Work from Home and Labor Market Trajectories

Alena Bičáková* Kamila Cygan-Rehm† Klára Kalíšková‡
Maike Steffen§

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Abstract

We exploit the sharp and unexpected increase in work-from-home (WFH) arrangements in 2020 as a WFH adoption shock to study the labor market responses among the most affected workers in subsequent years. Using German social security data linked to a measure of WFH potential at the 5-digit occupational level, we employ a dynamic difference-in-difference design to compare the career trajectories of individuals employed in occupations with high and low WFH potential by the end of 2019. Despite a protective employment effect, we find negative earnings responses to higher WFH potential, with increasing magnitudes over time and comparable losses across genders. Higher WFH potential induces greater occupational mobility toward part-time arrangements with lower job quality, suggesting a willingness to pay for remote work options.

Keywords: remote work, labor market trajectories, gender gaps, work from home potential, teleworking, flexible work arrangements
JEL Codes: J22, J31, J62

*CERGE-EI; email: Alena.Bicakova@cerge-ei.cz
†Dresden University of Technology (TUD), Helmholtzstr. 10, 01069 Dresden, Germany; email: kamila.cygan-rehm@tu-dresden.de
‡Prague University of Economics and Business; email: klara.kaliskova@vse.cz
§Institute for Employment Research (IAB); Dresden University of Technology (TUD); email: maike.steffen@tu-dresden.de

1 Introduction

In recent years, work from home (WFH) has transitioned from a niche work arrangement into a mainstream feature of employment relationships (Aksoy et al., 2022, Hansen et al., 2023, Adrjan et al., 2023). In many countries, including Germany, the prevalence of remote work remains well above its pre-2020 level (Barrero et al., 2023, Bick et al., 2023, Chen et al., 2023, Hansen et al., 2023, Ketter et al., 2025), indicating a persistent change in how jobs are organized and how workers and firms match in modern economies. Such structural change in the labor market is likely to have important long-term consequences both at the micro and macro level, affecting individuals and firms' behavior, market rents, productivity, and economic growth (Lee, 2023, Davis et al., 2024, Gupta et al., 2026). WFH has been also identified as an important factor affecting income inequality (Bonacini et al., 2021) or gender gaps (Olivetti et al., 2024), suggesting heterogeneous impacts on individual labor-market prospects.

This raises a central question of whether and how the recent expansion of WFH reshapes workers labor market trajectories through changes in employment attachment and earnings dynamics. The answer is not obvious ex ante. If workers value WFH as a non-wage amenity, expanded remote options may increase match surplus and employment stability by reducing frictions (e.g., commuting constraints) while generating compensating differentials in pay (Mas and Pallais, 2017, Maestas et al., 2023, Nagler et al., 2024). Alternatively, remote work can alter the production of human capital and careers through reduced informal learning, weaker mentoring, or lower visibility; such mechanisms may slow earnings growth even if employment is protected. To this end, WFH has been shown to be associated with lower productivity, resulting in pay penalty and worse career prospects (Bloom et al., 2015, Olivetti et al., 2024). On the other hand, due to the much higher and more widespread adoption of remote working arrangements in recent years, perceptions of WFH may have changed.[1] Finally, due to the time savings from reduced commuting, WFH can trigger re-optimization of job and location choices (Aksoy et al., 2023, Barrero et al., 2021a, Cowan, 2024, Coskun et al., 2026), potentially shifting workers toward jobs with different task content and quality. However, the discrepancy between how much workers value remote options and how costly employers perceive it to be (Lewandowski et al., 2026) makes it difficult to predict which of these mechanism actually predominates.[2]

[1] Evidenced by the data on the actual WFH use, in job postings, as well as survey data on preferences and future plans (Brynjolfsson et al., 2020, Abendroth et al., 2022, Chen et al., 2023, Hansen et al., 2023).

[2] As for other outcomes, WFH has been documented to affect the division of childcare and housework (von Gaudecker et al., 2024, Schüller, 2025, Alipour, 2025), health (Alipour et al., 2021), disability employment (Bloom et al., 2024a), productivity (Emanuel and Harrington, 2024, Gibbs et al., 2023a), and

This paper studies the medium-run labor-market consequences of the permanent expansion of WFH, focusing on workers employment and earnings trajectories through the end of 2023. We exploit the sharp and unexpected increase in WFH in Germany at the beginning of 2020 as a response to the Covid-19 pandemic as an exogenous "adoption shock" that differentially affected workers depending on how teleworkable their pre-2020 occupations were. To this end, we combine a detailed measure of WFH potential measured at the 5-digit occupational level (Bruns et al., 2023) with individual data on labor market biographies from German social security records. Using a dynamic difference-in-difference design, we compare the career trajectories of individuals who held jobs with high and low WFH potential as of December 2019. The identifying variation comes from the fact that occupations with higher WFH potential experienced a much larger increase in the actual use of remote work compared to occupations with lower WFH potential.

Our analysis delivers three main findings. First, workers in occupations with high pre-2020 WFH potential experienced persistently lower earnings in subsequent years, and the earnings gap increases over time. By the end of 2023, their quarterly earnings are lower by roughly 6 percent for both men and women relative to their respective pre-2020 baselines. Second, this cannot be explained by lower labor supply at the extensive margin as higher WFH potential has a protective employment effect. Specifically, workers initially employed in high-WFH-potential occupations spend roughly five additional days in employment per quarter by late 2023. Third, the earnings losses coincide with changes in working time arrangements and job content and quality. Specifically, workers with higher initial WFH potential exhibit greater mobility into part-time employment and into jobs with lower skill requirements and complexity. Thus, our results demonstrate a clear divergence in the impact of WFH on the extensive and intensive margins of employment. These findings are consistent with the idea that workers are willing to trade earnings for remote work options and related perks.

This paper contributes to several strands of the literature. First, we build on existing research on the impact of WFH on labor market outcomes. So far, this literature has primarily focused on the potential effects of remote work on productivity. Findings are mixed, with both positive (Bloom et al., 2015, Aksoy et al., 2025b) and negative impacts (Gibbs et al., 2023b, Emanuel and Harrington, 2024), and vary across contexts such as task characteristics and home working environment (Lee, 2023), or whether jobs involve managerial responsibilities (Choudhury et al., 2024). A few recent studies have investigated related outcomes among particular groups of workers, such as the

entrepreneurial spawning (Kwan et al., 2025). See also the survey by Lee (2023).

labor supply of individuals with a disabilities (Bloom et al., 2026) and the employee composition of a large call center in Turkey (Aksoy et al., 2025b). However, there is still a lack of comprehensive evidence on the broader impact of WFH on earnings and career trajectories in the post-Covid economy.[3] We add novel evidence to the literature on how individual earnings and employment outcomes respond to WFH by exploiting the early-2020 adoption shock as a bold natural experiment that affected a large proportion of the workforce.

The closest to our paper is Alipour (2025) who applies a similar empirical design to a relatively small sample from the German Socioeconomic Panel (SOEP). While he focuses on the effects of remote work on self-reported time use within a household,[4] he also documents positive employment effects for men and women at the extensive margin. This is consistent with our results, but his estimates for wages are largely underpowered and inconclusive.[5] A distinct feature of our paper is that we use extensive administrative data from social security records that provide highly reliable and detailed information on earnings and career trajectories until the end of 2023. Thus, beyond important efficiency gains, our data allows us to shed more light on the potential mechanisms behind the labor market effects from a longer-run perspective.

Our paper is also closely related to the literature studying the relationship between flexible work arrangements and gender gaps in the labor market. Typically associated with lower pay and predominatly used by women, WFH has been emphasized as one of the factors contributing to the persistence of gender wage gaps (Olivetti et al., 2024).[6] The differences in earnings has been mostly attributed to women's higher willingness-to-pay for remote work as a tool for facilitating work-life balance (Blau and Kahn, 2017) and to avoid commuting (Nagler et al., 2024).[7] The post-2020 shift to WFH substantially reduced the extent of commuting and induced new job and home reallocations

[3] A few exceptions from before 2020 are discussed in Arntz et al. (2022), who used fixed-effects models to estimate the relationship between working from home (WFH) and individuals' labor supply and wages. Their analysis was based on survey data from the German Socio-Economic Panel from 1997 to 2014.

[4] Alipour (2025) finds that in 2022, mens time use remained largely unaffected, while WFH reduced paid hours and increased domestic work and leisure among women.

[5] He finds a marginally significant 1.2% increase in hourly wages for men and a statistically insignificant 1.5% decrease for women. However, these results are for log wages, which are conditional on employment and may be biased due to significant effects on the employment probability.

[6] Interestingly, Porto et al. (2025) point out that while there is evidence that women and parents prefer flexible work arrangements, they do not work flexible jobs more than others. They attribute this flexibility puzzle to women's and parents' higher preference for meaningful jobs, which are at the same time less likely to offer flexible work arrangements.

[7] Work flexibility has been also associated with increase in informal work (Kesternich and Schouwer, 2025), which could further disadvantage those with flexible work arrangements in the labor market. Finally, lower pay of women in remote jobs has been also associated with differences in productivity. Adams-Prassl et al. (2025) shows that gender wage gap in an online labor market are mostly driven by work interruptions among women with children.

(Cowan, 2024, Coskun et al., 2026).[8] Several studies explore its effect on gender disparities in the labor market through changes in time use, with a special focus on child care arrangements and housework (von Gaudecker et al., 2024, Schüller, 2025, Alipour, 2025, Feuillade et al., 2025, Inoue et al., 2024).[9] While there is no consensus about the long-term effect of the post-2020 shift to WFH on gender wage gaps yet, several studies focusing on the pre-2020 period associate WFH with lower gender differences in pay or labor force participation.[10]

Women and men may respond differentially to the increased availability of WFH not only in terms of time-use, home production, labor supply or career breaks, but also through other adjustments, such as occupational choice or job quality. Studying the impact of the post-2020 shift to WFH on medium-run career trajectories of women and men allows us to explore these additional margins through which WFH potential affects gender differences in pay.

This paper proceeds as follows. Section 2 provides institutional details. Section 3 describes the data and Section 4 the empirical strategy. Section 5 presents our main results and robustness tests. Section 6 discusses potential mechanisms. Section 7 concludes.

2 Institutional background

Prior to 2020, WFH existed in Germany but was relatively uncommon and unevenly distributed across occupations. Figure 1 shows that in the 2010s, about 12% of German employees in the age group 25-64 worked from home, at least partly. Work from home was slightly more prevalent among men (14%) than women (11%). Independent of

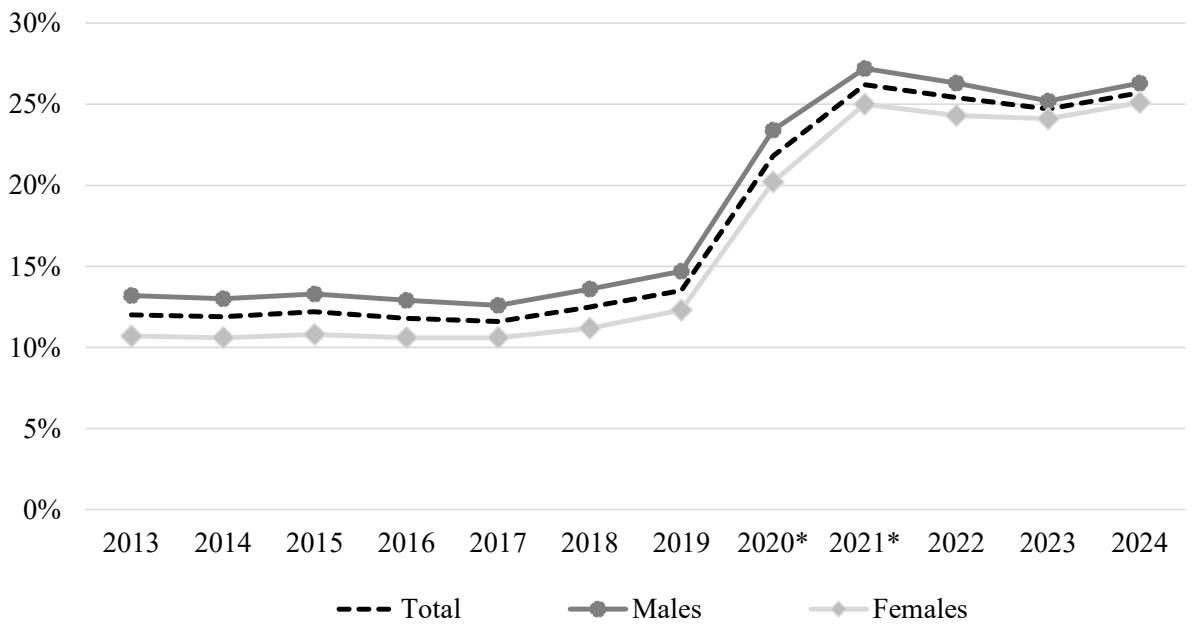
[8] Using a stated-preference experiment among German employees in 2022, Nagler et al. (2024) find that WFH reduces, but does not close, the gender gap due to differential preferences over commuting.

[9] While Alipour (2025) concludes that WFH intensifies gender gaps in unpaid work, particularly caregiving, Schüller (2025) shows that WFH potential of fathers decrease the maternal share of domestic tasks but not childcare. Cowan (2024) finds WFH-induced reduction in gender gap in childcare but only among college graduates. Finally, von Gaudecker et al. (2024), Feuillade et al. (2025), Inoue et al. (2024) also associate the post-2020 shift in WFH with a decrease in gender inequalities within the families in Netherlands, France and Japan. The contradicting findings could be partly driven by differences in the gender norms, initial within-family earnings gap (men's greater bargaining power) or higher childcare demand (lower childcare availability), as shown in Alipour (2025).

[10] Arntz et al. (2022) find lower gender differences in monthly earnings among parents after WFH take-up, but a rise in hourly wage limited only to fathers, unless mothers change employers. In terms of other labor market outcomes, WFH rise was associated with higher labor force attachment among mothers (Emma and Kahn, 2026). Shift towards WFH is also likely to narrow gender gaps in employment in greedy jobs, but the impact on gender wage gap is unclear, as women are willing to pay more than 5 times higher share of their salaries for the flexibility Harrington and Kahn (n.d.). Ciasullo and Uccioli (2025) show that control over work arrangements help increase maternal labor supply and share in household income, with no impact on female share of home production.

gender, the share or remote employment increased sharply in 2020, as a response to the Covid-19 pandemic. The public-health shock initially led employers to reduce on-site contacts where feasible. As a consequence, entire sectors, including hospitality and food services, were mandated to close (Alipour et al., 2021). Between January 2021 and March 2022 the requirement to offer WFH where possible was codified as a legal duty.[11] Consequently, during the most severe months of the pandemic, nearly 40% of German employees subject to social security contributions regularly worked from home (Frodermann et al., 2021). Figure 1 shows that, on average, the WFH rate exceeded 25% during 2020 and 2021.[12]

Figure 1: Percentage of employees working from home in Germany



Note: Employed persons aged 25-64 working from home (at least partly) as a percentage of the total employment in the respective age group. * denote breaks in time series.
Source: Labour Force Survey, as reported by Eurostat (2026). DOI: 10.2908/LFSA_EHOMP.

[11] After a brief improvement in the number of Covid-19 cases in the summer months of 2020, infection rates surged again in the fall leading to renewed lockdowns in the winter of 2020/2021. Overall, Germany's containing measures were less severe and shorter in duration than those in Spain, Italy, France, or the United Kingdom. Unlike many other countries, Germany did not impose a complete shutdown, curfew or stay-at-home orders (Cascini et al., 2022). However, the school closures were much longer than elsewhere in Western Europe (Fuchs-Schündeln, 2022).

[12] Despite the breaks in the time series in 2020 and 2021, the WFH rates reported in Figure 1 using Labour Force Survey data are only slightly lower than those elicited in other surveys during these years (Alipour et al., 2026).

While the early-2020 emergency substitution induced a large and rapid increase in WFH, Figure 1 also documents that the adoption shock also led to sustained changes in workplace organization. By 2024, a quarter of German employees still worked from home: nearly 15% did so for less than half of their working time and 10% for more than half of their working time (Eurostat, 2026). Our empirical analysis will focus on employees subject to social security contributions, and the IAB-OPAL survey of this group yields even higher WFH rates; In January and February of 2024, approximately 35 percent of respondents reported working at least partially from home (Brixy and Haas, 2025). Independent of the specific data source, this is more than double the pre-pandemic levels, highlighting its lasting impact on work habits. Interestingly, the gender gap in WFH utilization appears to converge over time, and this trend is consistent across different data sources.

The prevalence of WFH varies by sector, with the highest shares among desk-based occupations, such as professionals and academics (48.9%), managers (40.5%), and technicians and associate professionals (26.3%). Recent cross-country comparisons show that Germany is among the countries with the highest levels of WFH globally, similar to the US and UK (Zarate et al., 2024, Aksoy et al., 2025a).[13]

Another important institutional aspect is that during economic crises, Germany relies heavily on the *Kurzarbeit* (short-time work, STW) program introduced in 1910 to prevent mass layoffs when demand falls (Boeri and Bruecker, 2011, Gehrke and Hochmuth, 2021, Weber and Yilmaz, 2023). This was also the case during the pandemic. *Kurzarbeit* compensates employees for income lost due to reduced working hours, with the Federal Employment Agency covering up to two-thirds of foregone earnings in the severely affected firms. Nearly one-third of the labor force participated in this program during 2020-2021 (Fitzenberger and Walwei, 2023). Indeed, unemployment rose only slightly in Germany, from 5.1% in March 2020 to 6.1% in May 2020, and stayed above 6% until April 2021, then it started to decrease returning to 5% by September 2021. Inflation remained steady at around 5 to 6 percent throughout the entire period (Alipour et al., 2021).

These institutions are important for interpreting our results because they highlight that the 2020-2021 period constitutes a regime shift toward WFH, though the effects may be distorted by the public health crisis and the resulting measures implemented during this period. We address some of these issues in our empirical strategy. Beyond the labor-market distortions during the initial phase of the shock, these contaminating

[13]For example, in 2024/2025, German college and university graduates worked from home an average of 1.6 days per week (Aksoy et al., 2025a); a similar number to the US and slightly below the UK (1.8) and Canadian (1.9) levels.

measures and STW should be less important, and our results reflect the consequences of a sustained shift toward remote work arrangements.

3 Data and descriptives

For the main analysis, we use register records from the Sample of Integrated Labor Market Biographies (Graf et al., 2025).[14] The SIAB is a 2% sample of the population covered by the German social security system at least once between 1975 and 2023 due to employment or receipt of public transfers such as unemployment benefits and social assistance. Since 2000, registered job seekers not eligible for benefits and participants in active labor market programs have also been included. The original data cover about 80% of the total labor force in Germany, as civil servants and the self-employed are not subject to social security (Schmucker and vom Berge, 2025).

Apart from the large sample size, the main advantage of the SIAB data is the precise information on employment and earnings biographies, which allows us to follow individuals over time. Earnings are recorded as gross daily pay in EUR. Although the payroll information is generally very reliable, the social security records include gross earnings only up to the statutory social security contribution ceiling, which is relevant for the calculation of old-age pensions and unemployment insurance benefits. Original earnings above the ceiling are top-coded, which affects about 5% of all earnings spells. Nevertheless, our data includes imputed values for the top-coded earnings obtained from a common procedure (Drechsler and Ludsteck, 2025, Drechsler et al., 2023).[15] The data also include information on key socio-demographic characteristics (age, gender, educational attainment, state of residence, etc.) and the characteristics of job and employer characteristics (occupation, type of contract, industry, employer size, etc.).

We restrict the sample to individuals of prime working age (25-55 years old) who were employed on December 31, 2019, i.e., before the outbreak of the Covid-19 pandemic in Germany. We focus on employees in jobs subject to social security contributions (i.e., excluding the so-called minijobs). We transform the individual employment biographies stored in the daily spell data into a quarterly panel. Our main outcome is the quarterly sum of earnings for each individual. To measure employment, we calculate the total number of days an individual was employed in a given quarter. We focus on the evolution of outcomes between January 2016 and December 2023, up to four

[14] Specifically, we currently use the weakly anonymous version of the SIAB 1975-2023 and accessed the data via a Scientific Use File at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg.

[15] A similar procedure has been previously applied, e.g., in Dustmann et al. (2009) and Card et al. (2013). Our main results change little if we use the original top-coded values.

years before and after the onset of the outbreak of the COVID-19 pandemic.

There is no information on WFH arrangements in the SIAB data. Therefore, to measure the suitability of a given job for remote work, we use an index of WFH potential proposed by Bruns et al. (2023). Their so-called HOP index (*Homeoffice-Potenzial-Index*) relies on explicitly formulated work conditions, rather than tasks, to determine whether a given job can be performed away from the workplace. These work conditions refer to various dimensions such as social distance, work location, physical or cognitive strain, and demands on the distribution of working time (for details, see Bruns et al., 2023, Coskun et al., 2026). After normalization, the values of the HOP index range from 0 to 1. An important advantage of the HOP index compared to alternative measures proposed in the literature is that it measures the WFH potential at a very detailed occupational level (i.e., the 5-digit code of the German Classification of Occupations KldB 2010 comprising 1,300 different occupations).[16]

To show that the HOP index is a strong predictor of the actual use of WFH during the pandemic, we will also include auxiliary data from the IAB High-Frequency Online Personal Panel (IAB-HOPP) (Bellmann et al., 2021b) and the subsequent Online Panel for Labour Market Research (IAB-OPAL) (Coban et al., 2024). Specifically, the IAB-HOPP study (titled "Life and Work Situations in Times of Corona") was a standardized online survey conducted between May 2020 and March 2021 (initially monthly, later bimonthly). We use the IAB-HOPP-ADIAB version of the data, which links the information collected in the survey with administrative data on respondents' labor market biographies between 1975 and 2019. The administrative records come from the German Social Security, as in the SIAB data (Bellmann et al., 2021a). The first wave of the IAB-OPAL study began in October 2023.

Our main estimation sample from the SIAB data includes 243,011 men and 203,086 women. Table 1 provides the summary statistics. We observe substantial gender gaps in earnings. On average, women earn nearly one-third less than men, though this gap has slightly decreased over time (from 31.5% in Q4 2016 to 28.9% in Q4 2023). The earnings gaps emerge despite very similar labor force participation rates in our sample. Note that by construction, the number of days worked in the last quarter of 2019 was nearly identical for both genders. Before the reference period, men worked an average of 0.9 to 1.4 more days per quarter than women. This difference increased slightly dur-

[16] For example, Alipour et al. (2021) propose a WFH measure based on information from the 2018 BIBB/BAuA Employment Survey, which asked respondents about their job's potential for WFH regardless of whether they actually (ever) worked remotely. Given the relatively small sample size of the survey, Alipour et al. (2021) aggregate the individual-level data into WFH feasibility rates in a given occupation at the 2-digit level of the KldB 2010, which comprises 37 occupational categories. The correlation between the two WFH measures at the 2-digit level of occupation is 0.82.

ing the pandemic, reaching over 2, but has fallen back to 1.4 in the last quarter of 2023. The high earnings gap coinciding with the lower participation gap suggests a much lower female labor supply at the intensive margin, presumably due to prevailing social norms.[17] Unfortunately, German social security records do not include information on working hours.

Women are more likely than men to work in occupations with higher WFH potential. On average, 56% of women had a job with above-median WFH potential on the cutoff day, compared to 43% of men. This reflects substantial gender-specific differences in occupational choices. Women primarily work in healthcare, social services, teaching, and education (31%), business organization, accounting, law, and administration (29%), as well as commercial services, sales, and tourism (16%). In contrast, the largest fraction of men works in jobs related to production and manufacturing (33%) as well as traffic, logistics, safety, and security (17%). There are no meaningful differences in age, tenure, or educational attainment between men and women. On average, nearly one-quarter of individuals have a college or university degree.

Figure 2 shows the development of monthly earnings over time, broken down by occupations with high and low WFH potential (i.e., above- and below-median as of December 31, 2019). To limit the impact of the substantial seasonal variation in monthly earnings, we focus on quarterly aggregates in the main analysis. In general, individuals working in occupations with high WFH potential have, on average, by 50-60% higher earnings throughout. In the pre-Covid economy, the substantial earnings differentials between the two groups developed in a nearly linear and parallel manner, with slightly steeper earnings trajectories in occupations with high WFH potential. After the pandemic, a clear slowdown in the earnings growth emerges, regardless of gender or WFH potential. There are no striking differences in the slopes of the trends across groups and genders.

4 Empirical strategy

To investigate the effect of WFH on subsequent earnings, we adopt a quasi-experimental approach that exploits the sudden and unexpected surge in WFH due to the stay-at-home mandate at the beginning of the Covid-19 pandemic. Specifically, we use the differential treatment intensity depending on the WFH potential of an individual's job measured at the 5-digit occupational level before the outbreak of the pandemic (i.e.,

[17] The vast majority of German women tend to work part-time, which is more common in the West German states and not limited to mothers of young children. For example, Dehos and Paul (2023) report that in the 2000s less than 15% (25%) of mothers worked at least 35 hours/week when their youngest child was 7-9 (12-15) years old.

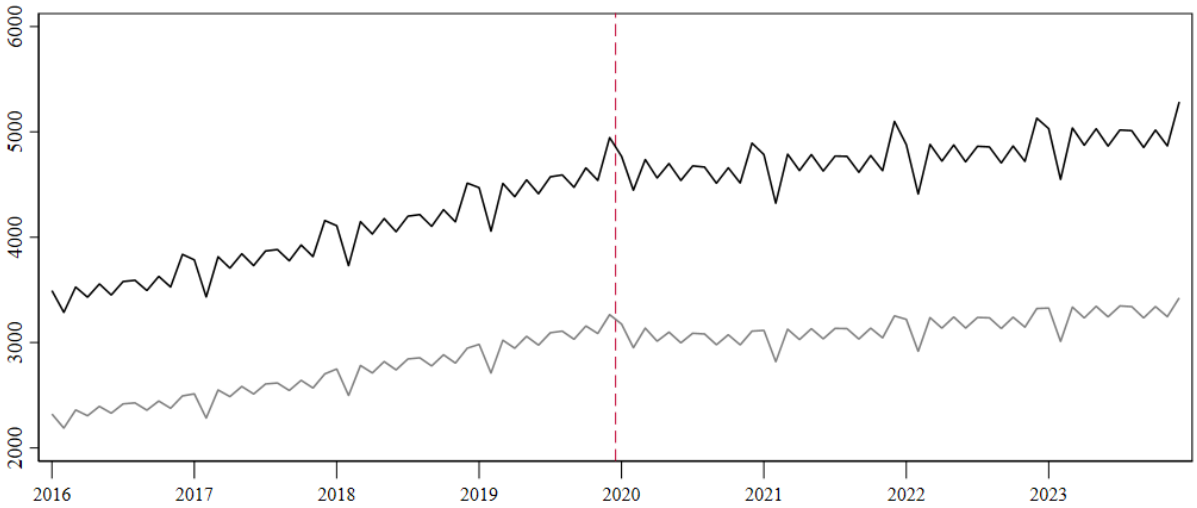
Table 1: Descriptive Statistics

	Male Mean (SD)	**Female** Mean (SD)
A: Outcomes		
Earnings Q4/2016	8,886.64 (5,805.26)	6,085.44 (4,687.26)
Earnings Q4/2017	9,617.51 (5,60.44)	6,626.78 (4,750.73)
Earnings Q4/2018	10,467.39 (5,601.28)	7,290.27 (4,759.48)
Earnings Q4/2019 (reference period)	11,489.43 (5,191.52)	8,267.34 (4,557.58)
Earnings Q4/2020	11,257.96 (5,774.58)	8,000.99 (5,007.95)
Earnings Q4/2021	11,602.81 (6,161.38)	8,135.95 (5,356.13)
Earnings Q4/2022	11,850.17 (6,274.86)	8,415.82 (5,486.93)
Earnings Q4/2023	12,215.83 (6,691.21)	8,685.51 (5,759.91)
Employment in days Q4/2016	77.81 (31.73)	76.90 (32.23)
Employment in days Q4/2017	81.21 (27.97)	79.81 (29.19)
Employment in days Q4/2018	85.00 (22.50)	83.64 (24.29)
Employment in days Q4/2019 (reference period)	90.62 (7.19)	90.32 (8.05)
Employment in days Q4/2020	86.20 (20.42)	84.78 (22.37)
Employment in days Q4/2021	84.72 (23.15)	82.37 (26.04)
Employment in days Q4/2022	83.28 (25.51)	81.35 (27.54)
Employment in days Q4/2023	81.72 (27.66)	80.30 (28.93)
B: Individual characteristics (as of December 31, 2019)		
WFH potential index (0−1)	0.37 (0.24)	0.45 (0.23)
Above median WFH potential (0/1)	0.43 (0.49)	0.56 (0.50)
Occupation area (1-digit)		
1: Agriculture, forestry, farming, gardening	0.02	0.01
2: Production and manufacturing	0.33	0.08
3: Construction, architecture, building services	0.10	0.01
4: Natural sciences, geography, informatics	0.06	0.02
5: Traffic, logistics, safety, security	0.17	0.09
6: Commercial services, sales, hotel business, tourism	0.09	0.16
7: Business organisation, accounting, law, administr.	0.14	0.29
8: Health care, the social sector, teaching, education	0.07	0.31
9: Philology, literature, humanities, social sciences, economics, media, art, culture, design	0.03	0.03
Age (in years)	40.47 (8.98)	41.15 (9.04)
Tenure (in years)	6.93 (7.37)	6.22 (6.57)
Highest educational attainment: Secondary	0.58	0.54
Highest educational attainment: High school	0.15	0.21
Highest educational attainment: College/University	0.23	0.23
Highest educational attainment: Missing	0.05	0.03
Individuals	243,011	203,086

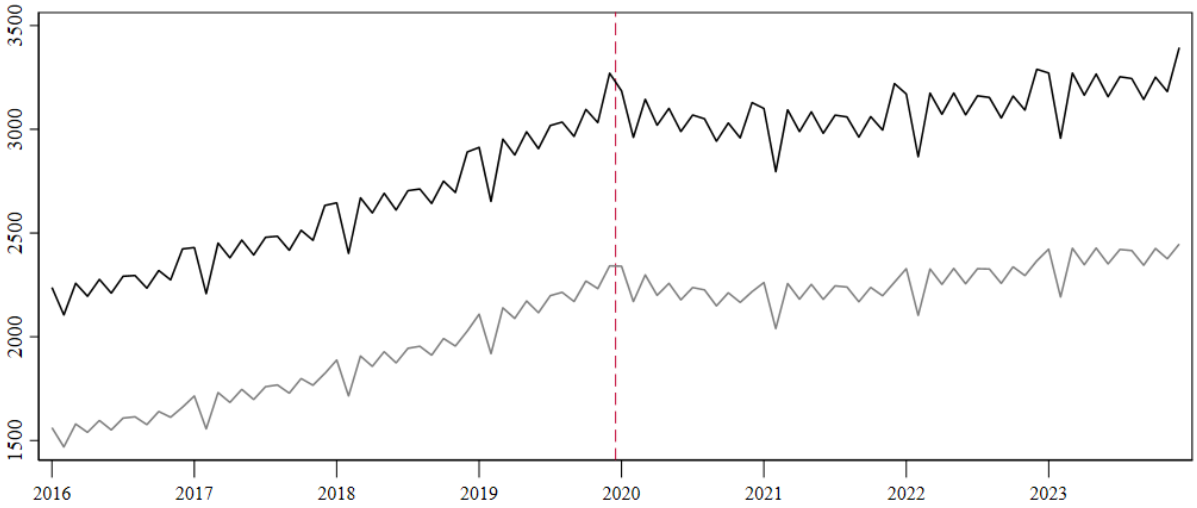
Note: Samples restricted to individuals aged 25-55 with positive wages as of December 31, 2019. Occupations are classified according to KldB 2010 (Federal Employment Agency, 2025).
Source: SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

Figure 2: Average earnings by treatment status

(a) Male



(b) Female



Note: Average monthly earnings (in EUR) for individuals in occupations with above-median work-from-home potential (black line) and below-median work-from-home potential (grey line). The sample is restricted to individuals who were employed on December 31, 2019.
Source: SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

on December 31, 2019).[18] Workers in occupations with a high WFH potential should have, on average, experienced a sharper increase in their WFH propensity compared to workers in occupations with lower WFH potential.

In our empirical analysis, we compare the subsequent earnings trajectories of workers across occupations (o) with different WFH potentials within a dynamic difference-in-differences (DiD) design. Given that previous literature highlights significant gender-specific differences in WFH behavior and labor market outcomes, we conduct separate analyses for men and women. Specifically, we estimate the following dynamic reduced-form equation by gender:

$$y_{it} = \alpha WFH_{o(i)} + \sum_{s \neq 0} \Big[\beta_s WFH_{o(i)} \times \mathbb{1}(t = s)\Big] + X'_{it}\gamma + \delta_t + \delta_{o(i)} + \delta_{p(i)} + \epsilon_{it}, \qquad (1)$$

where y_{it} are quarterly earnings of an individual i at time t, with the last quarter of 2019 as the reference period. $WFH_{o(i)}$ is the HOP index (0-100) of an individual's i occupation o as of December 31, 2019. For the ease of interpretation, in our main analysis, we replace the $WFH_{o(i)}$ index with a binary treatment variable indicating an above-median $WFH_{o(i)}$ index. The median threshold value on the cut-off day that we use for the split is 0.30 for men and 0.37 for women. Thus, the treated group consists of individuals having jobs with *high* WFH potential, while the control group consists of individuals having jobs with *low* WFH potential on that day.

The set of event time-fixed effects δ_t flexibly captures common changes in earnings over time (e.g., business cycle effects). The vector X_{it} includes an individual's age (linear and squared) measured at the start of each quarter. For robustness tests, we also control for additional individual-level characteristics such as, for example, educational attainment, job tenure, and the district of the work place as of the last quarter of 2019. In extended model specifications, we also include a full set of 3-digit occupation fixed effects ($\delta_{o(i)}$) and 5-digit industry fixed effects ($\delta_{p(i)}$), both as of the end of 2019. These capture any unobservable differences between the occupations and industries (e.g., preferences for WFH) as long as they are time-constant.

The coefficients β_s are on the interaction terms of WFH and event time dummies. Event time t is measured in quarters relative to the last quarter of 2019 ($s = 0$) and covers 4 years before and after December 2019. Thus, β_s capture the differences in

[18] Several studies use a similar idea to estimate the effects of WFH on other outcomes. For example, Alipour et al. (2021) find that WFH reduced the incidence of short-time work and firms distress from Covid-19 by applying a 2SLS strategy to county-level data for Germany. Coskun et al. (2026) show positive effects of WFH on commuting distance using individual-level data from the German Social Security.

earnings between workers with different WFH potential between a given quarter t and the reference period. The treatment effects for the quarters following the Covid-19 shock are represented by the estimates of $\beta_1, \beta_2, ...\beta_{16}$, which range from the first quarter of 2020 to the last quarter of 2023. Estimates of β with negative subscripts correspond to the pre-pandemic period and capture possible differences in the outcomes between workers with high and low WFH potential in the pre-treatment period. ϵ_{it} is an error term. We cluster standard errors at the 5-digit occupation level, which corresponds to the treatment assignment level (Abadie et al., 2023).

The main identification assumption is that in the absence of the Covid-19 pandemic, the potential outcomes of the treatment and the control group would evolve in parallel. In general, the *parallel trends* assumption ensures that workers in occupations with lower WFH potential are a valid counterfactual for workers in occupations with higher WFH potential. This assumption is not directly testable, but the graphical evidence in Figure 2 suggests that while both groups had increasing earnings trends before 2020, the pace of these developments was not necessarily identical.

To eliminate the differential developments in earnings between the treatment and the control group already before 2020, we apply a detrending and deseasoning procedure before estimating our main regressions, as specified in Equation (1). Specifically, using the pre-2020 outcomes of each individual i aggregated to monthly sums, we regress the outcomes on a linear (monthly) time trend and calendar month fixed effects separately for the treatment and the control group. Using the group-specific estimation results obtained from pre-pandemic data, we predict the outcomes for the entire sample. Finally, for each individual i, we calculate the difference between the actual and the extrapolated values, which yields detrended and deseasoned outcomes.[19]. When using these outcomes in the main regressions, we assume that, in the absence of the pandemic, both groups' outcomes would follow their respective pre-pandemic group-specific trends and seasonality patterns. The patterns in Figure 2 strongly support this assumption.

After detrending and deseasoning, the coefficients β_s estimated within the event study model Equation (1) reveal whether the surge in WFH resulted in a trend change or break that differed across the treatment status. We perform several empirical exercises to support the internal validity of our estimates.[20]

[19] A similar approach for de-trending was used, e.g., in Bhuller et al. (2013), Goodman-Bacon (2018, 2021).

[20] Most importantly, our event studies facilitate testing whether the detrending captures differential pre-trends across occupations with high and low WFH potential. In Section 5.2, we also test whether our main results remain robust when we include additional controls in X_{it}, which would suggest that pre-determined characteristics are balanced across occupations and there was no endogenous sorting into treatment. Finally, to address the concern that there may be omitted regional-level characteristics that

Finally, our approach also assumes that there was *no anticipation* that would have led to a differential sorting of individuals across occupations according to their WFH potential shortly before the pandemic. This assumption seems plausible given the unexpected nature of the outbreak and the unprecedented scale of containment measures.

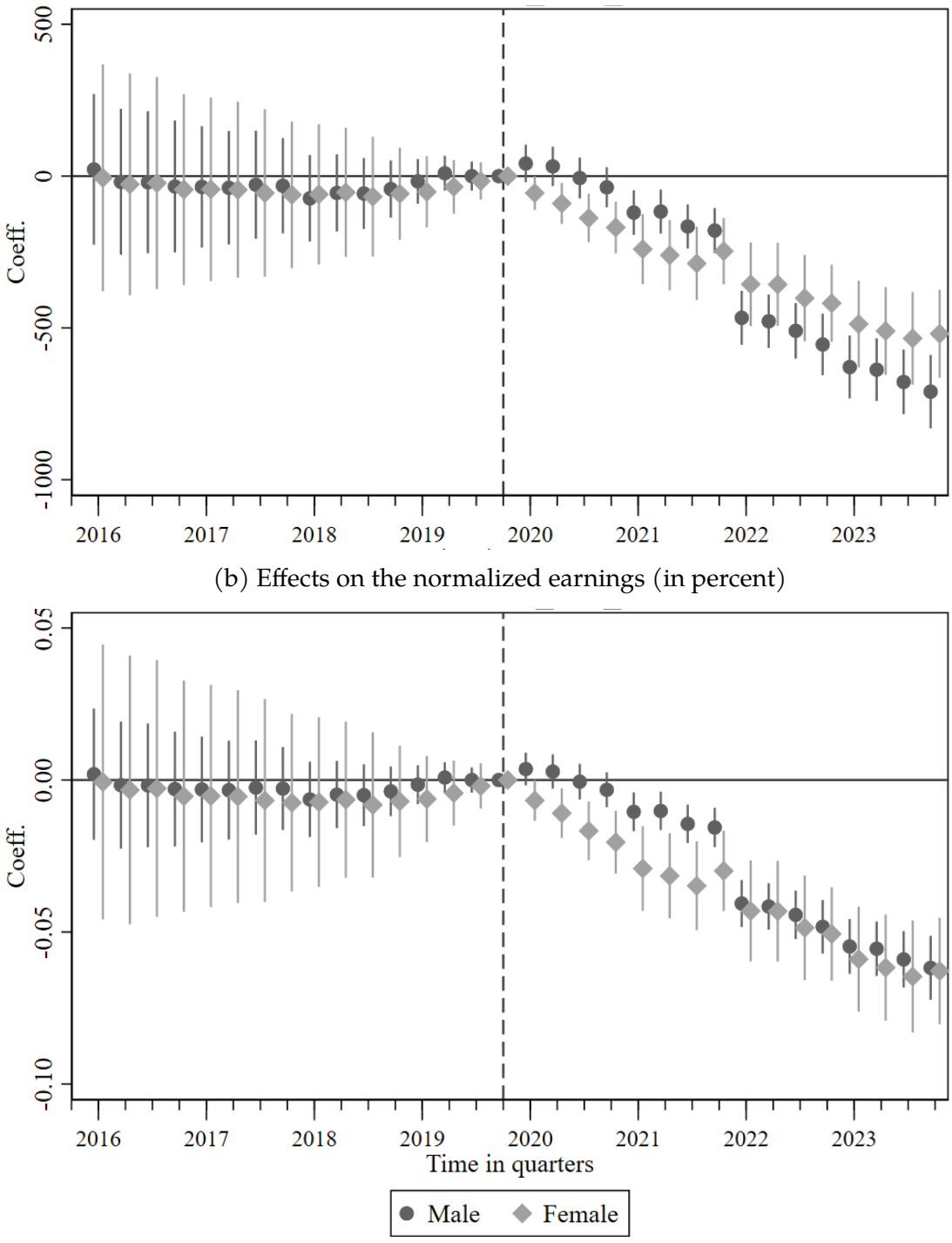
5 Results

5.1 Main results

Figure 3 shows the gender-specific effects of high WFH potential on the quarterly sum of earnings for each quarter between 2016 and 2023. In panel (a), the earnings are measured in absolute terms (in EUR). In panel (b), the earnings are divided by the gender-specific mean earnings in the last pre-treatment period. This normalization allows us to interpret the effect size in relative terms (in percent). We plot the estimated coefficients of the interaction terms of the binary treatment indicator and event time dummies. The last quarter of 2019 serves as the omitted reference category. The 95% confidence intervals around the point estimates are based on standard errors that are clustered at the 5-digit occupation level (i.e., the level of identifying variation).

confound our results, we estimate extended model specifications with county-level characteristics such as GDP, unemployment rates, broadband Internet access, etc.

Figure 3: Earnings responses to WFH potential



Note: The outcome in panel (a) is the quarterly sum of earnings. This sum is divided by the gender-specific mean from the reference period in panel (b). In both panels, the outcomes are detrended and deseasoned based on the pre-treatment data. The dots represent the interaction term coefficients of a binary treatment (i.e. above-median *WFH*) and event time dummies from a linear regression of Equation (1). The omitted reference period is the last quarter of 2019. The regressions control for age (linear and quadratic). Bars represent 95% confidence intervals based on standard errors clustered by 5-digit occupation. *Source:* SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

The patterns in Figure 3 are very similar across the panels. Specifically, most of the point estimates in the pre-treatment period are small in magnitude and statistically insignificant. This suggests that our linear detrending procedure captures potentially differential developments between the treatment and the control groups. Assuming that the group-specific trends and seasonality patterns would have remained unchanged without the Covid-19 pandemic, we observe differential earnings responses across workers with different WFH potential. Specifically, the estimates suggest that workers in occupations with high WFH potential experience lower earnings compared to those in occupations with low WFH potential, and the magnitude of the earnings gap increases over time.

Generally, the patterns are very similar across genders, though there are some notable exceptions. For example, women in jobs with a higher WFH potential experienced earnings losses immediately in the first quarter of 2020, whereas for men, the effect arises with a one-year delay. While the effects gradually increase in magnitude over time for women, we observe a sharp drop in earnings at the beginning of 2022 for men. The long-term effects, measured four years after the treatment, are substantial. Specifically, panel (a) yields earnings losses of approximately 750 EUR per quarter for men and 500 EUR for women. However, the gender-specific effects are not statistically significant as the confidence intervals overlap. Furthermore, the differential response across genders disappears when the absolute effect sizes are related to the last pre-pandemic mean in panel (b). Ultimately, we find that, on average, both men and women in jobs with high WFH potential lose about 6% of their quarterly earnings.

We also find significant earnings losses when earnings are measured in logs (see Appendix Figure A.1), which excludes the zero earners from the analysis. The somewhat larger magnitude of the effects on log earnings compared to Figure 3 suggests potential responses at the extensive margin, i.e., through employment. Indeed, we observe different employment trajectories for workers in jobs with high and low WFH potential in the post-Covid economy (see Appendix Figure A.2). Specifically, high WFH potential leads to positive employment responses. Since we focus on individuals who were employed during the reference period, remote work opportunities seems to have a protective employment effect. From a long-run perspective, the magnitude of this effect is substantial, with an average of up to five more days spent employed per quarter in the first four post-treatment years (or up to 6% relative to the pre-treatment mean).

Taken together, our results suggest that higher WFH potential is related to lower earnings in the long run, despite the protective effect on employment. Although increasing remote work opportunities has been suggested as a way to reduce gender gaps

in the labor market (Bertrand, 2018, Olivetti et al., 2024), our results do not support this conjecture, as the earnings and employment responses are very similar across genders. In Section 5.2, we demonstrate that our main findings are robust and not driven by potential differences in the characteristics of individuals in jobs with high or low WFH potential. Since the negative earnings responses among workers with greater WFH potential cannot be explained by a lower labor supply, at least not at the extensive margin, we examine alternative explanations in Section 6.

5.2 Robustness analysis

In this section, we demonstrate that our main findings are not driven by potential differences in the characteristics of individuals in jobs with high or low WFH potential. To this end, we include additional covariates one by one to an annual-level version of Equation 1. In these alternative model specifications, the treatment dummy is interacted with year fixed effects rather than with quarterly event time dummies. Thus, the point estimates β_s now correspond to the average treatment effects in the post-treatment years relative to the year 2019. Table 2 presents the estimation results. As in our main specification, the outcome is defined as quarterly sums of earnings, and all regressions include a full set of quarterly event time fixed effects (FE) and age (linear and quadratic).

The estimates in column 1 of Table 2 confirm that individuals in jobs with high WFH potential have persistently lower earnings levels in the post-treatment period. Relative to the baseline level in the last quarter of 2019, these effects are similar across gender. Specifically, in 2023, i.e., the fourth year after the treatment, men and women in occupations with high WFH potential experienced earnings losses of about 6% compared to their respective mean earnings levels in the reference period. Columns 2 through 5 show that the estimates remain nearly identical when we flexibly capture various factors that could be correlated with WFH potential and employment choices, such as occupation-specific effects, educational attainment, job tenure on the cutoff day, and firm location fixed effects. Column 6 adds individual fixed effects, which capture unobservable, time-constant factors such as attitudes and preferences that could have determined the sorting of individuals to jobs with different levels of WFH potential before treatment.

In the last two columns, we address the possibility that there could also be specific time-variant confounders in our setting related related to the pandemic and the use of short-time work to prevent mass layoffs during the crisis. Column 7 demonstrates that the point estimates are insensitive to allowing the time fixed effects to vary by

Table 2: Robustness: Effects of WFH potential on quarterly earnings (in EUR)

	(1) Baseline	(2) Occupation FE	(3) Education FE	(4) Tenure	(5) County FE	(6) Individual FE	(7) State×time FE	(8) Short-time work (STW)
Panel A: Men (Observations 7,776,352, Individuals 243,011)								
$WFH \times 2016$	-10.864	-10.788	-10.709	-10.509	-11.000	-12.549	15.303	-10.864
	(103.809)	(103.931)	(104.062)	(104.365)	(103.607)	(103.320)	(101.257)	(103.809)
$WFH \times 2017$	-31.602	-31.552	-31.499	-31.366	-31.693	-32.726	-15.62	-31.602
	(75.294)	(75.382)	(75.477)	(75.694)	(75.148)	(74.895)	(73.587)	(75.294)
$WFH \times 2018$	-55.116	-55.091	-55.065	-54.998	-55.162	-55.678	-47.413	-55.116
	(43.071)	(43.112)	(43.156)	(43.255)	(43.004)	(43.014)	(42.333)	(43.071)
$WFH \times 2019$	–	–	–	–	–	–	–	–
$WFH \times 2020$	9.624	9.598	9.572	9.505	9.669	10.185	10.236	-13.207
	(35.250)	(35.264)	(35.278)	(35.312)	(35.230)	(35.694)	(35.137)	(36.619)
$WFH \times 2021$	-143.473 ***	-143.524 ***	-143.577 ***	-143.710 ***	-143.382 ***	-142.350 ***	-142.177 ***	-162.194 ***
	(40.217)	(40.250)	(40.277)	(40.360)	(40.174)	(40.792)	(40.544)	(42.669)
$WFH \times 2022$	-500.111 ***	-500.187 ***	-500.266 ***	-500.467 ***	-499.975 ***	-498.426 ***	-497.010 ***	-500.111 ***
	(46.894)	(46.991)	(47.081)	(47.353)	(46.740)	(46.598)	(46.981)	(46.894)
$WFH \times 2023$	-661.473 ***	-661.574 ***	-661.680 ***	-661.947 ***	-661.291 ***	-659.227 ***	-656.956 ***	-661.473 ***
	(55.383)	(55.491)	(55.592)	(55.905)	(55.216)	(55.533)	(55.670)	(55.383)
Y-Mean				10,641.17				
Panel A: Women (Observations 6,498,752, Individuals 203,086)								
$WFH \times 2016$	0.887	0.725	0.310	1.306	0.763	6.684	27.700	0.888
	(146.337)	(146.449)	(146.853)	(145.957)	(146.482)	(143.063)	(143.179)	(146.334)
$WFH \times 2017$	-25.639	-25.747	-26.024	-25.36	-25.722	-21.774	-5.759	-25.639
	(108.596)	(108.666)	(108.932)	(108.349)	(108.692)	(106.652)	(106.324)	(108.594)
$WFH \times 2018$	-33.954	-34.008	-34.146	-33.814	-33.995	-32.022	-22.201	-33.954
	(67.927)	(67.961)	(68.092)	(67.805)	(67.975)	(67.187)	(66.628)	(67.927)
$WFH \times 2019$	–	–	–	–	–	–	–	–
$WFH \times 2020$	-87.425 **	-87.371 **	-87.233 **	-87.565 **	-87.384 **	-89.357 **	-88.176 **	-118.267 ***
	(36.200)	(36.223)	(36.291)	(36.132)	(36.225)	(35.937)	(35.977)	(35.465)
$WFH \times 2021$	-233.149 ***	-233.042 ***	-232.765 ***	-233.429 ***	-233.067 ***	-237.014 ***	-230.848 ***	-276.603 ***
	(43.687)	(43.657)	(43.587)	(43.747)	(43.660)	(45.887)	(43.510)	(48.754)
$WFH \times 2022$	-357.548 ***	-357.387 ***	-356.971 ***	-357.967 ***	-357.424 ***	-363.345 ***	-353.685 ***	-357.549 ***
	(49.211)	(49.169)	(48.929)	(49.431)	(49.126)	(54.004)	(49.659)	(49.211)
$WFH \times 2023$	-486.903 ***	-486.688 ***	-486.134 ***	-487.462 ***	-486.738 ***	-494.633 ***	-479.492 ***	-486.904 ***
	(59.195)	(59.132)	(58.903)	(59.410)	(59.104)	(64.568)	(59.813)	(59.196)
Y-Mean				7,495.98				

Note: The outcome is quarterly sum of earnings, detrended and deseasoned based on the pre-treatment data. The table shows the coefficients of the interaction terms of a binary treatment (i.e. above-median WFH) and event time dummies at the annual level from a linear regression of Equation (1). All regressions include the full set of quarterly event time fixed effects (FE) and age (linear and quadratic). In column 4, tenure is included as linear and quadratic terms. The standard errors in parentheses are clustered at the level of 5-digit occupation. *Source:* SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

state. This reassures that differential regional developments or shocks such as different course of the Covid-19 pandemic do not confound our estimates. Finally, column 8 controls for occupation-specific exposure to STW during the pandemic. We implement this by merging the STW index developed by Kagerl (2026) to our data at the three-digit occupational level.

Finally, none of the point estimates in Table 2 from the pre-treatment period are statistically or economically significant. Note that the estimated effect magnitudes are close to zero compared to the respective sample means from the reference period. Taken together, the extended model specifications provide confidence that our main results are not driven by differential sociodemographic characteristics, region-specific developments, or pre-trends between the treated and control groups.

6 Potential Mechanisms

Why is higher WFH potential related to lower earnings in the long run? In Section 6 we documented that lower labor force participation cannot explain this finding because our estimates for employment suggest a protective effect of WFH, at least at the extensive margin. This section discusses and shows evidence for alternative mechanisms behind our main results. To this end, we depart from earlier literature arguing that workers value WFH as a non-wage job perk, and are thus, willing to pay for better WFH options. For example, a stated-preference experiment conducted in July 2022 among nearly 3,300 German employees revealed that workers would forfeit 7.7% (5.4%) of their earnings for the option to work from home up to five (two) days per week (Nagler et al., 2024). These estimates are similar to those from experimental studies conducted in the U.S. before the pandemic (Mas and Pallais, 2017, Maestas et al., 2023).

Earlier research emphasizes the time savings from reduced commuting as a key reason for the high valuation of WFH options (Aksoy et al., 2023, Barrero et al., 2021a, Cowan, 2024). Several studies suggest that the time savings associated with WFH may be especially important for women, who seem to be more averse to long commutes than men (Farré et al., 2023, Caldwell and Danieli, 2024, Meekes and Hassink, 2022). Therefore, women appear more willing than men to pay for WFH options to avoid long commutes (Nagler et al., 2024).[21] However, we find comparable earnings and employment effects across genders. This is consistent with Coskun et al. (2026) who used a

[21] The stronger dislike of commuting among women can contribute to the gender pay gap. For France, Le Barbanchon et al. (2021) estimated that around 10 percent of the gender wage gap is due to differences in commuting valuation.

similar empirical strategy and found that the commuting distance of German workers increases with WFH potential, but to a similar extent for men and women. Therefore, commuting cannot be the sole mechanism through which a higher teleworkability of an individual's job leads to long-term earnings losses. In Table 3, we use our data to shed more light on this issue.

First, we study employment responses at the intensive margin. Although our data does not include information on work hours, we can distinguish between full- and part-time arrangements.[22] Columns 1 and 2 of Table 3 decompose the total effect on the number of days in employment (see Appendix Figure A.2) into the impacts on full-time and part-time employment days. For men, the average long-term increase in employment of more than 4 days per quarter in 2023 is driven to a larger extent by an increase in part-time employment (2.6 days in column 2) than in full-time employment (1.6 days in column 1). Considering that only about 10% of men in Germany work part-time, the shift towards part-time jobs among men with high WFH potential is notable; it implies a 27% increase in part-time arrangements compared to the sample mean in the reference period. The lower labor supply at the intensive margin could explain some of the earnings losses among men. For women, we find that the protective effect of WFH on employment is entirely driven by part-time employment. This is unsurprising given that female part-time employment is widespread and commonly accepted in Germany. The small and statistically insignificant shift away from full-time and data limitations do not allow us to conclude anything about the intensive labor supply for women.

Next, we examine the effects on occupational and regional mobility. We find that men in jobs with high WFH potential are more likely to change occupations (column 3) and employers (column 4) in the post-treatment period. This is accompanied by a change in workplace location at the county level (column 5), but not in residence location (column 6). Since occupational mobility is usually associated with favorable labor market outcomes, the negative impact of WFH potential on earnings indicates an inverse relationship for remote work. To test this conjecture, we consider different proxies for the quality of the new jobs and employers to which the treatment groups seem to transition. For example, we observe observe a significant reduction in the skill level that is required for a given job (column 7).[23] We also find that men who initially had jobs with a high WFH potential switch to jobs with lower WFH potential in the

[22] The decisive factor for distinguishing between full- and part-time employees is the ratio between the contracted hours and the usual working hours in a given establishment (Schmucker and vom Berge, 2025).

[23] The skill level describes occupation-specific job complexity in four categories: unskilled (level 1), skilled (level 2), complex (level 3), and highly complex (level 4).

Table 3: Mechanisms: Effects of WFH potential on labor mobility and job quality

	(1) Full-time	(2) Part-time	(3) Occupation	(4) Firm	(5) Workplace	(6) Residence	(7) Skill level
Panel A: Men (Observations 7,776,352; Individuals 243,011)							
$WFH \times 2016$	0.040	-0.020	0	0.002	0.001	-0.000	0.005
	(0.731)	(0.442)	(0.012)	(0.010)	(0.011)	(0.000)	(0.040)
$WFH \times 2017$	0.141	0.092	0.006	0.002	0.003	0.000	-0.007
	(0.541)	(0.326)	(0.010)	(0.008)	(0.008)	(0.000)	(0.030)
$WFH \times 2018$	0.305	0.021	0.001	-0.002	-0.001	0.000	-0.004
	(0.308)	(0.196)	(0.005)	(0.005)	(0.005)	(0.000)	(0.016)
$WFH \times 2019$	–	–	–	–	–	–	–
$WFH \times 2020$	0.475 ***	0.454 ***	0.02 ***	0.02 ***	0.018 ***	-0.000	-0.063 ***
	(0.151)	(0.098)	(0.002)	(0.003)	(0.002)	(0.000)	(0.004)
$WFH \times 2021$	0.981 ***	1.291 ***	0.034 ***	0.023 ***	0.031 ***	-0.000	-0.163 ***
	(0.209)	(0.276)	(0.006)	(0.005)	(0.004)	(0.000)	(0.015)
$WFH \times 2022$	1.224 ***	1.942 ***	0.060 ***	0.042 ***	0.054 ***	-0.000	-0.259 ***
	(0.284)	(0.406)	(0.008)	(0.007)	(0.005)	(0.000)	(0.024)
$WFH \times 2023$	1.55 ***	2.577 ***	0.086 ***	0.057 ***	0.074 ***	-0.000 *	-0.347 ***
	(0.334)	(0.502)	(0.010)	(0.008)	(0.007)	(0.000)	(0.031)
Y-Mean	73.17	9.41	0.22	0.26	0.18	0.00	2.20
Panel A: Women (Observations 6,498,752; Individuals 203,086)							
$WFH \times 2016$	-0.087	0.113	0.001	0.002	0.001	0.000 ***	0.003
	(0.900)	(0.934)	(0.019)	(0.012)	(0.011)	(0.000)	(0.046)
$WFH \times 2017$	-0.017	0.210	0.003	-0.001	0.001	0.000 ***	-0.006
	(0.679)	(0.682)	(0.016)	(0.010)	(0.009)	(0.000)	(0.035)
$WFH \times 2018$	-0.100	0.264	0.002	-0.004	0.001	0.000 ***	-0.014
	(0.372)	(0.381)	(0.009)	(0.007)	(0.006)	(0.000)	(0.021)
$WFH \times 2019$	–	–	–	–	–	–	–
$WFH \times 2020$	0.056	0.806 ***	0.015 ***	0.009 **	0.011 ***	-0.000 ***	-0.037 ***
	(0.135)	(0.169)	(0.003)	(0.004)	(0.003)	(0.000)	(0.003)
$WFH \times 2021$	-0.255	2.527 ***	0.013	0.007	0.017 ***	-0.000 ***	-0.125 ***
	(0.373)	(0.432)	(0.013)	(0.006)	(0.004)	(0.000)	(0.024)
$WFH \times 2022$	-0.535	4.177 ***	0.010	0.006	0.024 ***	-0.000 ***	-0.203 ***
	(0.641)	(0.658)	(0.025)	(0.009)	(0.006)	(0.000)	(0.041)
$WFH \times 2023$	-0.857	5.342 ***	0.028	0.006	0.032 ***	-0.000 ***	-0.269 ***
	(0.829)	(0.902)	(0.025)	(0.011)	(0.008)	(0.000)	(0.048)
Y-Mean	38.42	42.49	0.23	0.28	0.18	0.00	2.04

Note: The quarterly outcomes are detrended and deseasoned based on the pre-treatment data. The table shows the coefficients of the interaction terms of a binary treatment (i.e. above-median WFH) and event time dummies at the annual level from a linear regression of Equation (1). All regressions include the full set of quarterly event time fixed effects (FE) and age (linear and quadratic). The standard errors in parentheses are clustered at the level of 5-digit occupation.
Source: SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

post-treatment period.[24] For women, we also observe a significant change in work location, but not occupational mobility. Nevertheless, the treated women also seem to accept jobs with a lower level of complexity and lower WFH potential.

Taken together, the results in Table 3 suggest that, despite the positive employment effect, individuals who were initially exposed to a higher WFH potential experience earnings losses in the post-Covid economy because they are more likely to accept part-time arrangements in jobs of lower quality.

7 Conclusions

This paper examines effects of the permanent increase in the use of work from home (WFH) on labor market trajectories of women and men in Germany. Leveraging a unique natural experiment – the sudden expansion of remote work options in response to the Covid-19 pandemic – we employ a dynamic difference-in-differences method to examine how WFH reshapes employment and earnings outcomes. Specifically, we combine administrative records of individual career paths from the Sample of Integrated Labor Market Biographies with an index of WFH feasibility proposed by Bruns et al. (2023). We exploit differential treatment intensity by comparing individuals in jobs with high versus low WFH feasibility, measured at the detailed (5-digit) occupational level pre-2020, to isolate the causal impact of WFH on long-run labor market outcomes.

While a growing body of research documents the permanent shift toward remote work after 2020 (Aksoy et al., 2022, Barrero et al., 2021b, Bloom et al., 2024b), evidence on how this structural change might reshape gender inequalities in the labor market is thin (Olivetti et al., 2024). In principle, the flexibility that WFH provides may be particularly beneficial for women, who often shoulder greater household and caregiving responsibilities. The literature mostly perceives WFH as one of the family-friendly job amenities that might translate into earnings gaps whenever women have a higher willingness to pay for them than men. Remote work could also create unintended pressures, such as diminished visibility or fewer networking opportunities, that threaten to widen gender disparities even more. We contribute to this important question by evaluating how the pandemic-induced expansion of WFH affects labor market trajectories

[24] There are several possible explanations for this pattern. For example, our measure of WFH potential was developed at the beginning of 2020 and may not reflect the increasing teleworkability of many occupations over time. Second, individuals who were initially in jobs with high WFH potential have much lower improvement opportunities when it comes to changing to a job with an even higher WFH potential. This ceiling does not apply to individuals in jobs with low WFH potential during the pre-treatment period.

of women and men, and by examining whether it mitigates or exacerbates existing gender gaps.

Our findings reveal that the increase in the use of WFH had a positive effect on employment for individuals with WHF-feasible jobs that were of similar magnitude for both men and women. The employment effects grew over time for both genders, reaching five days per quarter towards the end of 2023. Despite a protective employment effect, our estimates imply that workers in occupations with high WFH potential experienced a drop in earnings compared to those in occupations with low WFH potential, with increasing magnitudes over time. Again, the effects are comparable across genders. Specifically, by the end of 2023, the quarterly earnings fell by roughly 6 percent for both men and women relative to their respective pre-2020 baselines. We provide empirical evidence that the earnings losses from higher WFH potential coincide with greater occupational mobility toward part-time arrangements with lower job quality.

Taken together, our results suggest that although the greater potential to work from home boosts employment, it is associated with persistently lower earnings. This finding is in line with the notion that employees view WFH as a non-wage amenity and accept significant wage reductions in exchange (Mas and Pallais, 2017, Maestas et al., 2023, Nagler et al., 2024).

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used *ChatGPT 5.1* in order to conflate ideas, get feedback on logical reasoning, and for table formatting. After using these tools/services, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Data statement

This paper uses proprietary data from the Sample of Integrated Labor Market Biographies (SIAB 1975-2023) that cannot be published. However, the data can be requested (e.g., for replication purposes) from the Research Data Center (FDZ) of the Institute for Employment Research (FDZ-IAB) in Nuremberg (Germany). The authors are willing to assist.

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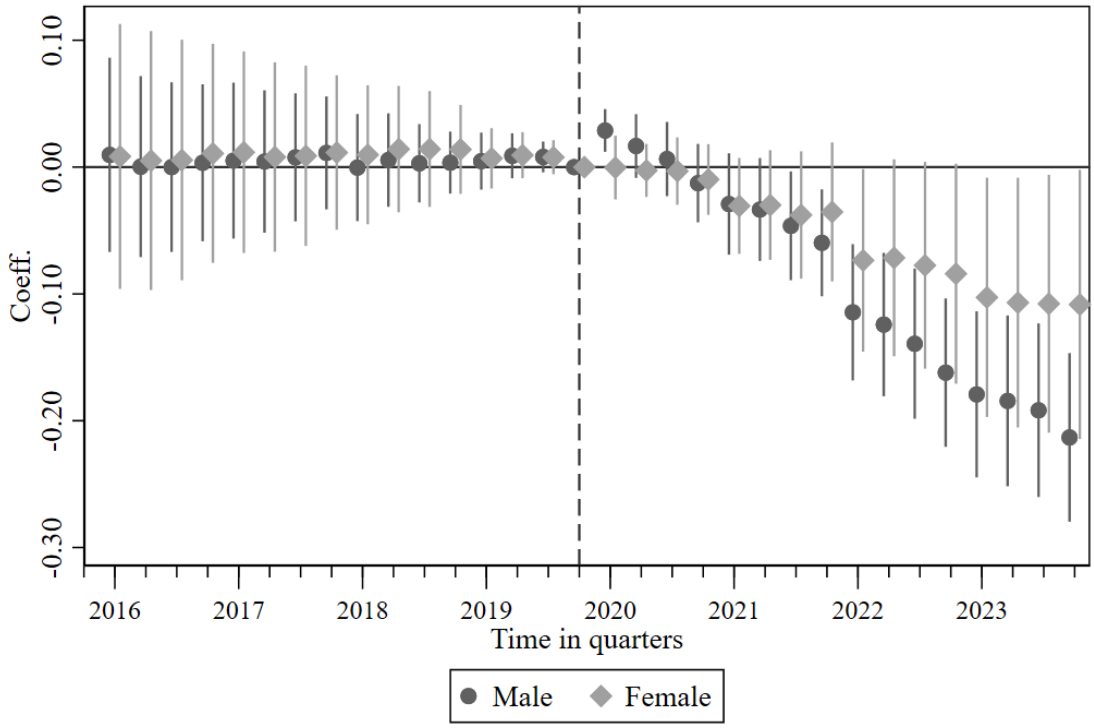
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Appendix

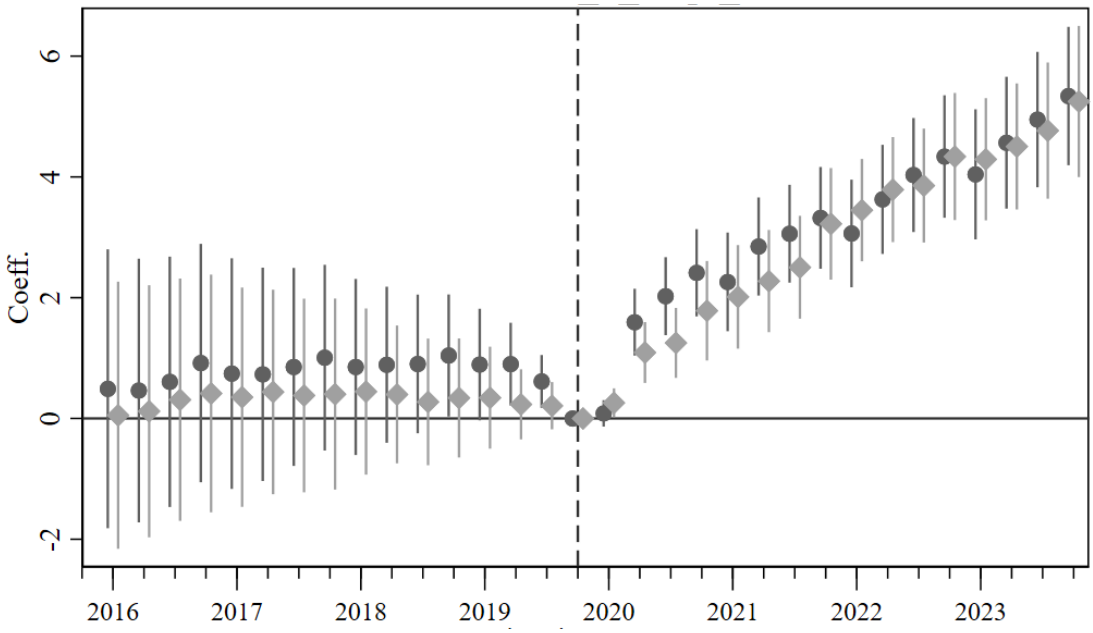
Figure A.1: Effects on log earnings



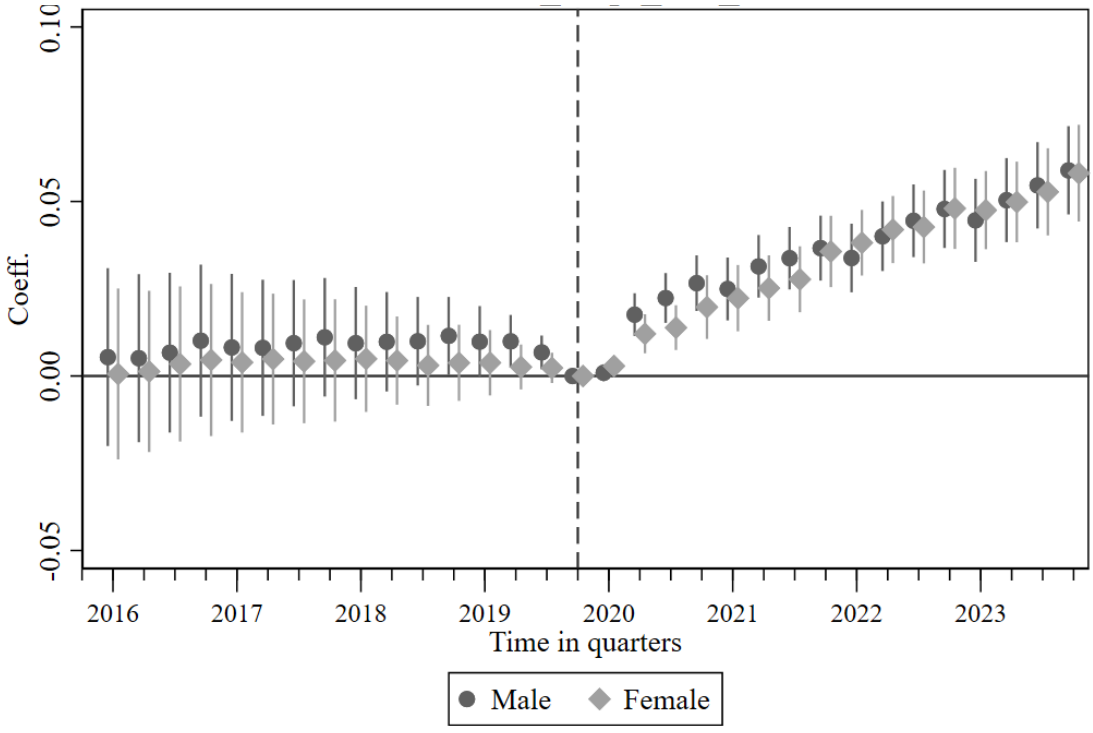
Note: The outcome is the natural logarithm of the quarterly sum of earnings, detrended and deseasoned based on the pre-treatment data. The dots represent the coefficients of the interaction terms of a binary treatment (i.e. above-median *WFH*) and event time dummies from a linear regression of Equation (1). The omitted reference period is the last quarter of 2019. The regressions controls for age (linear and quadratic). Bars represent 95% confidence intervals based on standard errors clustered by 5-digit occupation.
Source: SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.

Figure A.2: Employment responses to WFH potential

(a) Effects on the number of employment days



(b) Effects on the normalized number of employment days (in percent)



Note: The outcome in panel (a) is the quarterly sum of employment days. This sum is divided by the gender-specific mean from the reference period in panel (b). In both panels, the outcomes are detrended and deseasoned based on the pre-treatment data. The dots represent the interaction term coefficients of a binary treatment (i.e. above-median *WFH*) and event time dummies from a linear regression of Equation (1). The omitted reference period is the last quarter of 2019. The regressions control for age (linear and quadratic). Bars represent 95% confidence intervals based on standard errors clustered by 5-digit occupation. *Source:* SIAB 1975-2023; DOI: 10.5164/IAB.FDZD.2502.en.v1.