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The lasting earnings losses of COVID-19 short-time work

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Abstract

This study is the first to investigate the impact of short-time work (STW) schemes during the COVID-19 pandemic on earnings after STW. STW schemes were implemented to preserve employee–employer matches, support workers' incomes, and uphold consumption. Although workers faced temporary earnings losses under STW, it is unclear if the negative earnings effects of STW persisted or were limited to the STW spell. Therefore, this study uses a dynamic difference-in-difference (DiD) identification strategy with administrative data to identify any lasting STW effects on earnings. This approach accounts for factors that influenced worker selection into STW and tests for heterogeneous effects across subgroups of workers. We find lasting earnings losses that persisted beyond the STW participation itself. Most importantly, these earnings losses depended on the duration of STW exposure, with greater negative effects being more prominent in cases of long-term or recurring STW spells. Lasting, post-STW earnings losses tended to be more pronounced for white-collar jobs, while the largest losses were observed among men with blue-collar jobs whose STW spells exceeded one yea

Keywords:
COVID-19 pandemic; short-time work; lasting earnings losses; labor market; skills; register data; employment relations

1. Introduction

Countries across the globe implemented job retention policies during the COVID-19 pandemic to mitigate widespread layoffs and job terminations triggered by negative demand shocks (Corti et al.,

2023; Drahokoupil & Müller, 2021; Müller et al., 2022). Among these, short-time-work (STW) schemes significantly contributed to maintaining employer–employee relationships and sustaining consumption by supporting workers' incomes (Cassells & Duncan, 2020). Notably, countries with comprehensive STW policies were more effective in shielding workers from adverse income and employment impacts (Adams-Prassl et al., 2020; Almeida et al., 2021; Demirgüç-Kunt et al., 2022; Gasior et al., 2023; Lam & Solovyeva, 2023). Nevertheless implementing STW inherently incurred temporary earnings losses with varying extents across countries (Dias da Silva et al., 2020). These losses predominantly depended on the replacement rate—a percentage of previous earnings influenced by factors such as reduced working time, individual STW duration, and possible caps that limited the total amount payable for hours not worked (Drahokoupil & Müller, 2021).

STW schemes typically anticipated that workers would resume regular employment at pre-STW hours and income levels as demand and the economy recovered. However, it is unclear whether this expectation has aligned with reality, or if short-time workers incurred persistent income losses beyond STW. While some studies have investigated the *immediate* effects of how STW affected earnings or household income (Adams-Prassl et al., 2020; Adermon et al., 2022; Almeida et al., 2021; Demirgüç-Kunt et al., 2022), this study is the first to investigate its earnings effects beyond the STW period. We aim to uncover any *persistent* STW effects—specifically, the impact that STW exposure in 2020 and/or 2021 had on subsequent earnings in 2022 after regular employment had resumed—while accounting for potential recurrent STW periods. Using coarsened exact matching, we compared workers with similar pre-pandemic labor market histories that differ (only) with regard to their STW experience during the crisis.

Drawing on a rich database that combines register data from Austrian social security and public employment services, we examined worker retention rates and observed subsequent earnings trajectories considering worker transitions to new firms. Our dataset facilitates a comprehensive

examination of the diverse impacts that STW had on workers, firms, and industries, enabling us to detail heterogeneous STW effects along these characteristics.

Austria's experience provides valuable insights for European countries that have implemented similar STW or job retention schemes. In response to the COVID-19 outbreak and the accompanying containment measures that strictly limited economic activity in many industries, Austria introduced a comprehensive STW program in March 2020, which was prolonged several times with minor modifications (Huemer et al., 2021). The program reached its peak during the country's initial, strict lockdown in April 2020 when it covered over 1.24 million private sector employees, which accounted for approximately one-third of all dependent employees (Statistik Austria, 2021).[1] Initially, there was a 10% minimum reduction in working hours, which was later increased to 20%. Likewise, the maximum reduction was originally set at 90% of previous working hours and subsequently decreased to 70% with some exceptions. Companies directly affected by lockdowns could temporarily reduce working hours to zero (Eichhorst et al., 2020; Tamesberger & Theurl, 2021). Although STW was implemented across all sectors, four sectors accounted for over two thirds of all STW cases: manufacturing, wholesale and retail trade, accommodation and food service activities, and construction (see Table A.1 in appendix A). The net replacement rate ranged between 80% and 90% of the original net wage, capped at approximately 4000 Euros net per month, with apprentices receiving full compensation (Drahokoupil & Müller, 2021; Tamesberger & Theurl, 2021).

Our analysis shows that earnings losses persisted beyond STW participation itself, with the size of these earnings losses depending on STW duration. In addition, we observed effect heterogeneity between men and women and between blue-collar and white-collar jobs.

[1] Discounting public sector employees, who were not eligible for STW, the share of private sector employees affected by STW during 2020 in Austria was 42%.

2. Theoretical argument

2.1. Potential mechanisms

There are several potential reasons for why short-time workers faced lasting earnings losses compared to those who did not experience STW. Like unemployment, STW can have 'scarring effects' on earnings trajectories based on a set of mechanisms (Andersson et al., 2018; Arulampalam et al., 2001; Grzegorczyk & Wolff, 2020). These mechanisms include the lack of skill development or depreciation of skills and human capital during idle times, forgone promotions during STW, and statistical discrimination or negative signaling of prior STW spells for job applicants.

Because they reduce actual time on the job, STW spells impede the acquisition of job-specific training and the accumulation of firm-specific skills, which hinders productivity growth (Becker, 1964) and may therefore produce a human capital gap between those who were in STW and those who remained in regular employment. Furthermore, existing skills may depreciate during periods of reduced economic activity or inactivity. This skill depreciation has adverse productivity effects through the loss of work-specific human capital (Edin & Gustavsson, 2008). Taken together, these losses could result in the lower productivity of short-time workers, which may explain their earnings disadvantages after resuming regular employment.

Human capital depreciation may be of limited importance to most short-time workers, who experienced relatively short spells. However, long STW spells that coincided with large reductions in working hours may have greater consequences. In fact, it is the duration of the STW combined with its actual reduction in working hours that determines the amount of work experience and on-the-job training foregone, and thus the extent to which human capital explanations for potential STW scarring effects are plausible.

During STW, workers may miss out on opportunities for wage increases and promotions within the firm, which may cause diverging earnings trajectories between them and their co-workers who remained in regular employment. In fact, in an economic crisis when job market opportunities are

more limited, STW may cause workers to stay in their current position longer than they otherwise would have, possibly resulting in lower earnings growth over time due to reduced opportunities to move up the career ladder (Meriküll & Paulus, 2024).

Likewise, prior STW may cause persistent earnings losses among short-term workers due to statistical discrimination and signaling. Because the applicants' true productivity is opaque in the hiring process, employers resort to signals to assess the quality of applicants (Spence, 1973) and discriminate according to an observed statistic (Becker, 1995) to reduce uncertainty. STW may be interpreted as a signal of lower productivity, ambition, or ability. Given that many countries like Austria give employers full discretion over who they put on STW, future employers may assume that past employers based their STW decision on a productivity evaluation that led them to register workers whom they rated less productive and more easily replaceable for STW, independent of the adequacy of this evaluation. Nevertheless, the impact of the STW signal on job market opportunities, like in the case of unemployment, probably varies depending on duration.

As stipulated in Austrian labor law (Laimer et al., 2022 chap. 17), short-time workers who return to regular employment with the same firm will typically resume work under the same contractual conditions as prior STW. In particular, their hourly pay will remain unchanged since STW only represents a temporary reduction in hours until the original contractual conditions automatically resume. Pay cuts based on contractual changes after STW (which may in principle be done based on dismissals for variation of the contract—"*Änderungskündigung"*) have certainly been the exception in the Austrian context. This is not least because of labor shortages in most of the affected industries (Fritzer et al., 2022) and payment close to collectively agreed minima in tourism and retail, which cannot be undercut. Here, any reduced earnings that occur after returning to regular employment with the same firm are not truly from a wage cut, but rather because of a forced or voluntary reduction in working hours, or a reduction in overtime hours. However, wage gaps between those with and without STW spells may result from foregone wage increases or promotions during STW.

In addition to human capital arguments pertinent to employer evaluations, there are multiple ways that short-time workers may adapt to the situation. For example, affected workers have less contact with their colleagues and fewer opportunities to participate in organizational decision-making—especially during long STW spells that are associated with a strong reduction of working hours (Steiber, 2021a). Hence, short-time workers may experience reduced ties to and identification with their employer's firm, which may result in lower job satisfaction and motivation (Möhring et al., 2021) or increase the likelihood of job changes (de Moura et al., 2009).

However, because STW saved jobs in both expanding and declining industries and occupations (Carrillo-Tudela et al., 2022) and generated substantial windfall effects in firms that subsidized jobs that were not necessarily at risk of being eliminated (Cahuc et al., 2021), STW can have ambiguous effects on subsequent employment. Depending on the context, STW may motivate workers to return to their firm, or it may cause them to reorient and look for a job with another firm in the same or another industry. In expanding industries that only experienced a temporary COVID-19 demand shock, short-time workers could expect to continue to their regular work with the same pre-STW earnings (just like their colleagues who were not in STW) upon resuming their standard working hours. Conversely, workers in declining occupations and industries might reconsider their situation and aim for a new job in more prosperous segments of the labor market. Thus, they may try to switch employers and, upon success, improve their earnings (Farber, 1999). However, their previous STW may act as a negative signal to prospective employers, resulting in lower wages. Furthermore, those willing to switch but unable to secure a new job may become trapped in their previous position that could reduce their motivation to return to pre-COVID-19 working hours. Alternatively, more persistent issues like shrinking demands beyond COVID-19-related setbacks might prevent these workers from ever working pre-pandemic hours again. In industries where demand escalated during the pandemic like healthcare, workers have displayed intentions to leave their jobs in large numbers due to stress, work pressure, and a lack of job satisfaction and well-being (Zhang et al., 2022). Meanwhile, segments where demand temporarily recovered, such as the accommodation

and food service sector, have seen workers reorient themselves towards other, more sustainable sectors with more favorable and family-friendly work arrangements. Indeed, when tourism recovered in many regions during the summer of 2021, many former accommodation and food sector workers refused to return to their former jobs or were only willing to supply fewer hours of service (Mühlböck et al., 2023).

2.2 Theoretical expectations

The theoretical arguments above suggest that there are three mechanisms that primarily influence earnings losses among prior short-time workers. First, reduced normal work hours and/or fewer overtime hours compared to pre-STW after resuming regular work; second, reduced opportunities for promotions and wage increases within the firm (during periods spent in STW, but also afterwards due to forfeited skills accumulation); third, reduced remuneration among those changing employers from the potential negative STW signal. Indeed, earnings losses will probably increase alongside STW duration as well as the frequency of its exposure, like the number of days spent in STW and whether or not it only occurred during the strictest lockdowns in 2020 or (again) in 2021. This is mainly due to an amplification of the second and third mechanisms.

We examined post-STW earnings losses separately based on gender and the employment relation (blue-collar versus white-collar contracts) to address labor market segregation and its potential impact on treatment effects. The question is whether some groups of workers suffered greater income losses with similar STW exposure, i.e., if some of the mechanisms outlined above are more applicable to white- or blue-collar workers, as well as male or female workers. The significant earnings disparities and varying job tasks between blue- and white-collar contracts makes it crucial to differentiate between these two groups because of their distinct COVID-19 risk exposures in employment. Blue-collar workers (*"Arbeiter"*) mainly supply manual labor that requires physical presence, while white-collar contracts (*"Angestellte"*) are primarily issued in commercial or non-commercial services and clerical office work, often allowing for remote work (Adams-Prassl et al.,

2022; International Monetary Fund, 2021; Purkayastha et al., 2021; Steiber, 2021b). Consequently, white-collar jobs are more crisis-resistant (Fana et al., 2020; Irlacher & Koch, 2021; Purkayastha et al., 2021). Although most blue-collar workers in Austria perform skilled work that requires years of training ("*Facharbeiter*"), they face a persistent and substantial earnings gap compared to white-collar workers: In 2019, the median annual earnings for full-time blue-collar workers were 35,205 EUR, compared to 51,545 EUR for white-collar workers (Rechnungshof Österreich, 2020, p. 23). Considering the mechanisms of reduced post-STW earnings, white-collar workers may face more challenges regarding missed promotions and wage increases, which are less prevalent among blue-collar workers. Additionally, given the higher skill demand of white-collar jobs, reduced skill acquisition opportunities during STW could have a more pronounced effect on them compared to blue-collar workers. Conversely, post-STW earnings losses from working hours reductions that extend beyond the STW episode may disproportionally affect blue-collar workers, who are more likely to record paid overtime hours (Bauer & Zimmermann, 1999; Dhungel et al., 2021), whereas white-collar workers tend to have all-in contracts.

Research on the COVID-19 employment crisis tends to show that women's employment and wages were disproportionally affected (Albanesi & Kim, 2021; Cook & Grimshaw, 2021; International Monetary Fund, 2021; Kim et al., 2022; Kristal & Yaish, 2020), particularly by greater reductions in working hours (Reichelt et al., 2021; Schmitt & Auspurg, 2022) and an increase in part-time work among young mothers (Steiber et al., 2021). While prior research highlights women's heightened labor market risks during the crisis, including a potentially greater exposure to STW (treatment in our study), it remains unclear whether STW had gender-specific effects on post-STW earnings (magnitude of treatment effects). Women's high share of part-time work could decrease the likelihood of promotions and wage increases with further reductions in working hours during STW. Conversely, a reduction in overtime hours would be more relevant to full-time male workers, especially those in blue-collar jobs where overtime pay is more frequent.

While some workers may benefit from changing jobs (Farber, 1999), we expect that in the aggregate, short-time workers who transitioned to a new firm had to accept lower earnings due to the potential negative signal associated with their previous STW. Furthermore, deprived skills accumulation and skills obsolescence may see potential earnings losses after firm changes increase with the duration and incidence of STW exposure, and again, earnings trajectories may differ between men and women as well as between blue- and white-collar workers.

Finally, human capital arguments suggest greater earning losses among young and inexperienced short-time workers, as they may disproportionally suffer from reduced learning opportunities on- and off-the-job during STW (Bell et al., 2021; Blundell et al., 2022; International Monetary Fund, 2021).

3. Data, methods, and identification

3.1 Longitudinal administrative data and main variables

We used administrative data from social security registers linked to process data from the Public Employment Service (PES). The micro-data is available to researchers upon registration via the labor market database ("Arbeitsmarktdatenbank," see https://arbeitsmarktdatenbank.at/) provided by the PES and the Federal Ministry of Labour (AMS - BMAW, 2023). It consists of the universe of all spells of employment, unemployment, and a host of out-of-labor-force states covered by the Austrian social insurance system (detailed information on the data sources is available in Zweimüller et al., 2009). Employment spells can be matched to employers and a range of (derived) firm-level characteristics. For our main analyses, we focused on prime-age workers who were aged 30 to 49 years in 2020 to avoid conflating STW effects with processes of labor market entry (school-to-work transitions) and exit (part-time employment prior to retirement or similar arrangements of reduced employment before retiring). To check for age-specific effects, we compared prime-age workers with young workers aged 20 to 29 years as well as workers aged 50 to 59 years. For all age groups, we selected employees who were in STW during 2020 and/or 2021, while excluding those who were in

STW in 2022. This is because we observed yearly earnings (see below) and the 2022 earnings are *post-STW* earnings in our empirical setting that reflect income from regular employment. We constructed a balanced panel dataset for the observation period between 2015 and 2022, which meant that every individual in our final sample had valid earnings records in each of these eight years. Public sector employees (civil servants) and the self-employed, who were not eligible for STW, were excluded.

The data provide information on yearly gross earnings for every job held and the number of days worked, i.e., insured, in each job and year. For each worker, we selected *one* job spell per year of at least 91 days duration, which had to be a 'single job;' i.e., no other forms of employment were held during that job spell.[2] The outcome variable was then computed in daily rates from the yearly earnings in this selected job divided by the days worked in this job and year. If a worker held several consecutive jobs in a year, we selected the longest job spell. We used gross earnings beyond the *marginal earnings threshold* ("Geringfügigkeitsgrenze"), i.e., an income threshold of about EUR 500 per month defining *mini-jobs* in Austria that are exempt from some employer contributions. Earnings information was capped at the maximum social security contribution basis (i.e., right censored), which amounts to 55,800 Euro in 2015 (daily rate of 155 Euro) and 68,040 Euro in 2022 (daily rate of 189 Euro). Less than 10% of earnings were capped, as reflected by the 9th decile in yearly earnings for 2019 (66,446 Euro, see Rechnungshof Österreich, 2020, p. 54) being considerably below the maximum earnings of 73,080 Euro in the same year. Robustness checks were performed to see if this influenced our results (see section 3.4 below).

Our models used both STW duration and incidence. Regarding duration, we distinguished between four groups according to the length of their STW spells in 2020 or 2021: Those who were in STW

[2] Workers who held simultaneous forms of paid employment were excluded unless they had one single paid employment eligible to STW of at least 91 days per year without any additional paid employment during that spell. About 2.2% of all workers were thus not included. Most of these parallel employment spells were ineligible for STW, including civil service and self-employment, and were therefore excluded from the analysis.

between one and 91 days, between 92 and 182 days, between 183 days and one year, and more than one year. For incidence, we distinguished between three groups of short-time workers: Those who were in STW in 2020 only (about 58% of all short-time workers), those who were in STW in 2020 and 2021 (26%), and those who were in STW in 2021 only (4%). The remaining 12% of short-time workers in 2020 and/or 2021 were also in STW in 2022 and were therefore not considered in this study because we did not observe their post-STW earnings. Those with STW spells were compared to their counterparts with similar characteristics who were not in STW at any point between 2020 and 2022. While it would be interesting to also study the effect of the actual reduction in working hours during STW, this information was not available in the data.[3]

3.2 Identification

Identifying a causal relationship without an experimental design and random exposure to the treatment is challenging. Based on observational data, we attempted to assess STW effects by employing a *dynamic* difference-in-differences design (DiD) that estimated two-way-fixed-effects regressions with lead effects for pre-STW years and lag effects for STW and post-STW periods. Our dynamic approach allowed for checking whether the parallel trends assumption was plausible and for disentangling the STW earnings losses *during* STW (which is by design) from potential, persistent earnings losses *after* STW. The following equation was estimated:

$$\log(DR)_{it} = \sum_{t=2015}^{2018} STW_i^* a_t + \sum_{t=2020}^{2022} STW_i^* b_t + c_i + d_t + e_{it},$$

in which $\log(DR)$ are earnings in log daily rates for individual i and year t, STW is short-time work group membership (duration and incidence groups, respectively) of individual i. a and b are the lead and lag effects, respectively, that reflect the difference in daily rates of the groups who were in STW relative to those who were not in STW during the observation period. c are individual fixed effects, d

[3] The lack of information on working time is one of the main shortcomings of the Austrian administrative labor market data.

are year fixed effects, and *e* is a random error assumed to be independent and identically distributed. Because we specified both individual and year fixed effects, we could not estimate a fixed effect for each year, but needed to leave out one year, which was the reference year. We used the year prior to STW, which was 2019 for the groups who were in STW in 2020, and 2020 for the group that was in STW in 2021 only.

The key assumption for this design to yield consistent results of any persistent STW earnings effects was that in the absence of STW, the STW groups would have common trends in the outcome. Thus, the coefficients for the lead effects a should all be zero, which is not a proof of common trends but does support the assumption. In addition, the lead effects allowed us to uncover anticipation effects. In cases where the common trends assumption is violated, fixed effect regressions would return biased results (Imai & Kim, 2021; Morgan & Winship, 2015; Rüttenauer & Ludwig, 2020). In our case, this would pertain to the likely situation in which the earnings trajectories of workers who were in STW were *a priori* different from those who were not and that these differences were systematically related to STW exposure. Because our data included earnings trajectories for several pre-STW periods, we could easily observe that this was indeed the case, since empirical earnings trajectories differed across groups, both in their levels and slopes (see Tables A.3 and A.4 in appendix A and Figure B.2 in appendix B on pre-pandemic earnings trajectories).

3.3 Matching

To address these systematic differences between groups, we estimated our models on a matched dataset of short-time workers and similar workers from the No-STW group. Coarsened exact matching (CEM, Iacus et al., 2012) based on prior earnings trajectories, unemployment, and age was performed in R (Ho et al., 2011) to account for the selection process into STW. Although we could not match on educational level, which is not generally available in the Austrian labor market data, we assumed that educational differences were largely covered by earnings trajectories (e.g. Card, 1999). Another potentially relevant factor behind the decision of employers to put certain

employees on STW may be employee performance and productivity, for which prior earnings trajectories and unemployment should again provide proxies. Additionally, employers may have limited knowledge about worker productivity, especially when such information is only available only at the team level or, more generally, in work arrangements with considerable worker autonomy (Goldthorpe, 2007; Sauermann, 2016). Furthermore, there are probably several reasons as to why selection into STW according to (perceived) performance played a secondary role, especially during the COVID-19 crisis. First, the lockdowns rendered some jobs completely unfeasible, meaning employers largely put such employees on STW regardless of their perceived productivity. Second, decisions about STW had to be taken relatively quickly, especially in 2020 when employers faced an exogenous shock that made productivity-based STW decisions difficult. Third, to avoid alienating a large share of their workforce, employees needed to consider how their employees perceived fairness when deciding whom to place on STW, which probably created broad STW participation across firms and jobs. Because employees had little agency over these decisions, it is unlikely that they self-selected into STW. Nevertheless, we could not rule out further potential, unobservable confounding variables in specific cases. For example, workers who faced greater COVID-19 health risks were probably more likely to end up on STW. Such a vulnerability may have been irrelevant pre-2020 for earnings trajectories, but not thereafter (at least for the duration of the pandemic). Despite such cases, we are confident that matching was plausible in our context, especially since we could condition on several pre-treatment outcomes that have influenced earning trajectories and could minimize the probability of unobserved variables that influenced earnings post-STW only. We evaluated covariate balance after matching using standardized mean differences (SMD) as a balance metric. An SMD value close to zero is considered an indication of good balance, suggesting that the matched groups had similar covariate distributions. Indeed, the matching procedure yielded

satisfying results, as SMD values were close to zero for all covariates in most groups (see Tables A.5 to A.20 in appendix A for balance metrics).[4]

3.4 Robustness checks

To check the robustness of our findings, our main models were estimated at several quantiles of the log earnings distribution using quantile regression (Koenker, 2022; Koenker & Bassett, 1978). This was to evaluate whether earnings in our data being right-censored at the maximum social security contribution basis (see section 3.1 above) influenced the findings derived from ordinary least squares regression, which compared the groups at mean earnings. In addition, all models were run separately for the four economic sectors with the highest STW incidence to check if any influential sector drives our overall findings. These key sectors included manufacturing, wholesale and retail trade, accommodation and food service activities, and construction. All models are run using the *fixest* package (Bergé, 2018) and the *quantreg* package (Koenker, 2022) in R (R Core Team, 2018).

4. Findings

4.1 Short-time work duration and incidence

Descriptive statistics regarding STW incidence and duration showed that a disproportionally high share of blue-collar workers was in STW in 2020 and/or 2021 compared to white-collar workers (see Table 1). Female blue-collar workers had the highest incidence rates, with almost half (about 46%) having been in STW at least once in 2020 or 2021—compared to 41% of male blue-collar workers, 34% of male white-collar workers, and 31% of female white-collar workers. Furthermore, female blue-collar workers in STW recorded the longest STW spells: About four in ten had spells that over six months and almost every second (47%) female short-time, blue-collar worker experienced STW in both 2020 and 2021. By contrast, most men who faced STW spells experienced STW in 2020 only

[4] The SMD only exceeded 0.1 for some variables in very small groups, where less than 20 matches were found. However, results for groups with less than 50 matched cases are not presented.

(71% of blue-collar workers and 75% of white-collar workers). Thus, we observed a substantial gender gap in STW incidence and duration among blue-collar workers. Unlike blue-collar jobs, STW incidence rates were lower in white-collar jobs among both men and women; however, the STW duration gap between these two types of workers was more pronounced among women: While 41% of female blue-collar workers recorded long STW spells of over 183 days, this was only the case for 27% of their white-collar counterparts.

Table 1: Short-time work incidence and duration in 2020 and 2021 according to gender and employment contract

Short-time work	*Blue-collar workers*		*White-collar workers*	
	Women	*Men*	*Women*	*Men*
STW share (2020/21)	45.6%	40.8%	30.9%	34.2%
Of which (duration)				
1–91 days	34.9%	54.9%	47.1%	52.4%
92–182 days	24.4%	22.3%	25.6%	24.5%
183 days–1 year	32.9%	18.2%	21.1%	18.1%
More than 1 year	7.7%	4.7%	6.1%	4.9%
Of which (incidence)				
2020 only	46.2%	71.1%	64.5%	74.8%
2020 and 2021	47.4%	24.9%	32.7%	23.2%
2021 only	6.4%	4.1%	2.8%	2.0%

Workers aged 30–49. Source: Register data from the Austrian Labour Market Database (https://arbeitsmarktdatenbank.at/), own calculations.

4.2 The earnings effects of COVID-19 short-time work

Figure 1 depicts the main results from our analyses of differences in earnings trajectories between those who were subject to STW and those who were not. The results are broken down by STW duration as well as by gender and employment relations (blue-collar vs. white-collar). All the pre-2020 effects were non-different from zero, indicating that the parallel trends assumption was satisfied in the matched datasets. The figures show that earnings losses persisted even after exiting STW and resuming regular employment for most groups of short-time workers. The extent of these earnings losses varied according to the degree of STW exposure and across different groups.

We found that the earnings penalty increased considerably with the duration of the STW spell (see Figure 1 and post-STW estimates in Table 2). Among blue-collar workers, short spells of up to three months were not accompanied by any persistent earnings losses. The same was true for women in blue-collar jobs with STW spells of up to one year. On average, they earned the same as their peers who were not in STW upon returning to regular employment. However, we observed lasting post-STW earnings losses in all other groups of workers. The largest earnings loss was estimated for men in blue-collar jobs who were in STW for more than one year: On average, they lost about 6% of their earnings compared to the 2022 earnings of similar workers who were not in STW. The earnings gap for blue-collar male workers who were in STW for shorter periods compared to their unaffected counterparts were estimated at 1.5% and 0.8% for those in STW for three to six months and those in STW for up to half a year, respectively. No lasting earnings losses were observed among women in blue-collar jobs, except for those with the longest STW spells (2.4%).

Women in white-collar jobs experienced persistent earnings losses even after short STW spells. On average, they faced a decrease in earnings by 1.2% and 1.7% following STW spells of up to three months and six months, respectively. For longer spells of up to one year, their earnings losses exceeded 3%, and this figure further increased to nearly 5% for those whose STW spells lasted more than one year. Among white-collar males, post-STW earnings losses were somewhat lower than for females, but generally showed the same pattern: Losses increased with duration from 0.6% for short spells of up to three months, and up to 4.0% for spells longer than one year.

The timing of STW incidents revealed consistent patterns in lasting earnings losses after returning to regular employment, particularly among white-collar workers (see Figure B.1 in appendix B). Notably, their post-STW earnings losses mirrored the losses experienced during the STW period, with some gradual recovery observed only among men. This suggests that earnings have not recovered and have stagnated at STW levels for white-collar workers. By contrast, blue-collar workers with short STW spells in 2020 or 2021 fully recovered their earnings in 2022, except for

those with very long or recurrent STW spells. The median STW duration for 2020 and 2021 was approximately 240 days for men in blue- and white-collar jobs as well as women in white-collar jobs, and around 260 days for women in blue-collar jobs (refer to Table A.2 in appendix A).

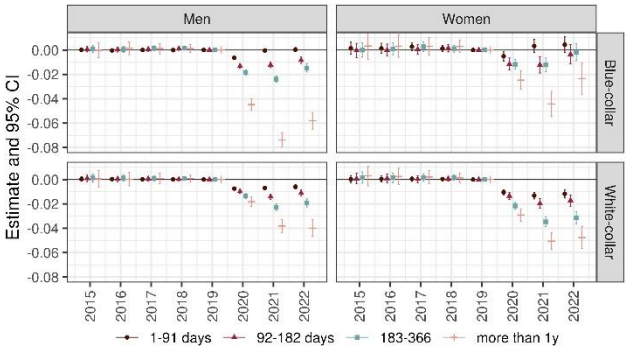

Figure 1: Earnings effects of COVID-19 STW by duration, gender, and employment relation
Effects estimates based on matched datasets per STW duration groups (balanced on pre-COVID-19 earnings trajectories and unemployment between 2015–2019 as well as 5-year age groups; workers aged 30–49. Source: Register data from the Austrian Labour Market Database (https://arbeitsmarktdatenbank.at/), calculations by the authors.

Table 2: Lasting earnings gaps post COVID-19 STW in 2022 (% differences in daily earnings)

Short-time work	*Blue-collar workers*		*White-collar workers*	
	Women	*Men*	*Women*	*Men*
STW duration				
1–91 days	0.4 (0.3)	0.0 (0.1)	-1.2 *** (0.2)	-0.6 *** (0.1)
92–182 days	-0.4 (0.4)	-0.8 *** (0.1)	-1.7 *** (0.2)	-1.1 *** (0.1)
183 days–1 year	-0.2 (0.4)	-1.5 *** (0.2)	-3.1 *** (0.3)	-1.9 *** (0.2)
More than 1 year	-2.4 *** (0.7)	-5.8 *** (0.3)	-4.8 *** (0.5)	-4.0 *** (0.4)
STW incidence				
2020 only	0.1 (0.3)	-0.1 + (0.1)	-1.1 *** (0.1)	-0.6 *** (0.1)
2020 and 2021	-0.8 ** (0.3)	-2.4 *** (0.1)	-3.6 *** (0.2)	-2.5 *** (0.1)
2021 only	0.4 (1.5)	-0.5 (0.5)	-3.8 ** (1.3)	-1.5 * (0.6)

Estimates from two-way-fixed-effects regressions for the year 2022 based on matched datasets. Estimates are percent point differences in daily earnings between short-time workers after returning to regular employment and similar workers who never experienced STW during the pandemic. Standard errors in parentheses. ***/**/*/+: estimates statistically significant at the 0.1%/1%/5%/10% confidence level. Workers aged 30–49. Source: Register data from the Austrian Labour Market Database (https://arbeitsmarktdatenbank.at/), own calculations.

In summary, the effects indeed varied with STW exposure according to duration and incidence, gender, and employment relation (blue-collar vs. white-collar jobs). As expected, the most pronounced, lasting earnings losses pertained to long and/or recurrent STW spells and were

substantial. For example, projected onto yearly earnings in 2022, male and female white-collar workers who experienced STW in 2020 and again in 2021 lost about 1,500 Euro in yearly wage income compared to their respective control groups (see Table A.22 in appendix A). The absolute loss is larger for women than for men, because of the differences in median yearly earnings (women: 34,100 Euro per year; men: 54,900 Euro). Losses of a similar magnitude were incurred by the relatively small group of women in white-collar jobs who only experienced STW in 2021. Their projected median earnings for 2022 were 37,700 Euro, which was almost 1,800 Euro less than for the control group. For very long STW spells of more than one year in 2020 and 2021, our models projected yearly earnings losses of about 2,900 Euro for men in white-collar jobs, 2,500 Euro for men in blue-collar jobs, and 2,100 Euro for women in white-collar jobs (see Table A.21 in appendix A). Regarding social inequality, the losses of male blue-collar and female white-collar workers carried more weight because of their lower earnings levels. The same applied to women in white-collar jobs who spent more than three months in STW since a loss of about 1,000 Euro is substantial given their yearly earnings levels of about 37,100.

4.2.1 Effects of changing employers

Our theoretical discussion led us to expect that short-time workers who changed employers after STW would experience greater earnings losses than those who stayed with the same firm. This expectation was supported for specific groups, particularly those who were in STW exclusively in 2020 and for short durations. For example, the average male blue-collar did not suffer lasting earnings losses from STW spells of up to 91 days. However, those who changed employers after STW earned 2.1% less (up to 91 days in STW, see Table 3) or 2.5% less (STW in 2020 only) in their new jobs in 2022 compared to similar workers who did not experience STW.

We also observed earnings penalties associated with changing employers among white-collar workers, again specifically for those who had relatively short STW spells. Women who experienced STW for up to 91 days faced penalties of up to 2 percentage points, resulting in a shift from -1.2% to

-3.1% for those who changed employers (compare estimates in Tables 2 and 3). Similarly, women and men who were only in STW in 2020, as well as men in STW for up to 182 days, encountered employer change penalties of approximately one percentage point.

These penalties likely stemmed from adverse unemployment effects after leaving the firm where the STW spell occurred. While short-time workers who changed firm were effectively matched to non-participants based on their pre-STW unemployment trajectories, disparities in post-STW unemployment patterns emerged between the two groups. Specifically, those who changed firms after STW were more susceptible to later unemployment spells compared to similar non-short-time workers. Conversely, among short-time workers who remained with their original firm, the gaps in unemployment compared to non-short-time workers were relatively smaller.

Interestingly, for longer STW spells lasting more than six months, there was no discernible difference in post-STW earnings between those who stayed with their original firm and those who changed employers. Conversely, among white-collar workers, individuals with very long STW spells exceeding one year who subsequently changed employers fared better than those who remained.

Table 3: Lasting earnings gaps post COVID-19 STW in 2022 for those who changed employers after STW (% differences in daily earnings)

Short-time work	*Blue-collar workers*				*White-collar workers*			
	Women		*Men*		*Women*		*Men*	
STW duration								
1–91 days	-1.7	(1.5)	-2.1 ***	(0.4)	-3.1 ***	(0.6)	-1.5 ***	(0.4)
92–182 days	-0.4	(0.4)	0.2	(1.5)	-2.8 ***	(0.6)	-2.2 **	(0.8)
183 days–1 year	1.8	(1.5)	-4.0 ***	(0.8)	-3.6 ***	(1.0)	-1.9 **	(0.7)
More than 1 year	-4.0	(2.9)	-5.0 **	(1.8)	-3.2 +	(1.7)	-2.3	(1.5)
STW incidence								
2020 only	-0.4	(1.2)	-2.5 ***	(0.4)	-2.2 ***	(0.5)	-1.5 ***	(0.3)
2020 and 2021	0.5	(1.3)	-3.5 ***	(0.7)	-4.2 ***	(0.8)	-2.7 ***	(0.7)
2021 only		(x)	-0.4	(2.5)	-10.8 *	(4.7)	-4.2 +	(2.4)

Estimates from two-way-fixed-effects regressions for 2022 based on matched datasets. Estimates are percent point differences in daily earnings between short-time workers after returning to regular employment from STW—*with another employer*—and similar workers who were never in STW during the pandemic (with or without employer changes). Standard errors in parentheses. ***/**/*/+: estimates statistically significant at the 0.1%/1%/5%/10% confidence level. *(x)*: too few observations (less than 50 matches). Workers aged 30–49. Source: Register data from the Austrian Labour Market database (https://arbeitsmarktdatenbank.at/), own calculations.

4.2.2 Analyses for different age groups

While we ran our main models using data for individuals aged 30 to 49, we also ran additional models for younger and older workers to check for potential age effects. Overall, we found that STW exposure effects did not vary greatly across age groups. A notable exception was men in white-collar jobs wherein young workers aged 20 to 29 who experienced STW in both 2020 and 2021 had persistent earnings losses of -4.9% in 2022, which was statistically significantly larger than the losses of their prime-working age colleagues (-2.5%). The fact that this age disparity was only observable for long STW durations of at least 183 days (see upper panel of Table A.23 in appendix A) corroborates the conjecture that was indeed the loss in human capital—which should be more pronounced for young and inexperienced workers with long STW spells—that leads to persistent income losses. Moreover, this age disparity may have only be observable among white-collar workers because they tended to be employed in knowledge-intensive jobs that require considerable on-the-job training to perform well. This was also consistent with the finding that their colleagues aged 50 to 59 tended to have the smallest losses among those with recurrent STW spells in 2020 and 2021. By contrast, however, young women in white-collar jobs incurred somewhat smaller losses than their prime-working age colleagues. This may have been due to the care responsibilities of (prime-age) mothers with dependent children that forced them to reduce their working hours during the pandemic because of reduced public care provisions and school closures independent of STW (Hanzl & Rehm, 2023). Younger women without such responsibilities may have largely been able to return to their pre-STW working hours or even increased them to compensate for reductions among their prime-age colleagues with care responsibilities.[5]

4.2.3 Analyses for different economic sectors

[5] In Austria, the mean age of mothers at first birth is about 30 (Statistik Austria, 2023), meaning that most working mothers with school-age children or children in institutionalized day care belong to our prime-age category.

Applying our design to the four economic sectors with the highest STW incidence revealed some variation in earnings losses across sectors. In manufacturing, which had the most STW cases and was likewise dominated by men (see table A.1 in appendix A), persistent earnings post-STW losses tended to be greater for some groups of workers, especially women. However, the differences across sectors were small and statistically insignificant. In wholesale and retail trade, which had almost as many STW cases as manufacturing and with a balanced gender ratio, lasting earnings losses were sometimes a little smaller than in manufacturing and in all sectors combined. These differences between sectors were statistically significant for women in white-collar jobs with STW spells in 2020 only or in both 2020 and in 2021. Among the latter group, lasting earnings losses were substantially lower (-2.0%) than in all sectors (-3.6%), and in manufacturing (-4.2%, see Table 2 and Table A.26 in appendix A). For the other two sectors—accommodation and food services as well as construction—no statistically significant differences could be observed. Accommodation and food services seemed to be a special case, with all estimates being highly statistically uncertain and neither differing from zero, nor from the results for the respective groups in all sectors. These zero findings probably occurred because we did not observe total earnings, since tips—which are a substantial income source for many workers in this sector—are not recorded. Moreover, as labor turnover and unemployment spells are more common among accommodation and food sector workers, STW may not act as a negative signal and therefore post-STW earnings are not affected.

4.2.4 Robustness checks

Breaking the analysis down by main economic sectors in the robustness checks of our results did not reveal any influential cases that would drive our aggregate findings. The zero effects in accommodation and food services scaled down the overall effects in our models, leading to

conservative estimates. Results were also stable when including economic sectors as a covariate in the matching procedure.[6]

Moreover, quantile regression results were in line with the findings we derived from our main specification. In fact, our main results gave a good approximation of the average effect across the earnings distribution. In some cases, the estimated effects at the median (Q50) tended to be a little smaller than the estimated effect at the mean, while the estimated effects at the upper and lower quintiles (Q75, Q25) as well as at the upper and lower deciles (Q90, Q10) tended to be greater. This suggests an inverted U-shaped effect across the earnings distribution where the upper and the lower quantiles bore larger earnings losses (see Table A.27 and A.28 in appendix A).

5. Conclusion

In this study, we analyzed whether short-time work (STW), a job retention program that was heavily used during the COVID-19 pandemic in Austria, had any lasting negative earnings effects after workers returned to regular employment. Employing a dynamic difference-in-differences design (DiD) for several groups of workers defined by degree of STW exposure, gender, and employment relation (blue- versus white-collar contracts), we observed lasting earnings losses that persisted beyond the actual STW participation period. First, we found that these earnings losses depended on the extent of STW exposure, with greater negative effects especially in the case of long-term or recurring STW spells.

Among white-collar workers, earnings losses are most pronounced for those who experienced STW in 2020 and (again) in 2021, or whose STW spells totaled up to half a year in total or more. Projected annual earnings for 2022, i.e., when these women and men have resumed regular employment, are about 1500 Euro lower than for their colleagues with similar profiles who remained in regular

[6] Balance in pre-STW earnings trajectory was somewhat weaker when including economic sectors in the matching, but effects estimates essentially remained unchanged.

employment throughout the pandemic. This loss is considerably more important for women, as it constitutes a higher proportion of their annual income. In absolute numbers, earnings losses increase to up to 3000 Euro on average for workers who were in STW for a full year or longer.

Among blue-collar workers, post-STW earnings losses are generally smaller than among white-collar workers. This is tentatively good news for earnings inequality, since blue-collar workers' earnings are on average substantially lower than those of white-collar workers. However, male blue-collar workers who experienced STW for more than one year throughout the pandemic were found to be the group that suffered the largest earnings losses in relative terms. This group—albeit not a large one—fared much worse after resuming regular employment, which should be of policy concern when evaluating STW use.

The finding of substantial and enduring earnings losses among specific worker groups aligns with human capital explanations, which emphasize the limited accumulation of skills and skills obsolescence during STW. It also supports our hypothesis that the magnitude of earnings losses varies according to STW exposure duration, with longer periods resulting in larger post-STW earnings gaps. We believe that the primary factors contributing to lasting earnings losses among all groups who remained with their pre-STW employers are reductions in working hours (including overtime), fewer opportunities for promotion, and lower wage increases during and after STW compared to workers who did not experience STW.

These factors may influence different groups to varying degrees, which may be related to the observed effect heterogeneity according to employment relation and gender. The persistence of earnings losses among men in blue-collar jobs, even after STW periods of at least three months, may reflect a reduction in overtime hours upon returning to regular employment. For female blue-collar workers, this mechanism may be less applicable since they typically engage in part-time work, where overtime compensation is less prevalent. Regarding white-collar workers, our analysis indicates similar patterns among men and women, with women appearing to be slightly more affected by

STW than men. This potentially suggests more significant post-STW working-hour reductions among women in white-collar jobs. Ultimately, women in white-collar positions may face a more substantial impact from forgoing promotions and wage increases, possibly due to the prevalence of part-time work where further reductions in working hours during STW hinder career advancement. While further research is needed to delve into these mechanisms, we posit that job-specific differences in the significance of particular earnings components are pivotal. Overtime pay appears to play a more critical role in blue-collar jobs, while promotions hold greater importance among white-collar workers. These distinctions appear to be closely intertwined with systematic differences in working time arrangements across genders, where full-time male blue-collar workers are particularly affected by the loss of overtime hours, and part-time female white-collar workers may suffer more from missed opportunities for promotions.

Workers who changed employers during or after STW differ from those who stayed with their original firms. While we initially hypothesized that some may benefit from job changes, our findings indicate that, overall, short-time workers who made employer changes during or following STW experienced greater earnings losses than those who remained. This trend is particularly pronounced for individuals who underwent STW at the onset of the pandemic for relatively short durations. Remarkably, aside from women in blue-collar jobs who were in STW exclusively in 2020 for less than six months, workers suffered lasting earnings losses that were twice as large as their counterparts with similar short STW spells who remained with their original (pre-STW) firm. This discrepancy may be attributed to the increased unemployment risk associated with changing employers. Interestingly, there was no significant difference in earnings outcomes between those who stayed and those who switched firms following longer STW spells of over six months. Yet, among white-collar workers, those with very long STW spells exceeding one year who subsequently changed employers seem to have fared better than those who remained with their original firm.

Our results have implications for the growing income inequality. Certain worker groups with relatively low initial earnings are particularly affected by lasting earnings scars from STW—specifically women in white-collar jobs and men in blue-collar jobs. Given the size of these groups and their vulnerability, it is crucial to closely monitor their future earnings trajectories. Additionally, examining other labor market outcomes, particularly unemployment risks, would provide further insights into the broader implications of these findings.

There are some limitations when interpreting our findings. Workers who experienced STW in 2022 had to be excluded from the analysis because we used 2022 earnings as the post-STW outcome measure. Importantly, these excluded cases mostly involved individuals with unusually long STW spells. Therefore, if anything, this exclusion likely renders our estimates conservative, as the lasting earnings losses from these excluded cases are probably larger on average than what we observed in our findings. Additionally, we lack information on specific earnings components, such as tips, which constitute a substantial income source for workers in the service sectors. Again, excluding tips could make our estimates more conservative, especially if post-STW working hours are not fully restored. Similarly, compensation for informal working hours remains unknown. However, Austria's comprehensive implementation of mandatory cash registers may make informal work arrangements less relevant, leaving companies with limited flexibility to facilitate informal working hours. Another potential limitation is that the earnings measure used to compare earnings trajectories across different groups is top-coded. However, the results from quantile regression analyses indicate that this does not bias the findings. Moreover, the results are robust to several alternative specifications. While these limitations should be considered, the study provides valuable insights into the relationship between STW and post-STW earnings trajectories. The exclusion of certain cases and the use of top-coded earnings do not significantly undermine the overall findings and conclusions of the study.

We believe that the findings can generalized beyond the Austrian case, since many European countries introduced STW schemes during the pandemic. While these schemes differ in terms of scope, maximum duration, and the level of wage replacement—with the Austrian regulations being among the more comprehensive and generous ones—comparative studies show strong overlaps in STW schemes across countries (cf. Corti et al., 2023). Hence, we assume that the Austrian findings will be applicable to other countries, especially those who both enacted STW regimes and also feature similar institutional contexts; for example, countries that represent the continental European labor market and welfare regime like Germany, France, and the Benelux countries. However, further research on individual countries or comparative studies are needed to verify this assumption and to test for potential differences between specific regulatory and economic contexts.

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6. References

Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2020). Inequality in the impact of the coronavirus shock: Evidence from real time surveys. *Journal of Public Economics*, *189*, 104245. https://doi.org/10.1016/j.jpubeco.2020.104245

Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2022). Work that can be done from home: Evidence on variation within and across occupations and industries. *Labour Economics*, *74*, 102083. https://doi.org/10.1016/j.labeco.2021.102083

Adermon, A., Laun, L., Lind, P., Olsson, M., Sauermann, J., & Sjögren, A. (2022). *Earnings Losses and the Role of the Welfare State During the COVID-19 Pandemic: Evidence from Sweden* (SSRN Scholarly Paper 4268770). https://doi.org/10.2139/ssrn.4268770

Albanesi, S., & Kim, J. (2021). Effects of the COVID-19 Recession on the US Labor Market: Occupation, Family, and Gender. *Journal of Economic Perspectives*, *35*(3), 3–24. https://doi.org/10.1257/jep.35.3.3

Almeida, V., Barrios, S., Christl, M., De Poli, S., Tumino, A., & van der Wielen, W. (2021). The impact of COVID-19 on households´ income in the EU. *The Journal of Economic Inequality*, *19*(3), 413–431. https://doi.org/10.1007/s10888-021-09485-8

AMS - BMAW. (2023). *Arbeitsmarktdatenbank (AMDB)—Tabellenbeschreibung UNI-Status*. https://arbeitsmarktdatenbank.at/docs/Beschreibung_AM-Datenbank-Tabellen%20Uni_Status.pdf

Andersson, F. W., Gullberg Brännstrom, S., & Mörtvik, R. (2018). Long-term scarring effect of neither working nor studying. *International Journal of Manpower*, *39*(2), 190–204. https://doi.org/10.1108/IJM-12-2015-0226

Arulampalam, W., Gregg, P., & Gregory, M. (2001). Unemployment Scarring. *The Economic Journal*, *111*(475), F577–F584. https://doi.org/10.1111/1468-0297.00663

Bauer, T., & Zimmermann, K. F. (1999). Overtime Work and Overtime Compensation in Germany. *Scottish Journal of Political Economy*, *46*(4), 419–436. https://doi.org/10.1111/1467-9485.00141

Becker, G. S. (1995). *The economics of discrimination* (2. ed., 6). Univ. of Chicago Press.

Bell, B. D., Bloom, N., & Blundell, J. (2021). *This Time is Not so Different: Income Dynamics During the COVID-19 Recession* (Working Paper 28871). National Bureau of Economic Research. https://doi.org/10.3386/w28871

Bergé, L. (2018). Efficient estimation of maximum likelihood models with multiple fixed-effects: The R package FENmlm. *CREA Discussion Papers*, *13*.

Blundell, R., Costa Dias, M., Cribb, J., Joyce, R., Waters, T., Wernham, T., & Xu, X. (2022). Inequality and the COVID-19 Crisis in the United Kingdom. *Annual Review of Economics*, *14*(1), 607–636. https://doi.org/10.1146/annurev-economics-051520-030252

Cahuc, P., Kramarz, F., & Nevoux, S. (2021). The Heterogeneous Impact of Short-Time Work: From Saved Jobs to Windfall Effects. In *CEPR Discussion Papers* (16168; CEPR Discussion Papers). C.E.P.R. Discussion Papers. https://ideas.repec.org/p/cpr/ceprdp/16168.html

Card, D. (1999). The Causal Effect of Education on Earnings. In *Handbook of Labor Economics* (Vol. 3, pp. 1801–1863). Elsevier. https://doi.org/10.1016/S1573-4463(99)03011-4

Carrillo-Tudela, C., Clymo, A., Comunello, C., Jackle, A., Visschers, L., & Zentler-Munro, D. (2022). *Search and Reallocation in the COVID-19 Pandemic: Evidence from the UK* (SSRN Scholarly Paper ID 4069858). Social Science Research Network. https://papers.ssrn.com/abstract=4069858

Cassells, R., & Duncan, A. (2020). JobKeeper: The efficacy of Australia's first short-time wage subsidy. *Australian Journal of Labour Economics*. https://search.informit.org/doi/abs/10.3316/INFORMIT.468936006281571

Cook, R., & Grimshaw, D. (2021). A gendered lens on COVID-19 employment and social policies in Europe. *European Societies*, *23*(sup1), S215–S227. https://doi.org/10.1080/14616696.2020.1822538

Corti, F., Ounnas, A., & De La Ossa, T. R. (2023). *Job retention schemes between the Great Recession and the COVID-19 crises* [Tech. rep.]. CEPS. https://www.ceps.eu/ceps-publications/job-retention-schemes-between-the-great-recession-and-the-covid-19-crises/

de Moura, G. R., Abrams, D., Retter, C., Gunnarsdottir, S., & Ando, K. (2009). Identification as an organizational anchor: How identification and job satisfaction combine to predict turnover intention. *European Journal of Social Psychology*, *39*(4), 540–557. https://doi.org/10.1002/ejsp.553

Demirgüç-Kunt, A., Lokshin, M., & Torre, I. (2022). *Protect Incomes or Protect Jobs? The Role of Social Policies in Post-Pandemic Recovery* (SSRN Scholarly Paper 4127791). https://doi.org/10.2139/ssrn.4127791

Dhungel, B., Murakami, T., Wada, K., & Gilmour, S. (2021). Mortality risks among blue- and white-collar workers: A time series study among Japanese men aged 25-64 years from 1980 to 2015. *Journal of Occupational Health*, *63*(1). https://doi.org/10.1002/1348-9585.12215

Dias da Silva, A., Dossche, M., Dreher, F., Foroni, C., & Koester, G. (2020). Short-time work schemes and their effects on wages and disposable income. In European Central Bank (Ed.), *Economic and monetary developments*. European Central Bank. https://www.ecb.europa.eu/pub/economic-bulletin/html/eb202004.en.html

Drahokoupil, J., & Müller, T. (2021). Job retention schemes in Europe: A lifeline during the Covid-19 pandemic. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3931230

Edin, P.-A., & Gustavsson, M. (2008). Time Out of Work and Skill Depreciation. *ILR Review*, *61*(2), 163–180. https://doi.org/10.1177/001979390806100202

Eichhorst, W., Marx, P., & Rinne, U. (2020). Manoeuvring Through the Crisis: Labour Market and Social Policies During the COVID-19 Pandemic. *Intereconomics*, *55*(6), 375–380. https://doi.org/10.1007/s10272-020-0937-6

Fana, M., Torrejón Pérez, S., & Fernández-Macías, E. (2020). Employment impact of Covid-19 crisis: From short term effects to long terms prospects. *Journal of Industrial and Business Economics*, *47*(3), 391–410. https://doi.org/10.1007/s40812-020-00168-5

Farber, H. S. (1999). Mobility and stability: The dynamics of job change in labor markets. In *Handbook of Labor Economics* (Vol. 3, pp. 2439–2483). Elsevier. https://doi.org/10.1016/S1573-4463(99)30023-7

Fritzer, F., Prammer, D., Salish, M., Schneider, M., & Sellner, R. (2022). Strong economic rebound amid high uncertainty about impact of Omicron variant. Economic outlook for Austria from

2021 to 2024 (December 2021). *Monetary Policy & the Economy*, *Q4/21*. https://ideas.repec.org//a/onb/oenbmp/y2022iq4-21b5.html

Gasior, K., Jara, H. X., & Makovec, M. (2023). *Assessing the effectiveness of social protection measures in mitigating COVID-19-related income shocks in the European Union* (Working Paper 109). International Inequalities Institute The London School of Economics and Political Science.

Goldthorpe, J. H. (2007). *On sociology: Vol. Two: Illustration and Retrospect* (2nd ed). Stanford university press.

Grzegorczyk, M., & Wolff, G. B. (2020). The scarring effect of COVID-19: Youth unemployment in Europe. *Bruegel - European Macroeconomics & Governance*. https://www.bruegel.org/2020/11/the-scarring-effect-of-covid-19-youth-unemployment-in-europe/

Hanzl, L., & Rehm, M. (2023). Less Work, More Labor: School Closures and Work Hours During the COVID-19 Pandemic in Austria. *Feminist Economics*, *0*(0), 1–33. https://doi.org/10.1080/13545701.2023.2251972

Ho, D. E., Imai, K., King, G., & Stuart, E. A. (2011). MatchIt: Nonparametric Preprocessing for Parametric Causal Inference. *Journal of Statistical Software*, *42*(8), 1–28. https://doi.org/10.18637/jss.v042.i08

Huemer, U., Kogler, M., & Mahringer, H. (2021). *Kurzarbeit als Kriseninstrument in der COVID-19-Pandemie. Kurzexpertise zum Vergleich der Modelle ausgewählter europäischer Länder* (p. 21). Österreichisches Institut für Wirtschaftsforschung. https://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=67020&mime_type=application/pdf

Iacus, S. M., King, G., & Porro, G. (2012). Causal Inference without Balance Checking: Coarsened Exact Matching. *Political Analysis*, *20*(1), 1–24. https://doi.org/10.1093/pan/mpr013

Imai, K., & Kim, I. S. (2021). On the Use of Two-Way Fixed Effects Regression Models for Causal Inference with Panel Data. *Political Analysis*, *29*(3), 405–415. https://doi.org/10.1017/pan.2020.33

International Monetary Fund. (2021). Austria: Selected Issues. *IMF Staff Country Reports*, *2021*(204), 1. https://doi.org/10.5089/9781513596655.002

Irlacher, M., & Koch, M. (2021). Working from Home, Wages, and Regional Inequality in the Light of COVID-19: *Jahrbücher Für Nationalökonomie Und Statistik*, *241*(3), 373–404. https://doi.org/10.1515/jbnst-2020-0030

Kim, A. T., Erickson, M., Zhang, Y., & Kim, C. (2022). Who is the "She" in the Pandemic "She-Cession"? Variation in COVID-19 Labor Market Outcomes by Gender and Family Status. *Population Research and Policy Review*, *41*(3), 1325–1358. https://doi.org/10.1007/s11113-021-09693-0

Koenker, R. (2022). *quantreg: Quantile Regression*. https://CRAN.R-project.org/package=quantreg

Koenker, R., & Bassett, G. (1978). Regression Quantiles. *Econometrica*, *46*(1), 33–50. https://doi.org/10.2307/1913643

Kristal, T., & Yaish, M. (2020). Does the coronavirus pandemic level the gender inequality curve? (It doesn't). *Research in Social Stratification and Mobility*, *68*, 100520. https://doi.org/10.1016/j.rssm.2020.100520

Laimer, H. G., Peer, M., & Wieser, L. (2022). *Fehl- und Abwesenheitszeiten in der betrieblichen Praxis*. Manz Verlag. https://shop.lexisnexis.at/fehl-und-abwesenheitszeiten-in-der-betrieblichen-praxis-9783214033729.html

Lam, W. R., & Solovyeva, A. (2023). *How Effective were Job-Retention Schemes during the COVID-19 Pandemic? A Microsimulation Approach for European Countries*. IMF Working Paper.

Meriküll, J., & Paulus, A. (2024). Were jobs saved at the cost of productivity in the COVID-19 crisis? *European Economic Review*, *161*, 104618. https://doi.org/10.1016/j.euroecorev.2023.104618

Möhring, K., Naumann, E., Reifenscheid, M., Wenz, A., Rettig, T., Krieger, U., Friedel, S., Finkel, M., Cornesse, C., & Blom, A. G. (2021). The COVID-19 pandemic and subjective well-being: Longitudinal evidence on satisfaction with work and family. *European Societies*, *23*(sup1), S601–S617. https://doi.org/10.1080/14616696.2020.1833066

Morgan, S. L., & Winship, C. (2015). *Counterfactuals and causal inference: Methods and principles for social research* (Second Edition). Cambridge University Press.

Mühlböck, M., Titelbach, G., Brunner, S., & Vogtenhuber, S. (2023). *Analyse des Fachkräftebedarfs in Österreich anhand ökonomischer Knappheitsindikatoren* [Research Report]. https://irihs.ihs.ac.at/id/eprint/6600/

Müller, T., Schulten, T., & Drahokoupil, J. (2022). Job retention schemes in Europe during the COVID-19 pandemic – different shapes and sizes and the role of collective bargaining. *Transfer: European Review of Labour and Research*, 102425892210898. https://doi.org/10.1177/10242589221089808

Purkayastha, D., Vanroelen, C., Bircan, T., Vantyghem, M. A., & Gantelet Adsera, C. (2021). *Work, Health and COVID-19: A Literature Review* (SSRN Scholarly Paper 3856915). https://doi.org/10.2139/ssrn.3856915

R Core Team. (2018). *A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Rechnungshof Österreich. (2020). *Allgemeiner Einkommensbericht 2020. Bericht des Rechnungshofs* (Reihe Einkommen 2020/1; p. 236). https://www.rechnungshof.gv.at/rh/home/home_1/home_1/Allgemeiner_Einkommensbericht_2020.pdf

Reichelt, M., Makovi, K., & Sargsyan, A. (2021). The impact of COVID-19 on gender inequality in the labor market and gender-role attitudes. *European Societies*, *23*(sup1), S228–S245. https://doi.org/10.1080/14616696.2020.1823010

Rüttenauer, T., & Ludwig, V. (2020). Fixed Effects Individual Slopes: Accounting and Testing for Heterogeneous Effects in Panel Data or Other Multilevel Models. *Sociological Methods & Research*, 004912412092621. https://doi.org/10.1177/0049124120926211

Sauermann, J. (2016). Performance measures and worker productivity. *IZA World of Labor*. https://doi.org/10.15185/izawol.260

Schmitt, L., & Auspurg, K. (2022). A Stall Only on the Surface? Working Hours and the Persistence of the Gender Wage Gap in Western Germany 1985–2014. *European Sociological Review*, *38*(5), 754–769. https://doi.org/10.1093/esr/jcac001

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, *87*(3), 355–374. JSTOR. https://doi.org/10.2307/1882010

Statistik Austria. (2021). *Unselbständig Beschäftige nach Wirtschaftsbereichen und -zweigen*. https://www.statistik.at/wcm/idc/idcplg?IdcService=GET_NATIVE_FILE&RevisionSelectionMethod=LatestReleased&dDocName=022636

Statistik Austria (Ed.). (2023). *Demographisches Jahrbuch 2022*. Kommissionsverlag "Verlag Österreich." https://www.statistik.at/en/services/tools/services/publikationen/detail/1703

Steiber, N. (2021a). The impact of the COVID-19 pandemic on working conditions and job quality in Austria. *Work, Employment & Society Conference 2021*.

Steiber, N., Siegert, C., & Vogtenhuber, S. (2021). The impact of the COVID-19 pandemic on the employment situation and financial well-being of families with children in Austria: Evidence from the first ten months of the crisis. *Journal of Family Research*. https://doi.org/10.20377/jfr-721

Steiber, Nadia. (2021b). Die COVID-19 Gesundheits- und Arbeitsmarktkrise und ihre Auswirkungen auf die Bevölkerung. *Materialien zu Wirtschaft und Gesellschaft*, *211*, 116.

Tamesberger, D., & Theurl, S. (2021). *Design and Take-Up of Austria's Coronavirus Short-Time Work Model* (127; ICAE Working Paper Series, p. 33). JKU. https://www.jku.at/fileadmin/gruppen/108/ICAE_Working_Papers/wp127.pdf

Zhang, S. X., Chen, J., Afshar Jahanshahi, A., Alvarez-Risco, A., Dai, H., Li, J., & Patty-Tito, R. M. (2022). Succumbing to the COVID-19 Pandemic—Healthcare Workers Not Satisfied and Intend to Leave Their Jobs. *International Journal of Mental Health and Addiction*, *20*(2), 956–965. https://doi.org/10.1007/s11469-020-00418-6

Zweimüller, J., Winter-Ebmer, R., Lalive, R., Kuhn, A., Wuellrich, J.-P., Ruf, O., & Büchi, S. (2009). Austrian Social Security Database. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1399350

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Highlights

- Earnings losses among short-time workers persist beyond the actual participation
- Lasting earnings losses are greater in the case of long-term short-time work spells
- Losses tend to be more pronounced among white-collar workers
- Workers who switched firms after short-time work experienced greater losses
- Reasons involve reduced working hours and fewer promotions and wage increases