeinde”) in which the employee’s place of residence is located (measured by the German Gemeindekennziffern (GKZ); for details see Hall et al., 2019, chapter 2.7.2). These are the most detailed information available in the data set. Unfortunately, this implies that distances within districts are neglected: if the employee’s place of residence and the company’s place are located in the same district, the precise distance is unknown, because start and destination cannot be determined exactly. In this case, the variable company-home distance has the value 0 km.

Doing multivariate analysis, we control for sociodemographic, socioeconomic, job- and company-related variables. First, we consider employees’ sex, age (in groups), whether he or she has children under the age of 18 living in the same household and whether he or she lives with an employed partner. Second, the employee’s highest educational level (no degree, vocational education and training, further training, academic degree), their career aspirations (i.e. whether employees pursue the goal of a professional career very strongly, strongly, not much or not all) and work experience in the company (in years) are controlled. Third, we include a classification of occupations (at 2-digit level of KldB 2010), contractual working hours and leading position (no, low, middle, high level of management). Fourth, company size and region (east/west) are incorporated.

4 Results

4.1 Descriptive analyses

Descriptive analyses are based on weighted data adjusted to total population indicators using the German Microcensus 2018 (for weighting of the BIBB/BAuA Employment Survey 2018 see Gensicke & Tschersich, 2018 or Hall et al., 2019). Table 1 shows summary statistics of the main variables as well as its correlations. Company-home-distance ranges from 0 (if both are located in the same district) to 716.7 km, with an average of 24.4 km. Considering the correlations with company-home-distance (column “1”), we find a negative link with all three categories of no WfH use while the correlation coefficient is positive looking at recognized WfH. This implies that no WfH use corresponds to lower levels of company-home distance while doing recognized WfH is associated with longer distances. The correlation coefficient of non-recognized WfH turned out not to be statistically significant. Among respondents doing recognized WfH, negative correlations are found with lower WfH intensities (rarely and sometimes) while higher WfH intensities (often and

always) possess positive correlations with company-home distance. Correlations of WfH intensities of those doing unrecognized WfH with company-home distance were found not to be statistically significant.

Table 1: Minimum score, maximum score, mean score, standard deviation, and bivariate correlations between the variables

		Min	Max	Mean	SD	1	2	3
1	Company-home-distance (km)	0	716.7	24.4	60.4	1		
2	Women	0	1	0.47	0.50	-0.09***	1	
3	Vocational education	0	1	0.72	0.45	-0.04***	-0.04***	1
	No WfH potential	0	1	0.43	0.49	-0.07***	-0.09***	0.34***
	WfH potential (but firm)	0	1	0.21	0.41	-0.04***	0.07***	0.03**
	WfH potential (but own decision)	0	1	0.09	0.29	-0.03***	0.07***	0.01
	Recognized WfH	0	1	0.22	0.41	0.14***	-0.00	-0.36***
	Non-recognized WfH	0	1	0.06	0.24	-0.00	-0.00	-0.11***
	Recognized WfH intensity							
	Rarely WfH	0	1	0.28	0.45	-0.09***	-0.08***	0.10***
	Sometimes WfH	0	1	0.30	0.46	-0.07***	-0.01	0.01
	Often WfH	0	1	0.27	0.44	0.11***	0.01	-0.06***
	Always WfH	0	1	0.15	0.36	0.07***	0.10***	-0.07***
	Non-recognized WfH intensity							
	Rarely WfH	0	1	0.34	0.47	-0.03	-0.08**	0.06*
	Sometime WfH	0	1	0.35	0.48	-0.03	-0.03	-0.03
	Often WfH	0	1	0.31	0.46	0.06	-0.04	-0.04
	Always WfH	-	-	-	-	-	-	-

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. Weighted data. *p<.05, **p<.01, ***p<.001.

As already suggested in literature, we find that company-home-distance as well as WfH patterns are not universal but correlate with sex and educational degree. Concerning company-home-distance, we find a negative link with both women and the vocational education dummy. Consequently, being a woman and holding a vocational degree correspond to lower company-home-distances compared to men and holding a university degree. Additionally, being a woman (column "2") is negatively linked with having a job without WfH potential and a rare use of WfH (for both recognized and unrecognized WfH users). In contrast, there is a positive association of being a woman and having a job with WfH potential but not using it (independent of the reasons for this non-use). Furthermore, a positive link can be found with using WfH always (among recognized WfH users). Holding a vocational degree (column "3") is positively associated with having a job without WfH potential or a job with WfH potential but the company not allowing WfH. In contrast, the link to WfH use (both recognized and unrecognized) is negative. Turning to WfH intensities, the correlation between holding a vocational degree and doing WfH rarely (both recognized and unrecognized) is positive while it is negative with doing WfH often or always (for those doing recognized WfH only).

As we do not find any significant correlation between non-recognized WfH and company-home distance in these descriptive analyses (neither in total not by intensity), in the following we consider only recognized WfH when analyzing differences by WfH intensities.

Table 2 shows means and differences in means of company-home-distance by WfH measures, sex and educational levels. In general, company-home-distance is higher for those using WfH compared to those not using WfH. Among WfH users, it is clearly higher for those doing recognized (40.5 km) compared to unrecognized WfH (24.3 km). Among non-users, differences are smaller, with the highest distance for those without WfH potential (19.8 km) and the lowest distance for those who decided themselves not to use WfH (18.7 km). Concerning the intensity of recognized WfH, we find the highest company-home-distance for those using WfH often (56.9 km), closely followed by employees who use it always (54.6 km). Lower distances were found for those using WfH sometimes (31.0 km) and rarely (27.4 km).

Table 2: Company-home-distance (in km) by WfH and sex and educational level (t-tests)

	Total	Sex			Educational level		
		Men	Women	Mean diff.	Vocational Education	University degree	Mean diff.
	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Total	24.4 (60.4)	29.5 (65.5)	18.5 (51.3)	11.0***	23.0 (67.9)	28.4 (68.8)	-5.4**
No WfH potential	19.8 (47.0)	23.6 (50.6)	14.4 (38.0)	9.2***	20.1 (44.7)	21.4 (69.8)	-1.3
WfH potential (but firm)	19.4 (42.8)	22.0 (45.4)	17.0 (39.3)	5.0*	18.8 (36.2)	19.5 (52.8)	-0.7
WfH potential (but own decision)	18.7 (54.3)	21.4 (54.8)	16.7 (53.3)	4.7	19.1 (49.7)	19.6 (73.8)	-0.5
Recognized WfH	40.5 (89.8)	50.9 (100.8)	28.4 (72.0)	22.5***	42.7 (84.2)	36.9 (86.9)	5.8
Non-recognized WfH	24.3 (62.2)	29.4 (64.9)	18.1 (57.8)	11.3*	26.3 (68.2)	23.2 (48.3)	3.1
Intensity of recognized WfH							
Rarely WfH	27.4 (67.8)	34.1 (78.6)	17.4 (39.4)	16.7**	26.6 (64.9)	27.9 (67.6)	-1.3
Sometimes WfH	31.0 (70.1)	38.9 (77.3)	21.6 (59.1)	17.3***	26.1 (55.2)	34.0 (76.1)	-7.8
Often WfH	56.9 (109.6)	72.9 (123.3)	39.1 (88.6)	33.8***	71.2 (108.1)	43.7 (96.1)	27.5**
Always WfH	54.6 (112.3)	77.7 (136.3)	37.8 (86.4)	39.9***	74.3 (109.3)	43.2 (106.3)	31.1**

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. Weighted data. *p<.05, **p<.01, ***p<.001.

Considering variations in these distances by sex, we find significant differences for all WfH measures except among employees who decided themselves not to use WfH. Across WfH measures, men show higher company-home-distances than women, with the differences being

highest among WfH users with high intensities (often and always). To get an idea of the size of these differences, among employees using WfH always, men indicated average distances of 77.7 km while women travel only 37.8 km. This implies a mean difference in company-home-distance of 39.9 km. Regarding differences by educational status, we computed mean company-home-distances for respondents with vocational degree and university degree separately. In contrast to the analyzed gender patterns, we find statistically significant differences only among WfH users with high intensities (often and always). In these two groups, mean company-home-distance was higher for respondents with vocational education compared to university degree, translating into differences of 27.5 km (31.1 km) for those using WfH often (always).

To ensure that the differences in the company-home-distances between WfH use and non-use as well as gender and educational degree that are apparent in the descriptive analyses are not caused by other underlying variables (e.g. employees' age or family responsibilities, working time, leading position or career aspiration, work experience in the company or company region), we conduct multivariate analyses in the next step. We apply OLS regressions on the continuous dependent variable company-home distance including the abovementioned controls.

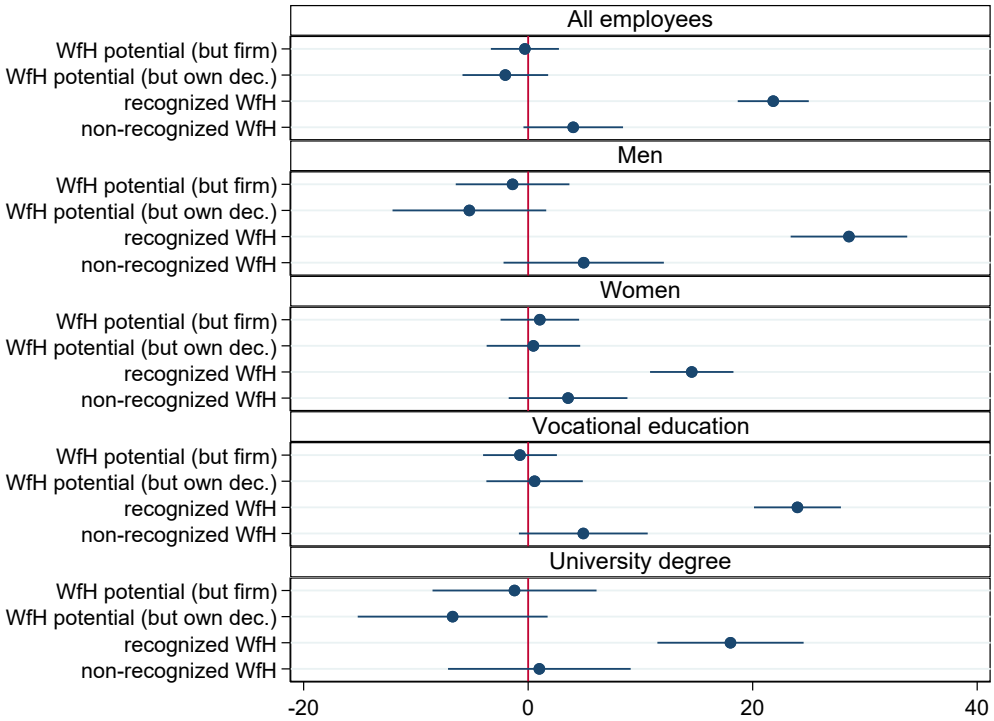
4.2 Multivariate analysis

Figure 1 shows the results of OLS regression on company-home-distance using WfH use as the main explanatory variable. We estimated five different models with the first model being based on all observations. We then run separate models by sex and educational level (vocational education and university degree).

Across all models, we find a statistically significant association only with recognized home working time: recognized WfH is linked to a higher company-home-distance when compared to no WfH potential. Estimates for WfH potential but firm, WfH potential but own decision and non-recognized WfH are not statistically significant across all five models. Still, we do find interesting differences across models. First, the link between recognized WfH and company-home distance appears to be stronger for men (compared to women) and employees with vocational education (compared to a university degree). Second, even though not statistically significant, we find differences regarding WfH potential but having decided not to use it: the respective coefficient is negative for men and

employees with university degree but show no correlation with distances for women and employees with vocational education.

Figure 1: Company-home distance by WfH categories

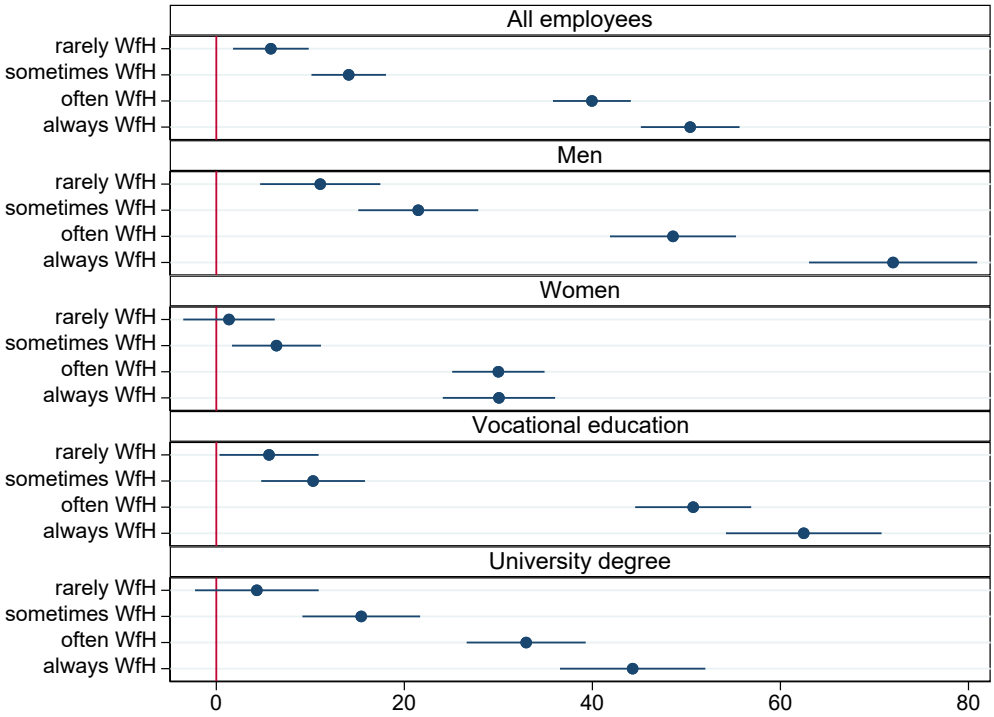


Data: BIBB/BAuA Employment Survey 2018, authors' own calculations.
Note: Samples include only employees (aged 18 to 65). Control for sex, age, children living in the household, employment of partner, educational level, contractual working time, leading position, career aspiration, work experience in the company, occupation (KldB2010 2-digit), company size and region are included but not displayed.

Figure 2 shows the results of OLS regressions on company-home-distance using WfH intensity as main explanatory variable, excluding employees with unrecognized home working hours from our models. Thus, when interpreting WfH intensity estimates, we compare recognized WfH users to non-users. The structure of the five models is the same as in figure 1.

Across all models, we observe the same tendency: higher WfH intensity corresponds to higher company-home-distance. Furthermore, all coefficients are positive and statistically significant, with the exception of the lowest intensity (rarely) not being statistically significant in the models with women and employees with university degree only.

Figure 2: Company-home distance by the intensity of recognized WfH



Data: BIBB/BAuA Employment Survey 2018, authors' own calculations.
Note: Samples include only employees (aged 18 to 65). Control for sex, age, children living in the household, employment of partner, educational level, contractual working time, leading position, career aspiration, work experience in the company, occupation (KldB2010 2-digit), company size and region are included but not displayed. Only intensity of recognized WfH (Ref. no WfH use).

In the model with women only, we find another exception from this outlined "universal" tendency: the estimates often and always are about the same and, thus, do not show the increasing tendency. Comparing the male and female models directly, we find that WfH intensities appear to be correlated more strongly with company-home-distance for men than for women. Turning to educational levels, we find that higher intensities (often and always) appear to be linked more strongly with company-home-distance for employees with vocational education than for employees with university degree.

5 Conclusion

Spatial mobility of employees in Germany has become more and more important in the past. Both increasing commuting distances (Dauth & Haller, 2018) and technological developments that enable mobile access to work, e.g. when working from home, can be observed. Although extending the geographical radius through commuting can be a way to improve individuals' careers without forcing people to move, commuting activities are stressful, exhausting and costly for employees.

WfH arrangements are a way to reduce commuting commitments and are thus discussed as a benefit in avoiding work-related strain (e.g. Lapierre, Van Steenbergen, Peeters, & Kluwer, 2016). Whether WfH use is associated with longer distances between company and place of residence is outlined in this paper. We found that only if WfH time is recognized (and thus replaces at least some commuting activities), people might be willing to accept more distant jobs. Moreover, higher WfH intensity corresponds to higher company-home-distance. This link appears to be stronger for men, which supports existing evidence on women's lower mobility. However, even for women, the distance between their place of residence and the company is significantly longer when working from home than when not working from home. This implies that also for female employees, WfH is associated with higher spatial mobility. Additionally, we observed that WfH users with vocational education cover longer company-home-distances than highly qualified WfH-users. This indicates that people with vocational education tend to use WfH opportunities to commute further distances, while people with university degree may prefer to relocate closer to the employers' premises – as stated by Melzer and Hinz (2019).

As the underlying cross-sectional data in combination with our choice of methods do not allow for an analysis of the temporal ordering, we cannot exactly differentiate whether the possibility of WfH itself encourages employees to commute longer distances, or whether WfH is simply more attractive for employees who already live farther away from the company's location. However, regardless of underlying reasons and the chronology of events, WfH can be beneficial for employees. WfH users may be more flexible in deciding where they live, which can for example be interesting considering expensive housing prices in city centers, as well as where they want to work. The latter could increase job satisfaction if implying a wider range of job alternatives. Associations between WfH and job satisfaction have already been shown for Germany (e.g. Mergener & Mansfeld, 2021). This in turn can have advantages not only for employees but also for employers. As employers recognize the benefits of increased employee flexibility during the extended WfH use caused by the Corona crisis, they tend to expand their WfH offerings in the post-pandemic period (Backhaus, Tisch, Kagerl, & Pohlan, 2020). The extent to which this is accompanied by increasing spatial independence between employers' premises and employees' place of residence and the effects this can have will be observed in the future.

Appendix

Table A 1: OLS regressions on company-home distance using WfH categories

	All employees	Men	Women	Vocational education	University degree
WfH (Ref.: No WfH potential)					
WfH potential (but firm)	-0.291	-1.388	1.039	-0.729	-1.215
WfH potential (but own decision)	-2.036	-5.237	0.486	0.573	-6.726
recognized WfH	21.833***	28.576***	14.573***	23.990***	18.025***
non-recognized WfH	4.016	4.948	3.555	4.912	0.996
Women (Ref. Men)	-5.762***			-6.073***	-4.363*
Children u18 (Ref. no)	-1.641	-2.273	-1.722	-0.799	-2.911
Age (Ref.: 18-34 years old)					
35-44 years old	0.401	3.432	-3.436	0.739	0.356
45-54 years old	3.705*	7.915**	-1.489	2.124	6.866*
55-64 years old	7.807***	15.121***	-0.460	4.545*	15.236***
65 or older	-4.217	-5.046	-6.075	-7.276	2.217
Lives with employed partner (Ref.: no)	3.509**	4.357*	2.005	2.914*	5.408**
Highest educational degree (Ref.: no)					
Vocational education	0.966	-1.429	4.036		
Further vocational education	0.018	-3.333	3.452		
University degree	0.174	-5.760	6.379*		
Strong (vs. not strong) career aspirations	1.225	1.156	1.042	-0.148	3.132
Working time	0.216**	0.213	0.154*	0.280**	0.207
Managerial responsibility (Ref.: no responsibil.)					
Lower management	-1.304	2.283	-4.747*	0.005	-4.343
Middle management	-2.468	-1.234	-3.358	-3.599*	-1.549
Upper management	0.252	-1.560	4.266	-2.354	1.658
Firm experience (years)	-0.463***	-0.719***	0.230***	0.353***	-0.702***
Occupational classification (2-digit of KldB2010)					
Agriculture, forestry, farming	-62.590***	-77.136***	-3.944	-54.610***	-47.676*
Gardening and floristry	-62.990***	-72.372***	-15.024	-55.134***	-48.354
Production and processing of raw materials, glass- and ceramic-making and -processing	-40.747**	-45.942*	-10.119	-28.827	-49.731
Plastic-making, -processing, wood-working, -processing	-59.803***	-71.797***	6.061	-50.855***	-48.812
Paper-making, -processing, printing, technical media design	-57.470***	-64.440***	-13.869	-47.343***	-49.328*
Metal-making, -working, -construction	-56.961**	-69.858***	19.504	-50.654***	-59.619*
Technical occ. in machine-building and automotive industry	-46.723***	-55.145***	-6.442	-41.697***	-28.093
Mechatronics, energy electronics and electrical engineering	-57.634***	-67.720***	-4.702	-51.716***	-41.142*
Technical research, development, construction, and production planning and scheduling	-52.870***	-63.398***	-1.186	-51.005***	-33.171*

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	All employees	Men	Women	Vocational education	University degree
Textile- and leather-making and -processing	-56.704***	-79.641***	-1.432	-62.433***	96.712
Food-production and -processing	-60.306***	-70.555***	-10.705	-54.325***	-50.610*
Construction scheduling, architecture and surveying	-50.571***	-54.399***	-15.012	-41.327**	-37.706*
Building construction above and below ground	-51.210***	-58.904***	-17.996	-43.809***	-59.385
Interior construction	-52.084***	-61.610***	42.579	-44.375***	-50.131
Building services engineering and technical building services	-58.511***	-67.670***	-15.101	-51.374***	-53.264*
Mathematics, biology, chemistry, physics	-62.079***	-70.524***	-15.183	-54.757***	-49.625**
Geology, geography, environmental protection	-57.640***	-70.280***	-5.194	-41.599*	-52.450*
Computer science, ICT	-60.699***	-72.907***	-12.540	-59.505***	-43.609**
Traffic and logistics (without vehicle driving)	-56.914***	-69.503***	-3.843	-50.783***	-38.091*
Drivers and operators of vehicles and transport equipment	-48.121***	-57.071***	-17.156	-40.429***	-21.421
Safety and health protection, security and surveillance	-51.774***	-61.002***	-1.821	-46.962***	-33.547
Cleaning services	-57.176***	-75.931***	-5.728	-50.909***	21.435
Purchasing, sales and trading	-13.088	-19.133	23.861	-3.528	-1.394
Sales retail trade	-54.110***	-59.486***	-7.735	-46.250***	-36.828*
Tourism, hotels and restaurants	-60.503***	-76.013***	-9.476	-49.350***	-54.825**
Business management and organization	-59.376***	-66.044***	-12.813	-53.239***	-45.810**
Financial services, accounting and tax consultancy	-55.636***	-63.888***	-8.204	-48.658***	-42.799**
Law and public administration	-60.975***	-71.732***	-12.926	-54.645***	-46.634**
Medical and health care occupations	-61.626***	-80.496***	-11.723	-54.216***	-49.946**
Non-medical healthcare, body care, wellness and medical technicians	-56.355***	-67.939***	-7.077	-47.997***	-42.418*
Education, social work, housekeeping, theology	-62.878***	79.330***	-11.854	-53.719***	-52.288**
Teaching and training	-67.055***	-77.575***	-17.003	-49.581***	-53.904***
Philology, literature, humanities, social sciences, and economics	-51.364***	-34.600	-11.929	-37.305*	-38.824*
Advertising, marketing, commercial, editorial media design	-55.717***	-68.581***	-5.799	-51.243***	-43.170*
Product design, artisan craftwork, fine arts and the making of musical instruments	-3.058	6.455	23.554	5.500	26.577
Performing arts and entertainment	-59.204***	-83.849***	12.931	-59.891***	-50.924*
Firm size (Ref.: <10 Employees)	f				
10-49 Employees	3.905*	7.662*	1.536	4.613*	6.368
50-249 Employees	5.837*	11.769***	1.994	6.062**	7.140
500/more Employees	10.982***	15.418***	8.356***	11.705***	12.797**
Firm region West Germany (Ref. East)	1.738	5.383*	-1.414	3.362*	50.205**
Constant	64.365***	68.227***	17.410	54.515***	50.205**
Observations	14,928	7,288	7,640	8,794	5,441
Statistics					
R-squared	0.067	0.082	0.041	0.078	0.064
Log likelihood	-8.28e+04	-4.14e+04	-4.09e+04	-4.79e+04	-3.08e+04

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 2: OLS regressions on company-home distance by the intensity of recognized WfH

	All employees	Men	Women	Vocational education	University degree
Recognized WfH intensity (Ref.: no WfH)					
rarely WfH	5.085**	11.057***	1.350	5.611*	4.314
sometimes WfH	14.085***	21.479***	6.401**	10.295***	15.418***
often WfH	39.948***	48.574***	30.000***	50.722***	32.958***
always WfH	50.403***	71.981***	30.602***	62.481***	44.283***
Women (Ref. Men)	-6.130***			-6.078***	-4.944*
Children u18 (Ref. no)	-2.268	-2.526	-2.752	-1.361	-4.139
Age (Ref.: 18-34 years old)					
35-44 years old	-0.412	1.631	-3.396	-0.027	-0.502
45-54 years old	2.913	6.038*	-1.732	1.108	6.639
55-64 years old	6.075**	11.166***	-0.833	2.622	14.151***
65 or older	-6.865	-10.926	7.102	-9.698	0.171
Lives with employed partner (Ref.: no)	2.079*	3.086	1.631	2.125	4.700*
Highest educational degree (Ref.: no)					
Vocational education	1.192	-1.107	3.954		
Further vocational education	-0.410	-3.370	2.470		
University degree	0.404	-5.120	6.360		
Strong (vs. not strong) career aspirations	0.980	0.566	1.191	-1.064	3.651
Working time	0.201**	0.276	0.113	0.238**	0.234
Managerial responsibility (Ref.: no responsibil.)					
Lower management	-0.757	3.244	-4.720*	1.046	-4.749
Middle management	-1.141	0.641	-2.607	-1.657	-0.835
Upper management	-1.209	-3.980	3.406	-4.896	1.453
Firm experience (years)	-0.471***	-0.683***	-0.266***	-0.333***	-0.769***
Occupational classification (2-digit of KldB2010)					
Agriculture, forestry, farming	-64.901***	-81.695***	4.733	-50.158***	-58.055*
Gardening and floristry	-62.967***	-71.612***	-6.435	-50.748***	-52.929
Production and processing of raw materials, glass- and ceramic-making and -processing	-37.517*	-40.138*	-1.655	-22.288	-46.714
Plastic-making, -processing, wood-working, -processing	-59.937***	-71.261***	15.297	-46.942***	-55.174
Paper-making, -processing, printing, technical media design	-56.888***	-63.386***	-4.432	-45.269***	-49.479*
Metal-making, -working, -construction	-56.740***	-68.948***	28.232	-47.008***	-62.238*
Technical occ. in machine-building and automotive industry	-45.740***	-53.709***	2.683	-37.975***	-26.450
Mechatronics, energy electronics and electrical engineering	-58.401***	-68.351***	3.000	-48.499***	-45.869*
Technical research, development, construction, and production planning and scheduling	-51.570***	-62.037***	8.702	-46.967***	-34.082
Textile- and leather-making and -processing	-57.593***	-78.658***	6.242	-58.003***	80.423
Food-production and -processing	-59.854***	-69.427***	-1.886	-50.514***	-50.685
Construction scheduling, architecture and surveying	-49.048***	-51.857***	-4.702	-37.034**	-39.156*
Building construction above and below ground	-50.469***	-57.091***	-8.913	-39.724***	-60.208

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	All employees	Men	Women	Vocational education	University degree
Interior construction	-51.129***	-59.326***	46.629	-39.647***	-53.182
Building services engineering and technical building services	-57.564***	-65.926***	-5.611	-46.875***	-58.938*
Mathematics, biology, chemistry, physics	-62.605***	-71.516***	-5.761	-51.049***	-54.520**
Geology, geography, environmental protection	-57.266***	-74.475***	8.344	-39.212*	-56.489*
Computer science, ICT	-60.984***	-73.237***	-4.373	-54.478***	-47.530**
Traffic and logistics (without vehicle driving)	-56.982***	-68.866***	4.758	-47.475***	-41.307*
Drivers and operators of vehicles and transport equipment	-48.132***	-56.011***	-8.731	-36.693***	-22.968
Safety and health protection, security and surveillance	-51.394***	-59.869***	6.554	-43.633***	-34.613
Cleaning services	-57.340***	-76.490***	2.281	-48.316***	19.842
Purchasing, sales and trading	-18.137*	-30.935**	35.611	-9.551	-4.609
Sales retail trade	-54.174***	-58.381***	0.557	-43.295***	-37.083
Tourism, hotels and restaurants	-61.299***	-74.085***	-1.883	-47.090***	-57.888**
Business management and organization	-59.337***	-66.815***	-3.207	-49.233***	-49.657**
Financial services, accounting and tax consultancy	-54.841***	-62.360***	1.475	-44.536***	-45.487*
Law and public administration	-60.906***	-71.716***	-3.425	-51.554***	-49.352**
Medical and health care occupations	-60.961***	-79.790***	-2.499	-50.460***	-50.967**
Non-medical healthcare, body care, wellness and medical technicians	-54.932***	-65.494***	2.691	-43.732***	-40.394
Education, social work, housekeeping, theology	-63.979***	-81.160***	-3.523	-51.441***	-56.198**
Teaching and training	-83.597***	-97.945***	-18.525	-52.607***	-71.455***
Philology, literature, humanities, social sciences, and economics	-50.120***	-30.054	-3.382	-28.243	-41.014*
Advertising, marketing, commercial, editorial media design	-59.282***	-68.771***	-2.706	-52.205***	-50.171**
Product design, artisan craftwork, fine arts and the making of musical instruments	1.111	5.383	39.792	12.012	33.941
Performing arts and entertainment	-59.875***	-81.384***	18.727	-56.985***	-55.883*
Firm size (Ref.: <10 Employees)					
10-49 Employees	4.801*	10.242**	1.477	5.360*	7.895
50-249 Employees	5.898**	12.670***	1.606	6.552**	6.644
500/more Employees	12.244***	17.233***	9.416***	12.226***	14.851***
Firm region West Germany (Ref. East)	1.607	5.737**	-1.745	2.977	1.842
Constant	65.738***	64.626***	11.620	53.694***	51.743**
Observations	13,872	6,726	7,146	8,349	4,850
Statistics					
R-squared	0.088	0.107	0.059	0.104	0.086
Log likelihood	-7.69e+04	-3.82e+04	-3.82e+04	-4.53e+04	-2.75e+04

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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