

# Furlough unemployment

## Appendices

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### Contents

<b>A Firm-level furlough events: those chosen to be furloughed vs. those not</b>	<b>2</b>
<b>B The effects of furloughs on net income</b>	<b>8</b>
<b>C Changes to furloughing in the Nordics</b>	<b>11</b>
<b>D A simulated furlough experience rating</b>	<b>13</b>
<b>E List of datasets used</b>	<b>15</b>
<b>F Employer identification</b>	<b>16</b>
<b>G Measuring furlough unemployment in Finland</b>	<b>18</b>
<b>H Definitions and additional descriptives: furlough spells</b>	<b>19</b>
<b>I Partial unemployment</b>	<b>28</b>
<b>J Medium- and long-term outcomes: year 2011 and additional groups</b>	<b>33</b>
<b>K Daily furlough follow-ups by age, industry and profession</b>	<b>39</b>
<b>L Teacher summer unemployment</b>	<b>42</b>
<b>M Fixed-term contracts vs. furloughs</b>	<b>44</b>
<b>N Furloughs by industry: coarsening and additional descriptives</b>	<b>46</b>
<b>O Definitions and additional descriptives: the often furloughed</b>	<b>55</b>
<b>P Definitions and additional descriptives: employer classification</b>	<b>69</b>

<b>Q Matched individuals: the matching procedure and additional descriptives</b>	<b>76</b>
<b>R Matched firms: the matching procedure and additional descriptives</b>	<b>82</b>
<b>S Evolution of UI financing</b>	<b>87</b>
<b>T Part-time, fixed-term and open-ended employment</b>	<b>91</b>

## Appendix A Firm-level furlough events: those chosen to be furloughed vs. those not

When employers furlough, they typically do not furlough everyone. Figure 1 plots a heatmap of the furloughing intensity, defined as the share of the headcount furloughed during an event.

Events were defined by windows of up to six months at the employer level, usually three months before and after the furlough. Each event has at least one furlough. The reason for the long timeframe is that furloughs may be accompanied by dismissals. These dismissals may turn up in the unemployment records with considerable delay, because the dismissal triggers a paid notice period, which can last several months. For computational reasons, a random half of all events between 2004 and 2017 were selected for further analysis.

Everyone who was employed around the event was classified as furloughed, dismissed or experiencing neither, based on the benefit and jobseeking data. For each event, the peak number of new furloughs per event defined time 0; thus, some of the furloughed or dismissed may experience the suspension or separation at a time between  $-3$  and  $+3$  months. After this, a status was defined for each (day, individual, originating event) triplet for five years before and after the event.

Table 1 lists some characteristics by the classified experience. Fitting a simple binomial logit model to the data suggests that tenure and profession are the variables most highly associated with the probability of being furloughed. Once these variables are taken into account, differences in wage or family status have much less predictive power.

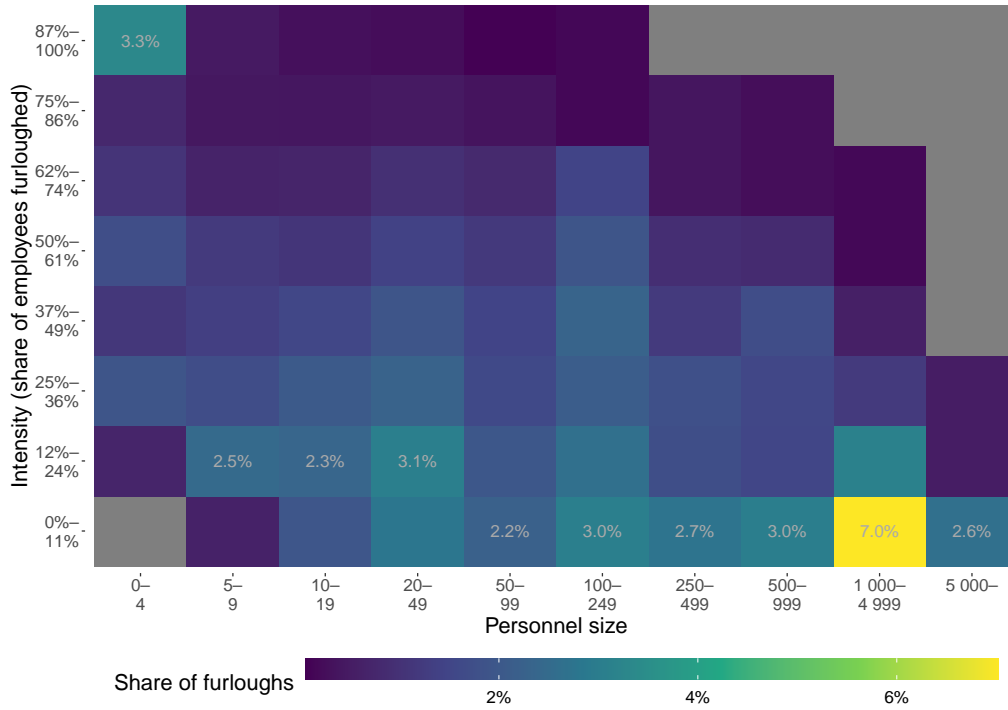
One potential explanation is that furloughs are targeted at individuals who appear most strongly attached to the employer and are less likely to switch jobs during the furlough. While some collective agreements<sup>1</sup> have provisions indicating that worker tenure and family size should be "taken into consideration" when choosing employees to be dismissed or furloughed, it is not clear these provisions have much effect.

Those furloughed and those experiencing no furlough or dismissals tend to stay at the

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<sup>1</sup>For example, the framework agreement *Irtisanomissuojasopimus (TT-SAK)* from 2001, 17 §.

Figure 1: Distribution of furloughing intensity



The percentage numbers are plotted for the most common intensity by personnel size class.

originating employer at roughly similar rates. Figures 2 and 3 plots the share who are employed at the event-time employer or a different employer at a given time respectively.

Figures 4 and 5 show the evolution of wages based on whether the person experienced a furlough, dismissal or neither. The first figure plots the wage conditional on continuing to work, and demonstrates that those furloughed tend to collect reasonably stable wages over the long run, while those who dismissed experience are characterized by sharply dropping wages (collective dismissals), strong fluctuations (fixed-term contract expirations), or had lower wages to start with (other UI events). The second figure combines the wage level effect and employment effect, as it plots the unconditional wage.

Figures 6 and 7 demonstrate the share of those experiencing another furlough or dismissal at a given time. Those chosen to be furloughed often experience new furloughs, while those whose employment continued uninterrupted only do so rarely. In both groups, few end up collectively dismissed later.<sup>2</sup>

<sup>2</sup>While the figure for dismissals tracks persons in a collective dismissal-based spell *at a time*, such spells tend to be very long, making the figures also informative about future cumulative incidence.

Table 1: Characteristics by group at firm-level furloughing events.

Variable	Furloughed	UI, collective dismissal	No event	UI, other	UI, from fixed-term
Monthly wage	3,582€ (1,510€)	4,300€ (1,933€)	3,205€ (1,804€)	3,437€ (1,844€)	3,507€ (1,658€)
Age	44.0 (11.0)	46.2 (12.1)	41.0 (12.8)	43.9 (11.6)	41.0 (11.8)
Tenure with employer, years	3.4 (1.6)	3.1 (1.7)	2.7 (2.0)	2.0 (1.7)	1.5 (1.3)
Male	74.6%	74.3%	68.9%	55.4%	64.3%
Has children	36.0%	29.6%	35.3%	32.7%	33.7%
N	451,970	17,069	3,102,574	56,108	46,132
Individuals	257,047	16,686	1,178,019	48,502	35,926
Employers	43,158	5,062	40,178	11,645	8,424
Events	101,574	7,181	95,302	20,599	15,002

Figure 2: Share employed with the event-time employer by group.

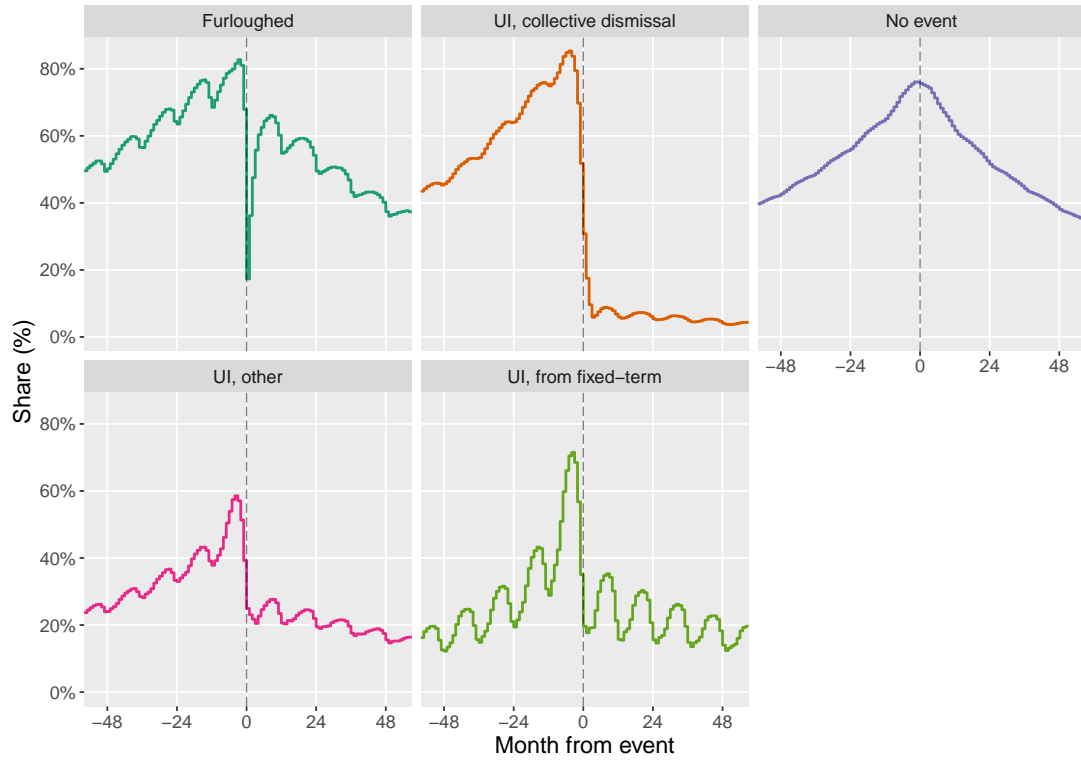


Figure 3: Share employed with a different employer by group.

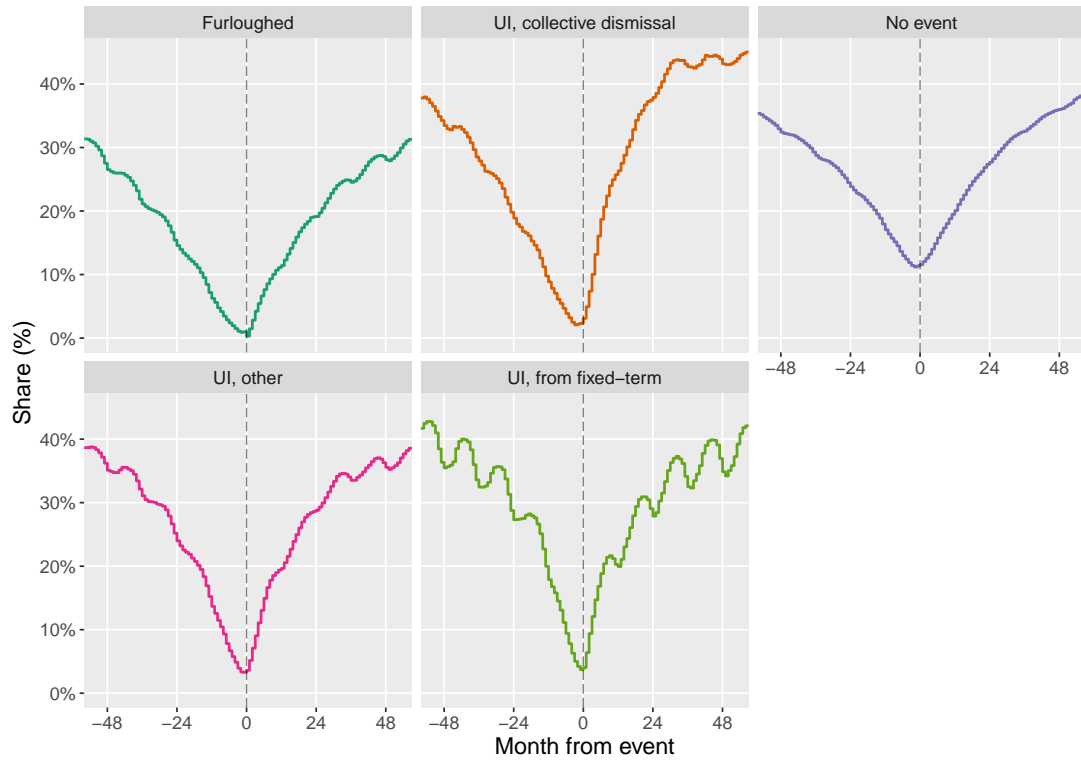
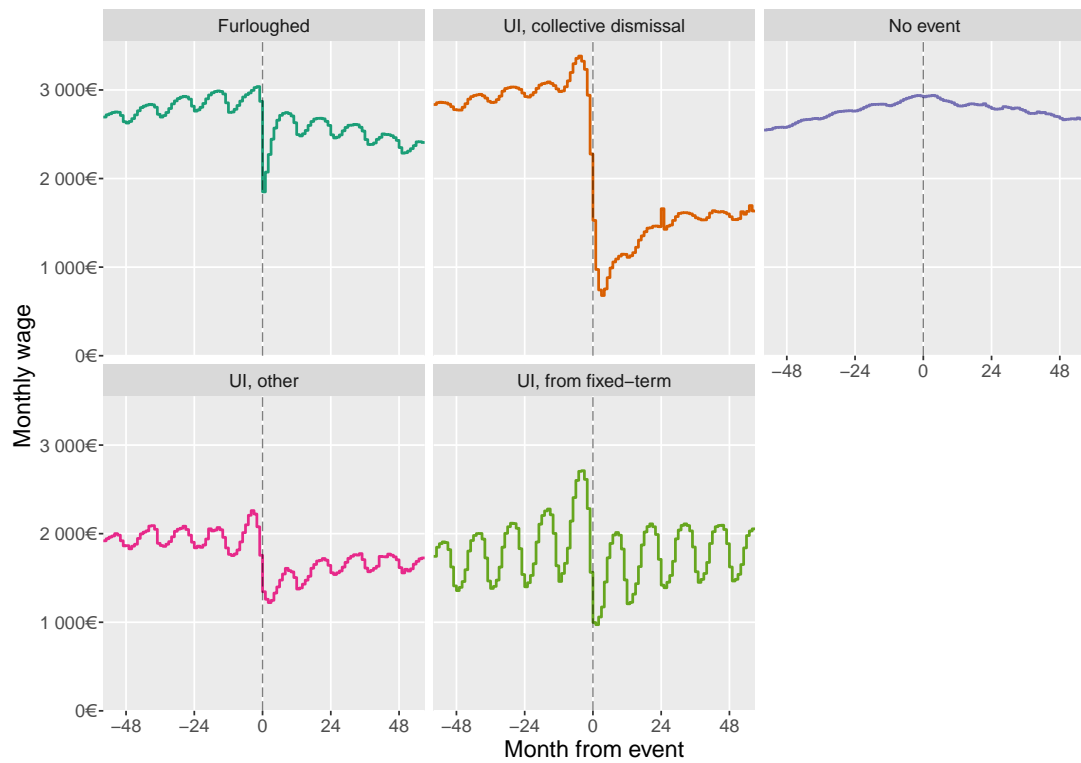


Figure 4: Wages for different groups before and after employer-level furloughing events.



Persons with no wages count as 0.

Figure 5: Wages, conditional to being employed, before and after events.

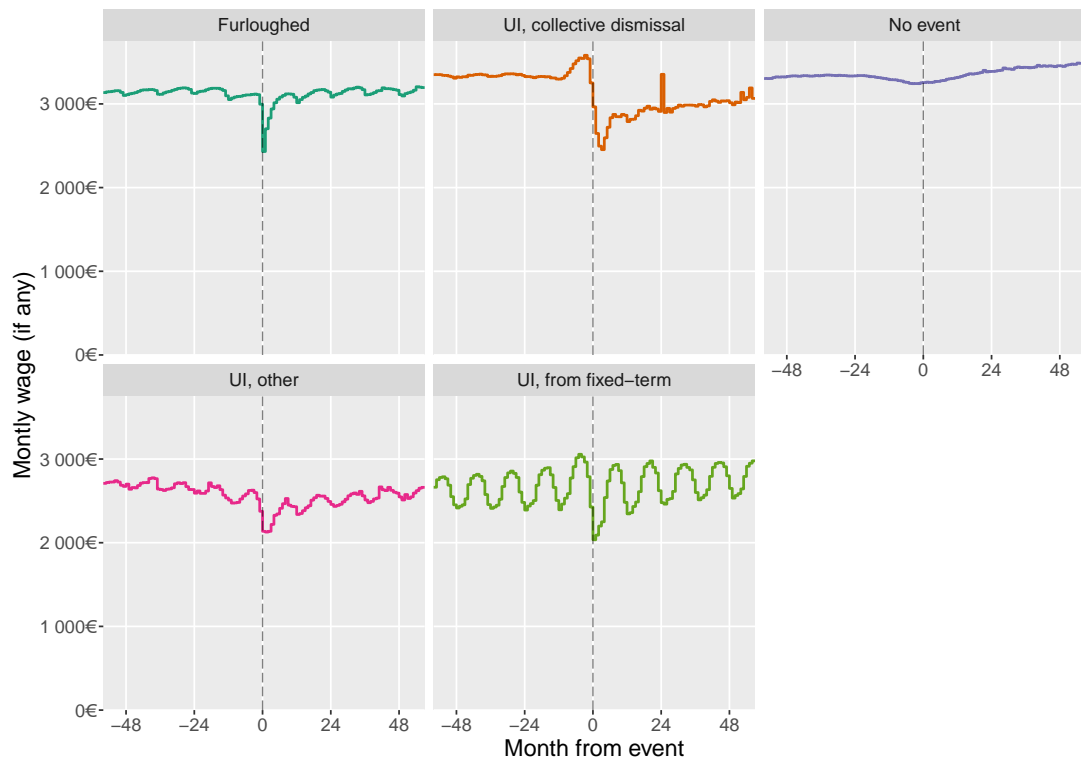


Figure 6: Furloughs spells distinct from the originating spell at event time.

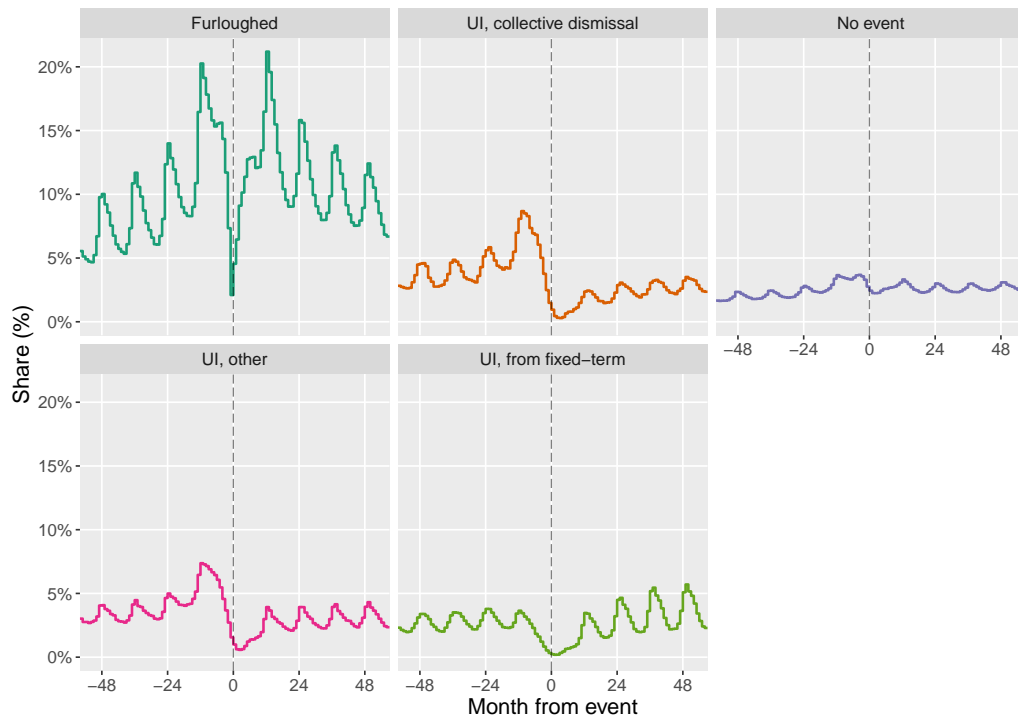
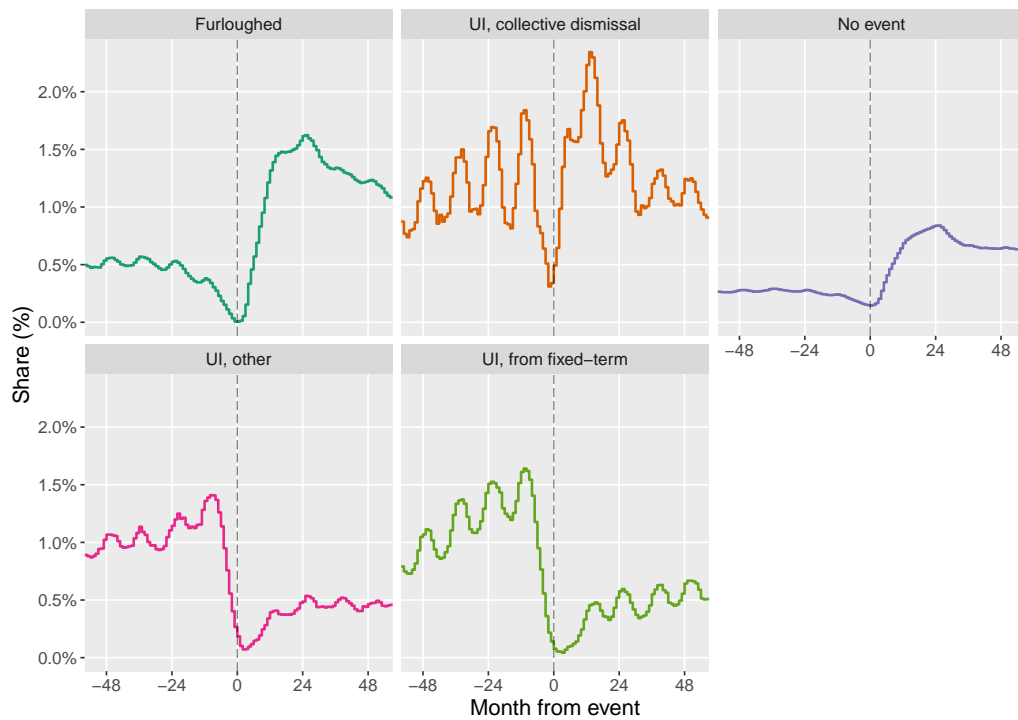


Figure 7: Collective dismissal spells distinct from the originating spell at event time. A break of 30 days between benefit base periods ends a spell.



## Appendix B The effects of furloughs on net income

The net effect of a furlough on net incomes depend on wages, UI, taxes and other transfers. Besides unemployment insurance, households may be eligible to additional mean-tested benefits, such as housing and social assistance. Additionally, the fall in gross wages also affects the tax rate, as the tax bracket is progressive and based on annual income. General income taxation also differs for UI and wages, while various mandatory insurance premiums that apply to wages are not levied on UI. Finally, the first 1–1.5 weeks of a furlough usually yield no benefits due to a short waiting period for new UI spells. For these reasons, the actual net effect of furloughs on incomes depends on the duration of the furlough non-linearly.

For this analysis, a specific sample of furloughs were selected. The sample consists of 48,016 year-pairs for 31,420 individuals who were employed full-time for a full base year  $t \in [1999, 2019]$ , experienced a furlough at year  $t + 1$ , and were either furloughed or employed for the entire year  $t + 1$ . The base population was restricted to persons born in 1960–1976, the balanced panel of individuals followed in the main text. Persons with other sources of income (property or business income, sickness allowance, study grants, pensions, or parental benefits) in either year were excluded. Only cases where some benefits are collected are included; furloughs that do not extend beyond the waiting period are thus excluded.

Figure 8 shows the average change in income from  $t$  to  $t + 1$  by the duration of furlough and grouped by category (wages, taxes, UI and other transfers). In this case, the weeks on the horizontal axis include any waiting periods. For short furloughs, changes in taxes are quite important in shielding worker incomes, while UI paid can be lower than the nominal replacement rate. Generally, the net replacement rate increases as a function of the furlough duration, from about 60% at durations around 4 weeks to about 70% at durations around 12 weeks. Figure 9 shows the interquartile distribution of net income changes in absolute terms.

The week brackets were chosen so that they would correspond to 11 roughly equal-sized classes. Figure 10 illustrates the distribution of the FTE weeks that the furloughs lasted within this sample.



Figure 8: The relative effect of a furlough on net annual income, by duration of furlough and source of change.

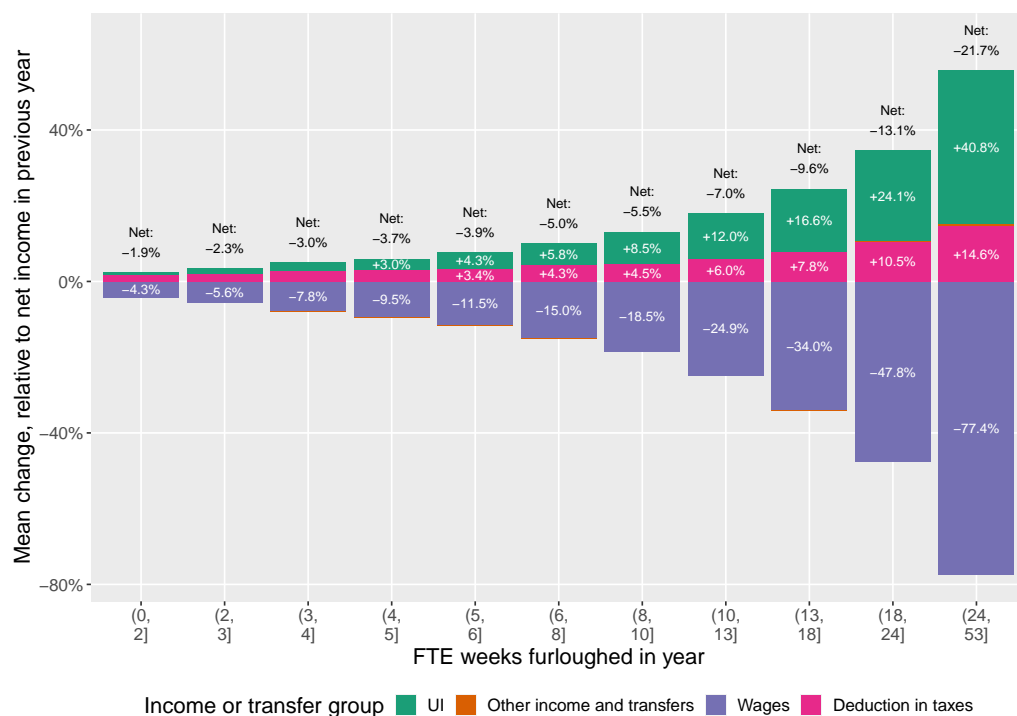


Figure 9: The interquartile range of empirical changes in net annual income, by duration of furlough.

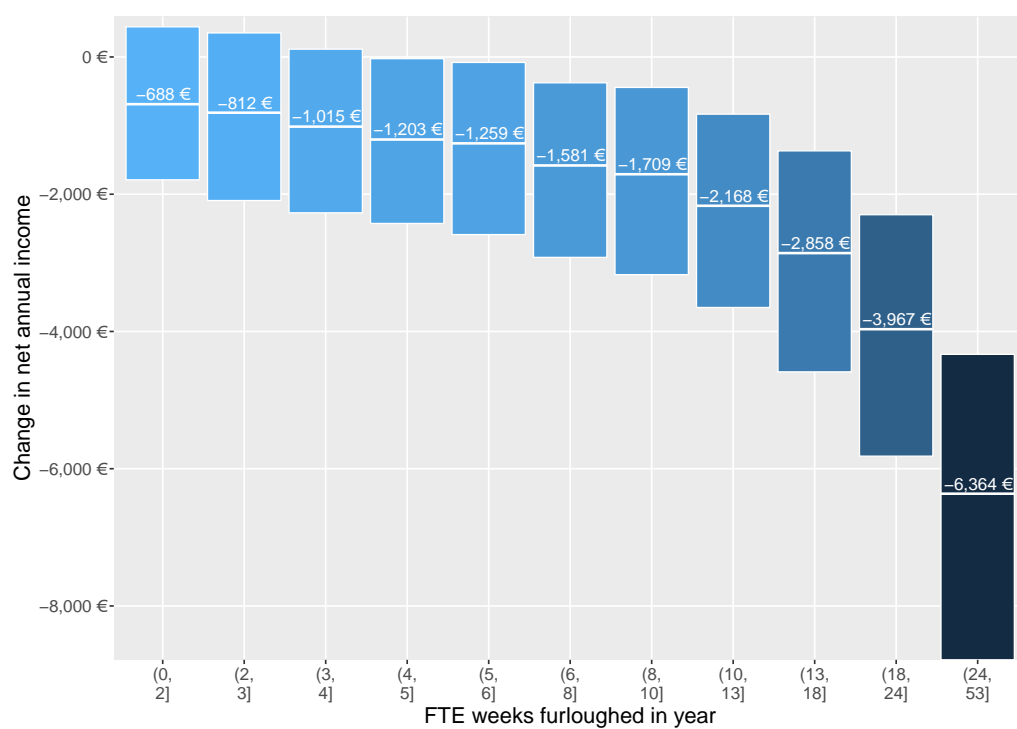
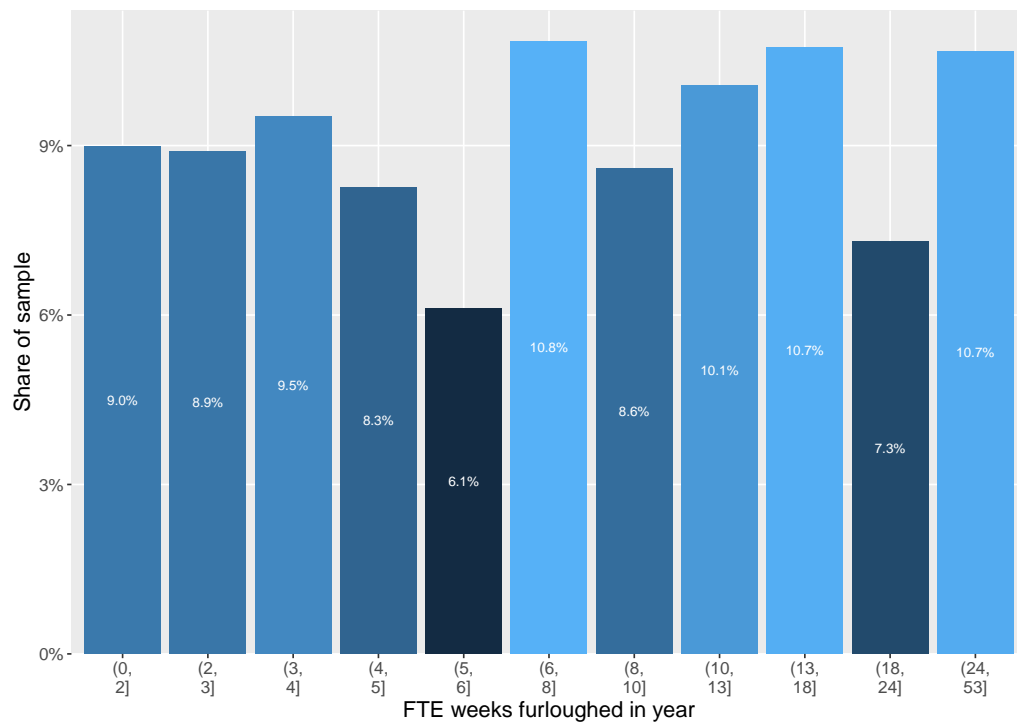


Figure 10: Shares by annual furlough weeks



## Appendix C Changes to furloughing in the Nordics

Furloughing (*permittering*) were used in Sweden since a central collective agreement in 1938. In Finland, furloughs were recognized by some agreements more than half a century ago; the ability to furlough employers became explicitly regulated by law in 1970, extending it to all employers. In Norway, according to Bredesen (2021), furloughing practices were established in case law by 1938 at the latest, and entered legislation in 1947.

The depression in 1990's affected all Nordic countries, although it was exceptionally severe in Finland. From 1988 to 1995, unemployment rates changed from 4.2% to 17.2% in Finland, from 3.2% to 6.4% in Norway, and from 1.8% to 9.0% in Sweden. Each country eventually responded to the crisis by tightening the rules for furloughing.

Sweden ended up abolishing its old furlough scheme. In the financial crisis, new sectoral collective agreements allowed employers again to reduce working hours temporarily, but wages could not be lowered below 80%. A new short-time work scheme was enacted in 2014, which allows employers in financial difficulty to apply for state aid during deep recessions; this was the primary job retention scheme used during the COVID-19 pandemic.

As discussed in the main text, Finland enacted a weak form of UI tax experience rating. Additionally, the UI benefits for the first 3 weeks of furloughs were temporarily reduced in 1994–1996.

These measures of shifting some of the costs to both employers and employees were later abolished to make way for tripartite negotiations on UI funding. In 1999, an agreement between employers, employees and government shifted the entire burden of UI to be fully financed by employees, employers and unemployment funds, with no share coming from the government. It is noteworthy that the government explicitly justified its withdrawal from funding furlough costs on the basis that "the persons in question are not always genuinely available to the labour market as unemployed job seekers".<sup>3</sup> However, this change also severed the *individual* link between the costs, the furloughing employer, and furloughed employee, as furlough costs were (and are) financed by employees, employers and the funds collectively.

Norway went through a total of five different furloughing regimes over 1999–1994. The changes required firms to continue to pay wages for a initial period, and limited the maximum duration of furloughs that can be covered by UI, with maximums changing between 12 and 80 weeks. Røed and Nordberg (2003) study the effects of these changes. They find that recall rates by firms spiked just prior to UI exhaustion, and these spikes moved along with the maximum duration changes. This strongly suggests that these firms were both willing and able to continue to pay workers in the absence of the UI subsidy.

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<sup>3</sup>Government bill HE 64/1998, subsection 3.2.

Collective agreements continue to have a strong role in the Finnish furlough system. Approximately 80%<sup>4</sup> of workers are covered by collective agreements that have some provisions for furloughs, either directly or by an indirect link to framework agreements between the largest confederations of unions and employers. While many of the actual provisions simply repeat rules already set in the law, this also implies that in many cases, changes to the rules would have to be made to both legislation and the collective agreements to take widespread effect.

Some of the more important such provisions deal with postponing, suspending and canceling furloughs when the firm's situation changes. In a small number of industries, the agreements explicitly refer to furloughs due to "variation in labour demand typical to the industry", "lack of demand", "end of working season" or related terms.<sup>5</sup> Another set of agreements explicitly refers to furloughs due to weather conditions.

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<sup>4</sup>Author's calculations, based on a manual search of 168 generally applicable collective agreements; counts of employees covered by agreement are by Ahtiainen (2024).

<sup>5</sup>*Alalle tyypillinen työvoiman vaihtelu*, agreements Asfalttialan työehtosopimus; Huvi-, teema- ja elämyspuistoja koskeva tes; Lattianpäällystysalan työehtosopimus; Rakennusalan toimihenkilöiden työehtosopimus; *Työkauden päättyminen*, agreements Maalausalan työehtosopimus; Rakennusalan työehtosopimus; Vedeneristysalan työehtosopimus.

## Appendix D A simulated furlough experience rating

The Finnish experience rating experiment for furloughs in the 1990's set a fixed-rate tax for each new furlough, corresponding to two weeks' payments of the flat-rate UA. The fixed rate was not explicitly justified in the government proposal, but may have been set for either simplicity or to avoid incentivizing targeting furloughs at employees that are ineligible for UI.

A similar system was simulated for 1999–2021 against payments actually made. It was assumed that had such a system existed, the Employment Fund would have lowered the other UI tax rates in proportion to the proceeds from experience rating. Since micro-level data on employer payments was not available, the payments were first estimated from wages using the rules for each year separately; the estimates matched aggregate UI tax statistics with a mean difference of 0.1%. It was assumed that the extra tax would be levied on the year following the furlough, rather than immediately, to avoid having the tax itself add to the immediate financial stress of employers.

As the original fixed rate turned out to only cover a very small portion of costs, the fixed tax was doubled for the simulation. Even with this increase, on average less than a quarter of actual costs during furloughs would be covered according to the simulation.

Figure 11 shows the UI costs that would be covered under different regimes:

- Fixed rate and days: the baseline scenario
- Fixed rate and days, employers with wages: as baseline, but only employers who paid wages in the tax collection year included
- Detected employers: a purely technical scenario with full experience rating, but employer detection based on the Statistics Finland employment data. This scenario illustrates the degree of measurement error in identifying the employer.
- Duration limits only: durations of UI spells starting with a furlough censored at three years, otherwise full rating
- Fixed rate per day: no duration limit, but daily rate set at the flat-rate unemployment assistance levels
- True rate at fixed days: same duration limit as the baseline, but full rating per day

Figure 12 shows the overall distribution of simulated cumulative tax rate changes per employer. For most employers, the net change in the average UI tax rate would be less than 0.1 percentage points. For about half a dozen two-digit furlough-prone industries, the mean change would be between 0.4 and 0.6 percentage points; the within-industry standard deviations were between 1.0 and 1.5 percentage points.

Figure 11: Furlough UI costs covered under different simulated experience rating regimes

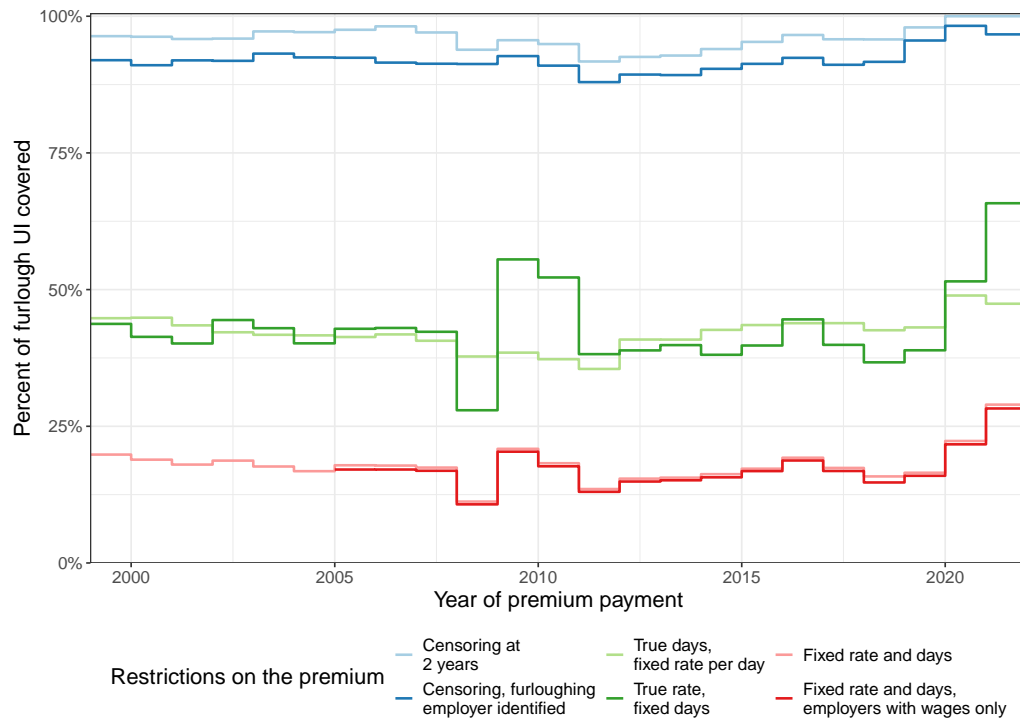
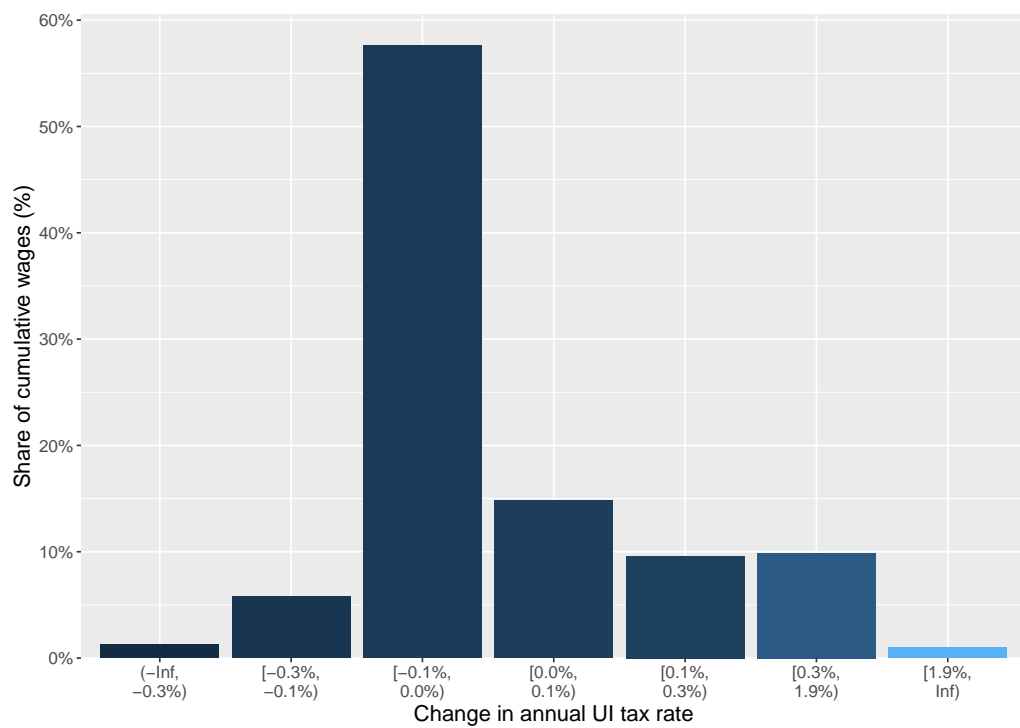


Figure 12: Distribution of simulated tax rate changes



## Appendix E List of datasets used

Table 2 complements the description of the data used in the main text with some additional details.

Table 2: Description of datasets

Dataset/source	Covers	Frequency	Time	Notes
UI benefits (Financial Security Institution)	Each payment of UI, and whether the payment was for furloughs; UI waiting periods	One day	1999–2021	
UA benefits (Social Security Institution)	Each payment of UA (labour market subsidy, basic unemployment allowance)	One day	2010–2021	
Jobseeking register (Ministry of Economic Affairs and Employment)	Registered jobseekers: reason for entering unemployment, preceding activity	Daily (when in register)	1991–2021	
FOLK Income (Statistics Finland)	Incomes: wages, business, property, wages and levies, practically all transfers	Annual	1987–2019	Used to estimate daily wages for (employer, employee) pairs without TAX_XPER data
FOLK period data: employment relationship (Statistics Finland)	Finnish employment contracts plus employer characteristics	Daily	1987–2019	
FOLK Employment (Statistics Finland)	Profession in main job per year	Annual	1987–2019	
FOLK Basic (Statistics Finland)	Demographic data, including birth year, marital status, number of children, foreign background, and place of residence	Daily	1987–2019	
FOLK Degree/Qualification (Statistics Finland)	Educational attainment	Varies (day, month, or year)	1987–2022	
FIRM_FSS (Statistics Finland)	Firm financial statement data, including short-term and long-term debt, liquid funds, turnover, profits, equity, financing costs, and taxes	Annual	1987–2019	Imputed data and data from the financial industries were not used
TAX_XPER (Statistics Finland)	Data on annual wages paid per employer-employee pair	Daily	1987–2019	Used to estimate daily wages
Incomes Register: wages (through Statistics Finland)	Wage earnings, employer IDs, profession	Payment period (usually monthly)	2019–04/2023	
Incomes Register: benefits (through Statistics Finland)	90% of benefits, taxes and disbursement on benefits; excludes social assistance and some pensions	Payment period	2021–04/2023	Used to approximate tails for unemployment spells that continued to 2022

## Appendix F Employer identification

For persons entering unemployment (experiencing a new spell of unemployment), the previous and next job (if any) were determined as follows:

1. Three months preceding and following the spell were searched for jobs
2. A qualifying job must last at least 30 days within this window
3. The gross wage in the job must be at least 16.7 euros per day in 2019 levels
4. If there multiple employers on a given day, the one paying the highest daily wage was the primary job
5. If there were multiple qualifying jobs in the last 90 days, the latest (first) one was the previous (next) job
6. A job following unemployment is only determined for uncensored spells
7. There is only one primary previous job and one primary next job
8. The employer must have a non-empty identifier in the data

The sensitivity of recall estimates to such constraints was assessed in two ways. For this analysis, a random sample of 100,000 spells was drawn from all new UI spells started in 1999–2020. Figure 13 shows how the recall rate estimate would react on average to different constraints on employment preceding or following unemployment, against a baseline of no constraints on the job. Figure 14 shows how the identity of the recalling employer would change if different constraints were imposed.

Requiring longer observed job durations in the windows before and after unemployment would change recall estimates quite dramatically, by 20% or more. These findings emphasize caution when interpreting and comparing these recall rates from different sources due to potential measurement error. Such issues are common even when identifying the preceding employer has direct monetary stakes. Miller and Pavosevich (2019) note that an estimated 38% percent of UI claimants in the US had multiple base period employers, and that varying, somewhat arbitrary methods are used to identify one or more of them as the ones "responsible" for the UI spell to determine the UI taxes.

The sensitivity does not necessarily imply that recall jobs would truly be often very short. One example which can cause distortions in the data are various end-of-job residual payments, such as compensation for earned but unused vacation time. Depending on the payment and the legislation in force, such payments may extend the time a jobseeker needs to wait before they can collect UI payments. This can cause long gaps between the end of the job contract and entry into the UI system, shortening the observed period of employment within the observation window.



Figure 13: Effect of potential employer restrictions on recall rate estimate

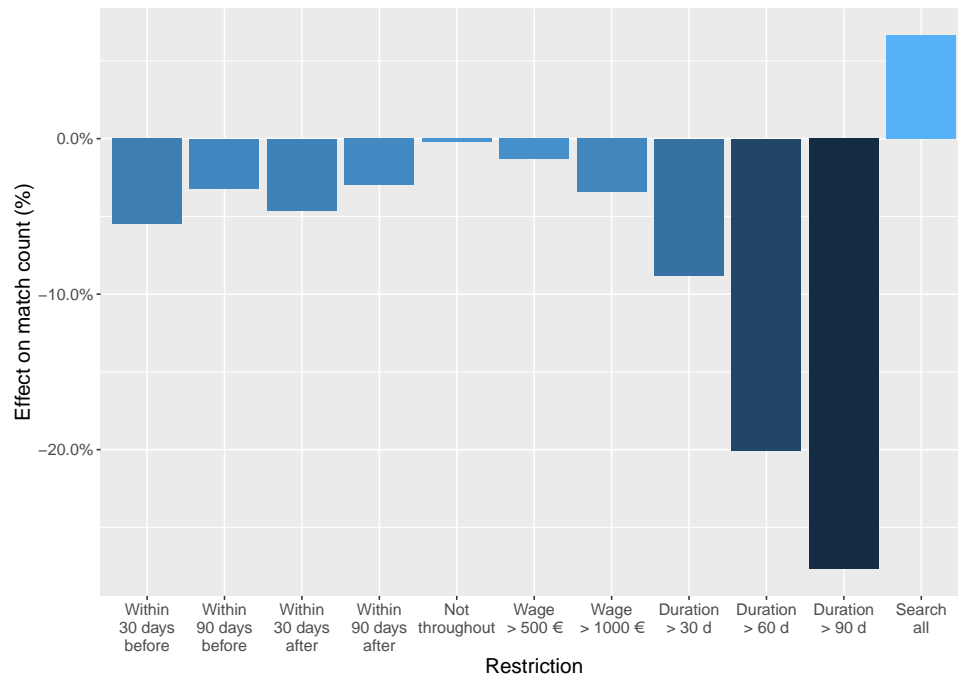
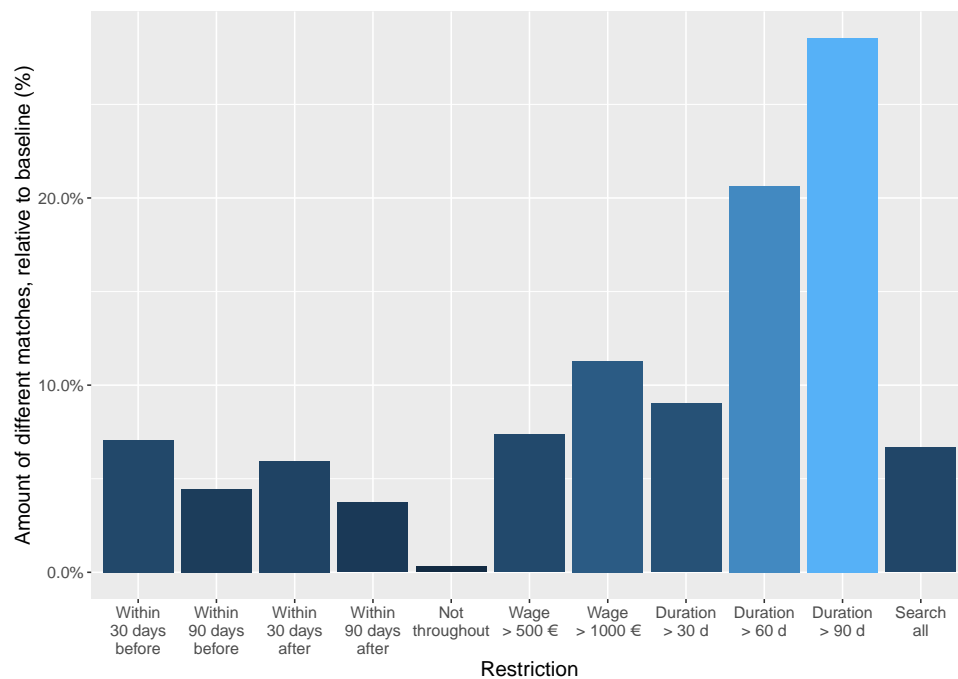


Figure 14: Effect of potential employer restrictions on the identified employer



The baseline is have no constraints on the jobs, but only identify one preceding and one following employer per unemployment spell. The "search all" alternative searches across all preceding and following employers in a 3-month window preceding and following the spell.

## Appendix G    Measuring furlough unemployment in Finland

To qualify for UI, the unemployed have to first register with the public employment services (PES) as an unemployed jobseeker. Before 2013, this obligation was waived for collective furloughed individuals (furloughs of at least 10 employees). Instead, the employer submitted a collective notice to the PES offices and the unemployment funds. The employees would still have to apply for UI benefits from their fund individually. Thus, the jobseeking register does not have individual data for many of the furloughed before 2013.

Since mid-2013, everyone has had to register as a jobseeker personally to qualify for unemployment benefits. This allows for a cross-comparison of furloughs appearing in the jobseeking register and the benefit data. Four important conclusions are apparent. First, more than 95% of all furlough *spells* in the jobseeking register also appear in the benefit data as furloughed. Second, more than 90% of the furloughed specifically collected UI, rather than UA. Third, the furlough spells in UA appear to have uncertain end dates: persons appear as furloughed for much longer in this data than they do in the jobseeking register, indicating that the furloughed do not bother to notify the Social Security Institution that their contract has been terminated and they have moved to non-furlough unemployment. Fourth, the spell *end dates* in the jobseeking register appear unreliable for unemployment more generally; there are no sanctions for failing to notify the PES offices about re-employment, while there are substantial penalties and monitoring for trying to collect benefits while not actually unemployed.

For these reasons, the paper (a) focuses on furloughs covered by UI, and mostly ignores UA, and (b) defines the furlough spells by the time for which the individuals claim benefits, rather than the time of registered unemployment.

## Appendix H Definitions and additional descriptives: furlough spells

Table 3 lists some additional descriptives by spell type, complementing the one in the main text. All monetary values are deflated to 2019 levels by the Statistics Finland wage index. Table 4 shows the top industries the individual last worked in per spell type, and the profession they reported when registering for unemployment. Professions were coarsened with a procedure similar to that for industries (described in appendix N).

The measurement of recalls for the tables is discussed in F. Re-employment is defined similarly, but without requiring that the post-unemployment employer is identified and is the same as the preceding employer.

Prior and later wages come from employment data, but simultaneous weekly wage is recorded directly in the unemployment benefit data. For spells with some partial unemployment, their means are separately shown divided by either total duration of the spell or the fraction of spell with partial unemployment.

Furloughs can be part-time in one of two ways: with reduced hours per day (less than 1% of furloughs), or with reduced days per week (about 10% of furloughs). After 2009, the latter case is not registered as partial unemployment, and the individuals are paid regular UI for those days. This does not appear to have had a significant impact on whether a furlough is implemented as full-time or part-time. Figure 15 illustrates the number of ongoing furlough UI spells in a given week over 1999–2021. Since furlough weeks can be “part-time furloughs” either because the furlough starts or ends mid-week or because a longer furlough is only applied to some days each week, the stock is partitioned into first/last weeks and weeks in between, which can be either full weeks or partial weeks. “Other UI” includes spells that started on furloughs but continue due to a permanent dismissal.

BUA and LMS refer to two different types of flat rate unemployment assistance: the basic unemployment allowance and the labour market subsidy. The basic allowance is available to those who satisfy the employment condition of UI, but had not been members in an unemployment fund for this time. It has the same maximum duration as UI. The labour market subsidy covers those who do not have enough recent employment or who exhaust the maximum duration of UI or BUA. Both benefits pay the same flat rate, but LMS has some additional means testing for capital income and extra provisions for parental or spousal incomes; on average, this has little effect on the rate paid over a spell.

Waiting periods come directly from benefit data for UI, and are estimated by the rules for UA. The income forfeit due to these periods is calculated as the daily mean benefit times the waiting period.

The duration of last job only counts directly connected employment with the same primary employer. In this case, one day without wages paid counts as a break in the job.

Table 3: Additional descriptives for unemployment benefit spells in 1999–2020.

Variable	Furloughed	UI, from fixed-term	UI, collective dismissal	UI, unknown reason	UI, misc. reasons	UA, from activity	UA, misc. reasons
Censored	0.33%	2.08%	9.69%	4.33%	4.53%	5.85%	15.40%
Re-enters unempl. within 6 months of spell end	36.55%	38.83%	22.47%	49.54%	32.79%	35.70%	39.46%
Full-time equivalent weeks (if re-entered)	2.80	11.60	21.00	8.00	14.20	13.40	24.65
Time from last job if any, days	1	8	12	1	62	8	202
Duration of last job, years	0.8	0.5	1.8	0.4	0.5	0.3	0.2
Collects partial benefits	10.36%	28.33%	16.49%	48.78%	27.64%	29.43%	20.18%
FTE benefit weeks / calendar weeks (mean)	0.85	0.92	0.94	0.78	0.90	0.94	0.94
Weeks of partial benefits (if any)	3.0	7.2	8.8	8.2	8.6	8.6	12.0
Simultaneous weekly wage (avg. over rel. spells)	564€	182€	81€	321€	128€	113€	58€
Simultaneous weekly wage (when working)	1,387€	460€	320€	527€	362€	288€	225€
Collects BUA	0.00%	0.01%	0.01%	0.05%	0.04%	51.09%	2.00%
Collects LMS	0.49%	3.02%	5.18%	5.74%	7.56%	57.21%	100.00%
Furloughed at start (past 2010)	100.0%	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%
Waiting periods, in weeks (mean)	1.2	1.0	1.2	1.0	0.8	0.6	0.6
Income forfeit to waiting periods (mean)	393.6€	254.9€	397.2€	176.9€	236.8€	78.9€	99.5€

Values are counts, frequencies or medians, unless otherwise noted.

Table 4: Top preceding industries and professions by spell type

Variable	Spell category	Top 3 most common values	
Industry	Furloughed	Manufacturing (n.e.c.) (26.8%) Manufacture of machinery and equipment n.e.c. (7.6%) Building construction (7.4%)	
	UI, from fixed-term	Education (14.5%) Services (n.e.c.) (7.7%) Other social work without accomm. (7.6%)	
	UI, collective dismissal	Manufacturing (n.e.c.) (21.2%) Services (n.e.c.) (10.1%) Trade; repair of motor vehicles (n.e.c.) (7.9%)	
	UI, unknown reason	NA (12.8%) Services (n.e.c.) (9.7%) Education (7.8%)	
	UI, misc. reasons	NA (46.9%) Services (n.e.c.) (6.2%) Retail trade, excl. motor vehicles (4.4%)	
	UA, from activity	NA (36.6%) Services (n.e.c.) (7.5%) Temporary employment agency activities (6.7%)	
	UA, misc. reasons	NA (68.4%) Services (n.e.c.) (4.1%) Temporary employment agency activities (3.1%)	
	Profession	Furloughed	Plant and machine operators, and assemblers (n.e.c.) (9.7%) Building frame and related trades workers (8.9%) Metal, machinery and related trades workers (n.e.c.) (6.8%)
		UI, from fixed-term	Teaching professionals (9.5%) Others (8.2%) Child care workers and teachers' aides (8.1%)
		UI, collective dismissal	Professionals (n.e.c.) (7.4%) Plant and machine operators, and assemblers (n.e.c.) (7.3%) Others (7.1%)
UI, unknown reason		Others (9.2%) Personal care workers in health services (8.8%) Clerical support workers (8.4%)	
UI, misc. reasons		Others (8.9%) Clerical support workers (7.5%) Personal care workers in health services (7.0%)	
UA, from activity		Unknown (12.4%) Others (8.6%) Personal service workers (7.7%)	
UA, misc. reasons		Unknown (25.1%) Others (8.1%) Personal service workers (6.6%)	

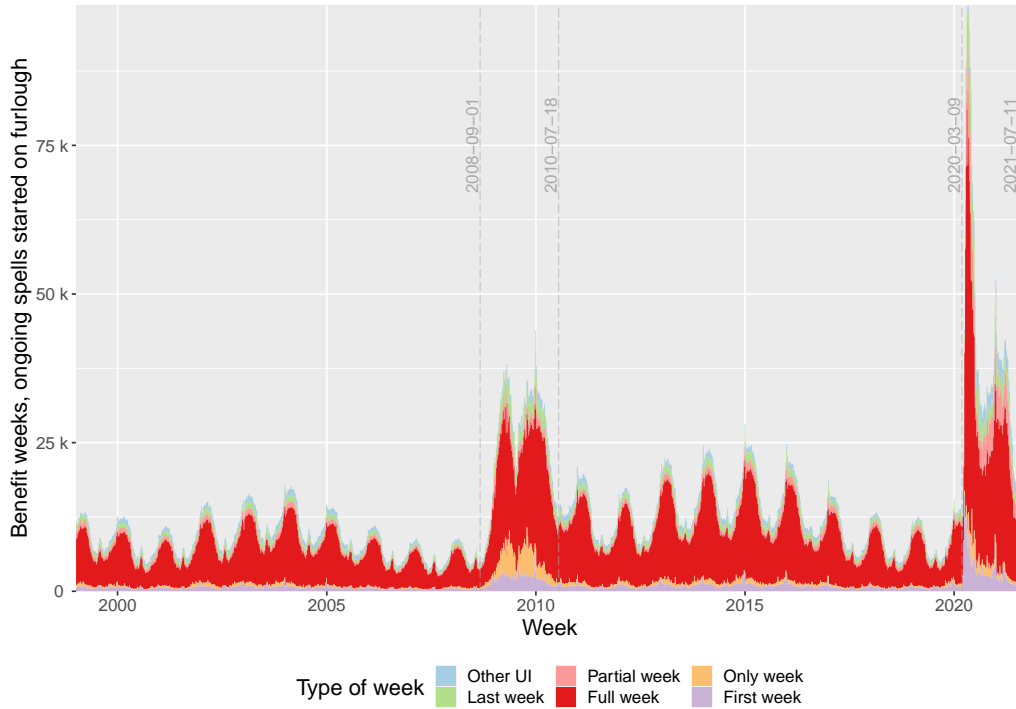
Industry data comes from employment data for the previous job. If the separating employer was not identified as in appendix F, so is the industry. Profession refers to the profession the person reported to the jobseeking register.

Table 5 lists a more detailed description of the coarser spell types. For classification, the job termination was only checked if the preceding activity was work and if both the preceding activity and the job termination were from a recent date preceding unemployment. Apart from furloughs, data for the preceding activity and job termination reason come from jobseeking data.

Figure 16 shows the share of events by varying recurrence by spell type. A spell is considered recurrent when the same person experiences the same type of spell with the same preceding employer several times over 1999-2020. Furloughs are repeated much more commonly than other spells, with almost half of all spells being for the same employee-employer pair.

To complement the median durations, figure 17 demonstrates the interquartile range of durations by spell type. Figure 18 plots the evolution of this range by year and spell

Figure 15: Number of persons in ongoing furlough spells



category, while 19 shows how the recall rates have varied.

Figure 20 shows the number of new entries into the different spell categories per month, plus a seasonal adjustment by X13-ARIMA-SEATS. The spikes in UA entries in 2020 are due to exceptionally high numbers in industries and for workers where furloughs are rare and fund membership low.

The main text showed the distribution of employment rates by age and spell type. Figure 21 illustrates how the median duration for an individual spell interacts with age and spell type.

Observed contacts and re-employment plans were used as proxies for the attachment of the different groups of unemployed to the unemployment and jobseeking system. The contact data decomposed by the party initiating the contact was only available for 2017–2019, illustrated in figure 22. The data for various re-employment plans is used from mid-2013, when all the furloughed were required to individually register as jobseekers at the PES offices. The share plotted in figure 23 is the share of ongoing spells where the individual has agreed to a re-employment plan with an explicitly agreed task to search for open market jobs (the most common such plan task). Contact frequencies and plans are, on average, much lower in the first ten weeks of unemployment for both the furloughed and for teachers experiencing summer unemployment than for most other spell types. The teacher contact rates also jump considerably after about ten weeks among the minority who did not end up being recalled at the end of the summer.

Table 5: Spell category coarsening

Coarsened category	Detailed classification	Share
Furloughed	Collects UI and furloughed according to benefit data	22.0%
UI, from fixed-term	Job termination reason, other than teacher summer unempl.	14.6%
	Teacher summer unemployment, several rules	2.2%
UI, collective dismissal	UI, collective dismissal	3.4%
UI, unknown reason	Preceding activity unknown	21.4%
	Job termination reason unknown	4.8%
UI, misc. reasons	Preceding activity child homecare	1.8%
	Misc. preceding activities	1.8%
	Voluntary quit, jobseeking data	1.7%
	Preceding activity education	0.8%
	Preceding activity illness	0.8%
	Job termination during probation	0.6%
	Individual job termination	0.5%
	Misc. job termination reasons	0.5%
UA, from activity	LMS, preceding activity education	3.1%
	BUA, preceding activity unknown	2.2%
	BUA, job termination due to fixed-term contact	1.4%
	BUA, misc. preceding activities	1.4%
	LMS, job termination due to fixed-term contact	1.2%
	LMS, preceding activity military/civil service	0.9%
	LMS, job termination reason unknown	0.8%
	BUA, job termination reason unknown	0.6%
	LMS/BUA, furloughed according to benefit data	0.6%
	BUA, misc. job termination reasons	0.5%
	LMS, misc. job termination reasons	0.5%
	BUA, collective dismissal	0.2%
	LMS, collective dismissal	0.1%
UA, misc. reasons	LMS, preceding activity unknown	5.4%
	LMS, job termination reason unknown	3.1%
	LMS, preceding activity child homecare	0.7%
	LMS, preceding activity illness	0.3%
	LMS, preceding activity entrepreneurship	0.2%

Figure 16: Recurrent events by spell type.

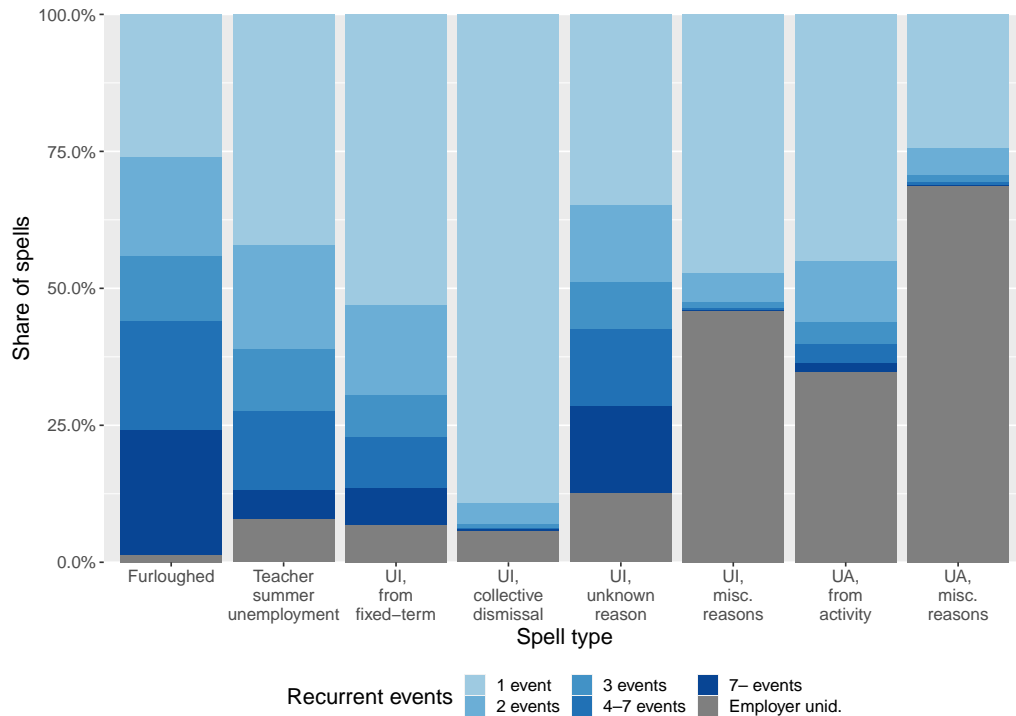


Figure 17: Interquartile range of spell durations by type

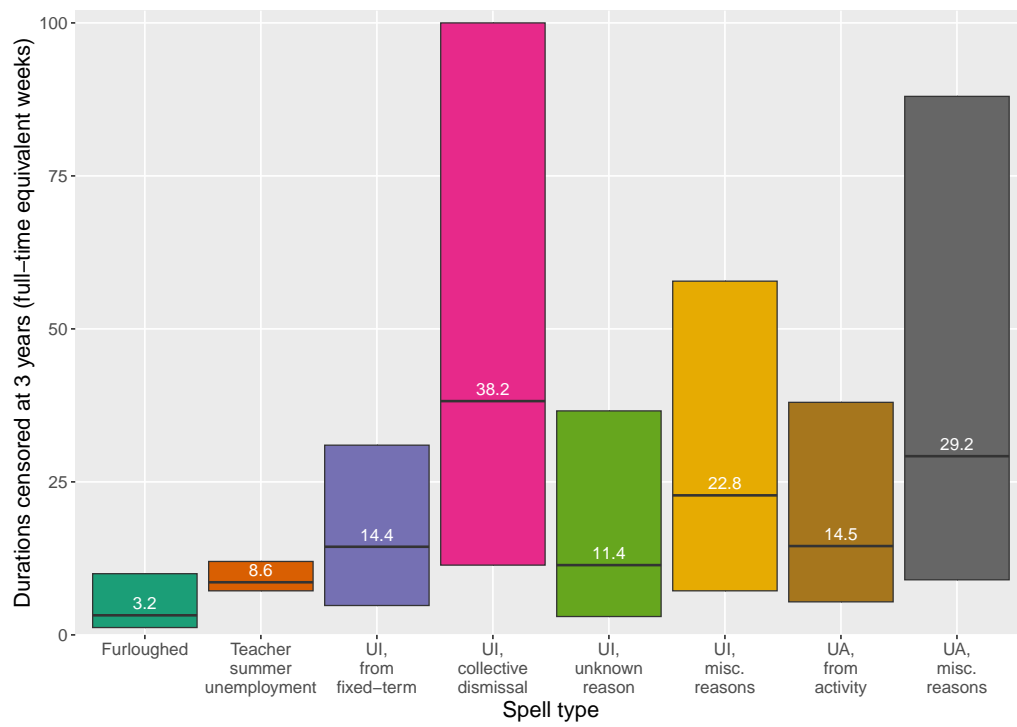


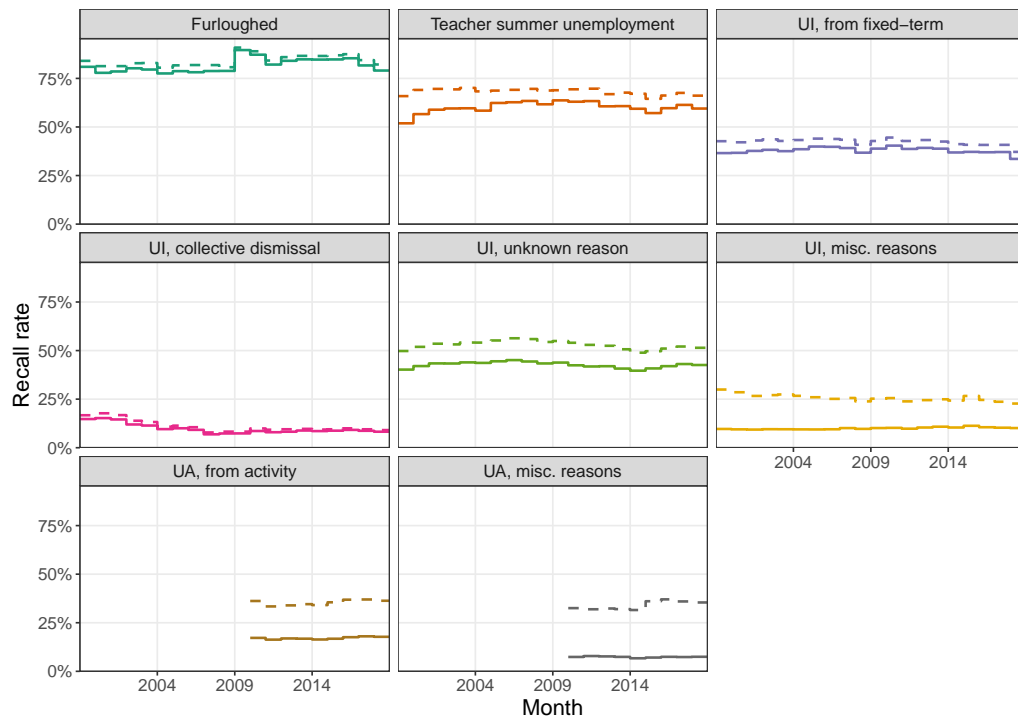


Figure 18: Spell duration IQ range by spell duration and year



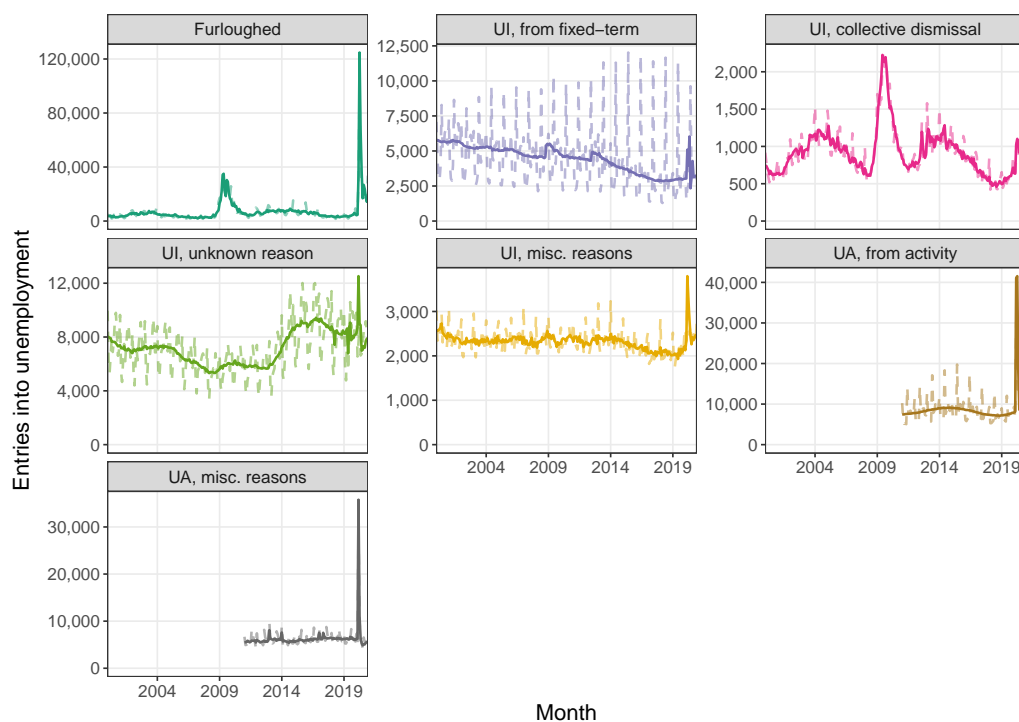
The bold solid line is for the median; the shaded areas represent the interquartile range. Note that the vertical scale varies by spell category.

Figure 19: Recall rates per year and spell type



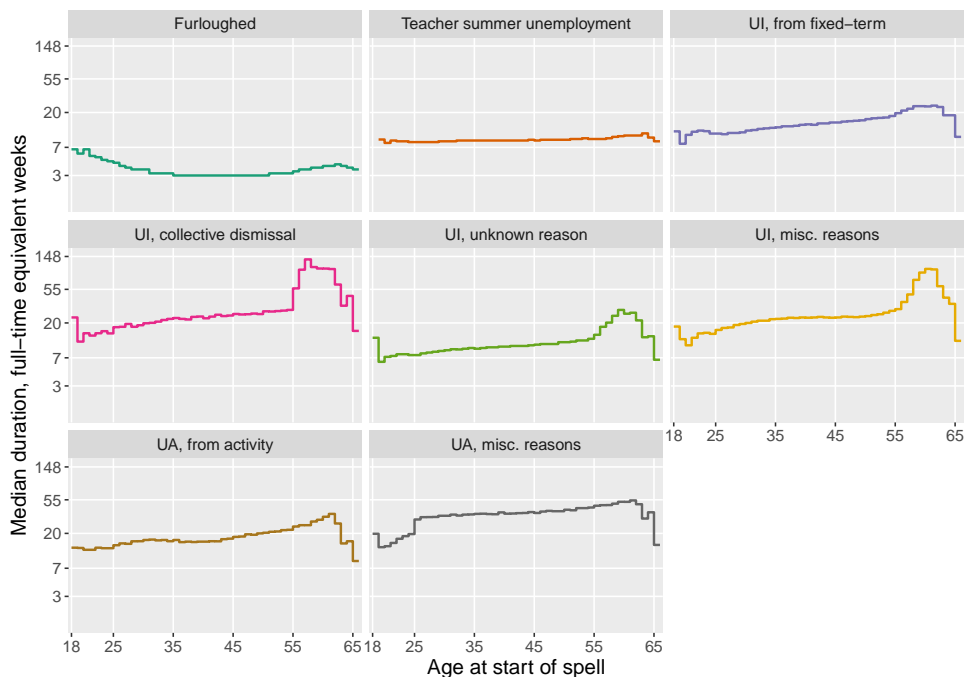
The dashed line represents the recall rate conditional on having an identified previous employer. The solid line is for the unconditional recall rate.

Figure 20: Unemployment entries 1999-2021 by spell category and month



Dashed line: original data. Solid bold line: series seasonally adjusted with X13-ARIMA-SEATS.

Figure 21: Median duration by age and spell type



Spell durations are censored at 3 years. Note that the vertical axis is on a logarithmic scale.

Figure 22: Contacts per week in unemployment, spells starting in 2017–2018.

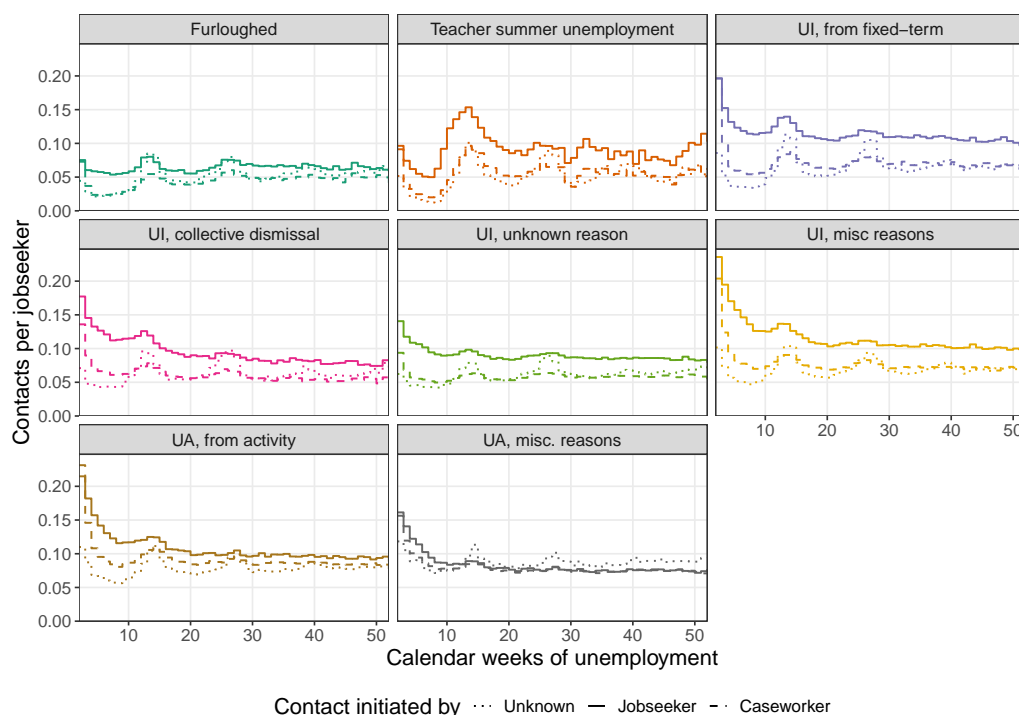
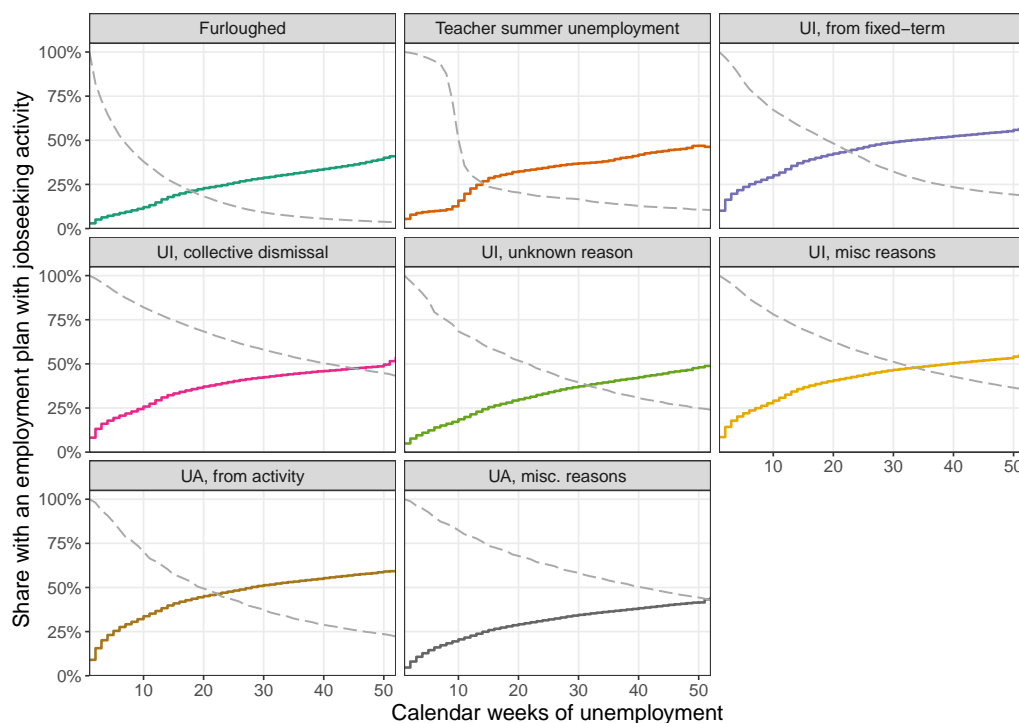


Figure 23: Employment plans by week and spell type, spells starting in 07/2013–2018.



The dashed grey line is the survival curve for continued unemployment.

## Appendix I Partial unemployment

More than a quarter of all unemployment spells include some time in part-time unemployment. Kalin, Kyyrä, and Matikka (2023) utilize reforms in 2010's that increased the generosity of benefits for the partially unemployed to study their effects. They find that while the reforms increased participation in part-time employment during unemployment, there is no evidence that they increased or decreased transitions to full-time unemployment.

Figure 24 shows how total unemployment benefits between 2010 and 2019 are distributed by the share of the spell spent in part-time unemployment. Figure 25 demonstrates, for spells that have some part-time unemployment, the distribution of benefits by the average weekly wage in 2019 levels. Overall, while many work during unemployment, the intensity of this work appears relatively low.

Most part-time workers in Finland do not collect the part-time benefits. As with all unemployment benefits, the part-time benefits require that one is a registered jobseeker and looks for a full-time job. While it is not clear how strongly and uniformly the job search requirement is monitored by the PES offices, most part-time workers do not end up registering as jobseekers. According to the Labour Force Survey, a substantial fraction of the partially employed work part-time due to studies (27.1% in 2023), and students cannot claim unemployment benefits. Only 22.2% of part-time workers said they worked part-time because no full-time work was available.

As with furloughs, it is also of interest whether the unemployed usually alternate between underemployment and full-time employment with the same employer. Figure 26 follows a random sample of 400,000 periods of part-time unemployment. A new period simply means a person starts collecting part-time benefits; such a period ends when no benefits are claimed for a period of at least 30 days. This can occur (and often does) in the middle of a broader spell of unemployment, during which the intensity of unemployment may vary.

For each day for 3 years before and 3 years after such a period, the individual followed is designated a status: in full-time unemployment, partial unemployment, employed (without simultaneous benefits), or unknown. Additionally, if the person is employed, their primary employer is compared to the employer at the start of the period. The figure then plots the share of the entire sample in each of these designations.

The partially unemployed appear to have some persistent attachment to their part-time employer over time. It is, however, substantially weaker than the link between furloughed workers and their employers. To a first approximation, after two years, roughly equal shares are (a) working with a different employer, (b) working the initial part-time employer, and (c) not working.

Table 6 collects summary statistics for the periods of partial UI which started between

1999 and 2018, followed until 2021. Partial UA is not included, as detailed data for UA is only available from 2010, and partial benefits are both more common and more generous for UI. In addition to wages and benefits, the table reports a measure of wage gap. It is defined as the difference between a person's prior weekly wage (the wage basis for UI benefits, typically a full-time wage) and wage in partial unemployment. It approximates an answer to the counterfactual question of how much more the persons would have earned, had they been employed full-time instead of part-time.

Figure 24: Distribution of unemployment benefits by time spent in partial unemployment

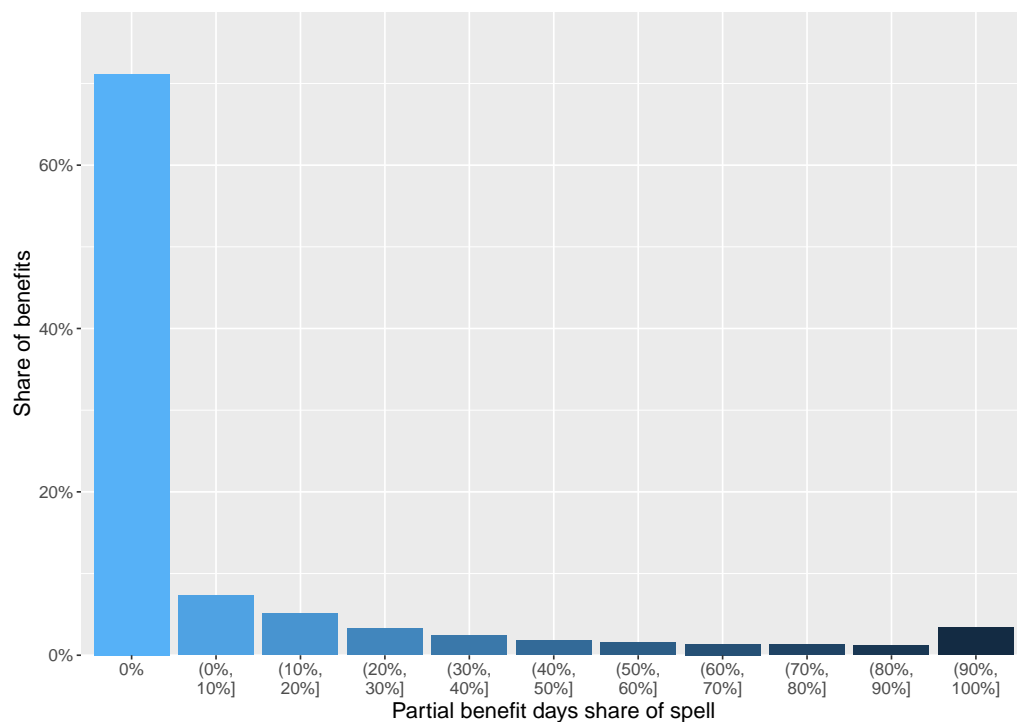
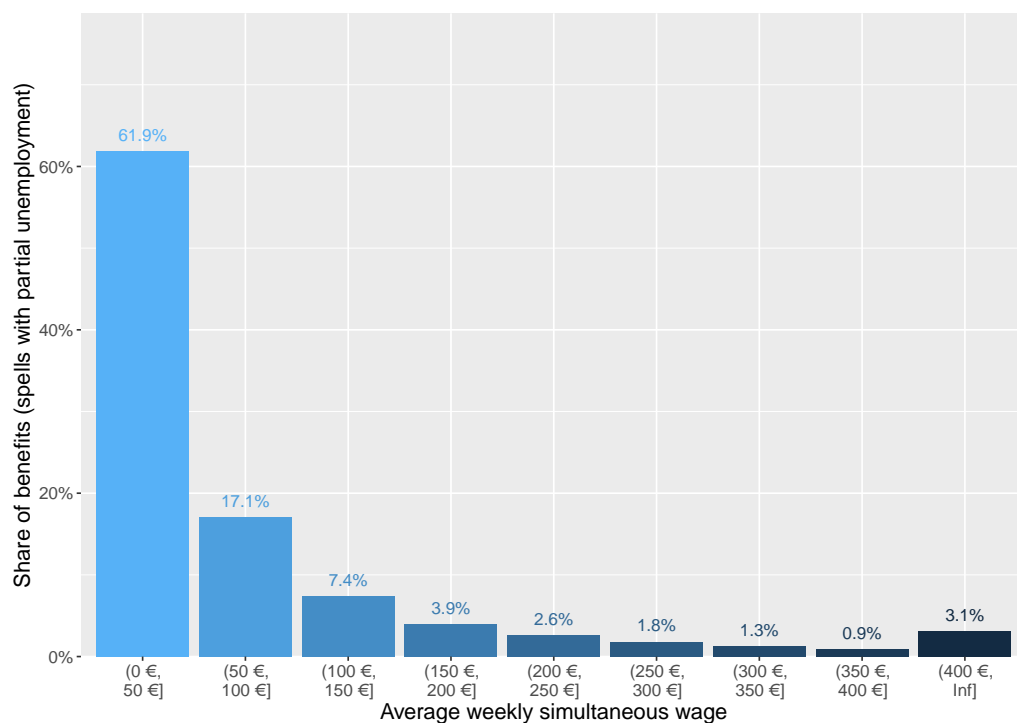


Figure 25: Distribution of unemployment benefits by simultaneous weekly wage



Both figures are for spells started between 2010 and 2019, to capture data for both UI and UA consistently. The lower figure only include benefits for spells with some part-time unemployment.

Figure 26: Daily status before and after entry into partial unemployment

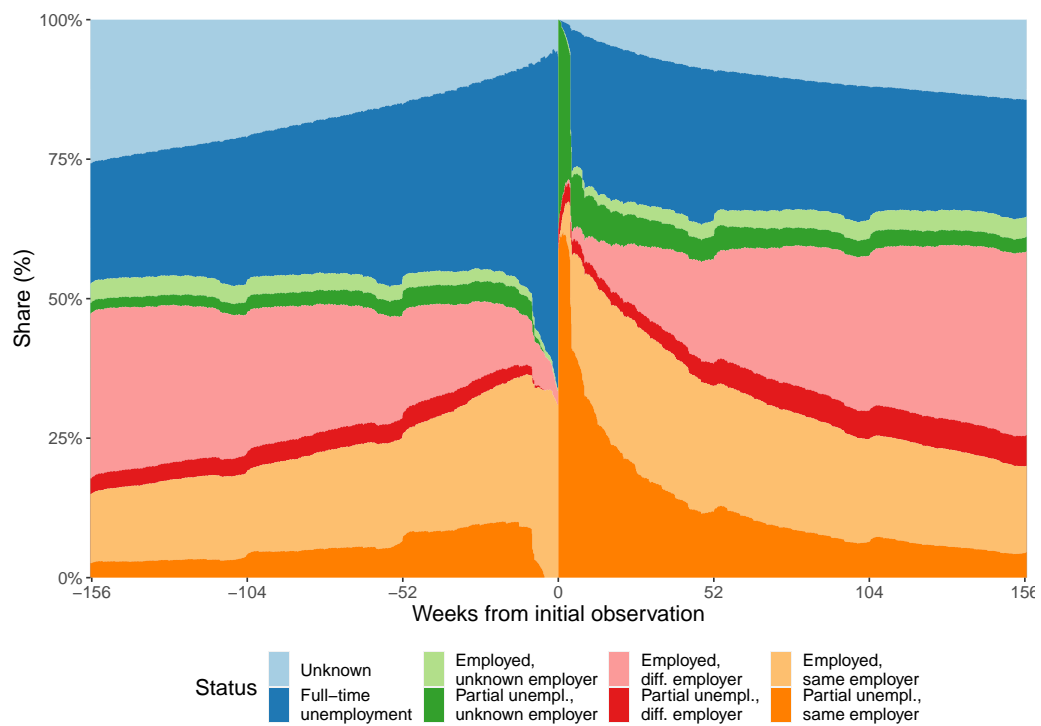


Table 6: Periods of partial UI started in 1999–2019.

	Duration of period, in months																	
Variable	(0, 1)		[1, 2)		[2, 4)		[4, 6)		[6, 9)		[9, 12)		[12, 18)		[18, 24)		[24, Inf)	
Benefit weeks	31,069 (3.2%)		108,458 (11.0%)		167,685 (17.0%)		125,362 (12.7%)		140,104 (14.2%)		97,686 (9.9%)		90,436 (9.2%)		61,434 (6.2%)		162,084 (16.5%)	
FTE benefit weeks	19,122 (3.6%)		67,670 (12.9%)		98,815 (18.9%)		70,517 (13.5%)		75,164 (14.3%)		50,340 (9.6%)		47,751 (9.1%)		32,085 (6.1%)		62,480 (11.9%)	
Benefits	5.3 (3.4%)	M€	18.8 (11.9%)	M€	27.4 (17.4%)	M€	19.8 (12.6%)	M€	21.7 (13.7%)	M€	14.8 (9.4%)	M€	14.8 (9.4%)	M€	10.3 (6.5%)	M€	25.0 (15.8%)	M€
Wages	7.1 (3.2%)	M€	23.4 (10.6%)	M€	37.9 (17.2%)	M€	29.1 (13.2%)	M€	32.9 (14.9%)	M€	23.4 (10.6%)	M€	20.3 (9.2%)	M€	13.2 (6.0%)	M€	33.3 (15.1%)	M€
Wage gap	11.3 (3.9%)	M€	37.2 (13.0%)	M€	52.9 (18.5%)	M€	37.3 (13.1%)	M€	39.7 (13.9%)	M€	25.9 (9.1%)	M€	26.0 (9.1%)	M€	17.5 (6.1%)	M€	37.8 (13.2%)	M€
Median weekly wage	227.8 €		197.7 €		218.9 €		232.2 €		239.7 €		247.0 €		233.6 €		221.5 €		211.8 €	
Median weekly wage gap	315.9 €		311.7 €		283.0 €		262.0 €		244.4 €		223.4 €		239.0 €		228.7 €		178.7 €	
Spells	14,314 (20.5%)		22,760 (32.6%)		15,768 (22.6%)		6,526 (9.3%)		4,790 (6.9%)		2,373 (3.4%)		1,557 (2.2%)		742 (1.1%)		1,028 (1.5%)	
Persons	213,754 (38.8%)		289,568 (52.6%)		218,521 (39.7%)		110,378 (20.0%)		82,626 (15.0%)		43,941 (8.0%)		31,484 (5.7%)		15,438 (2.8%)		20,651 (3.7%)	

All counts and sums are divided by the number of years observed, except for persons. The numbers in brackets are for the respective shares across all partial UI spells and medians. The wage gap is the difference between a person's prior wage (usually a full-time wage) and the part-time wage.



## Appendix J Medium- and long-term outcomes: year 2011 and additional groups

The main text presented nine-year follow-ups for spells started in 2009 for two spell types. Figures 27–30 demonstrate the same follow-ups for other spell types, while figures 31–37 show follow-ups starting from 2011. The base population remains the same, so that only persons born in 1960–1976 are included.

While spells following collective dismissals are often very long, even for the younger cohorts, their long-term employment prospects are in fact better than for most other groups. Persons entering unemployment assistance represent the other end of the spectrum, with low long-term employment rates. Unemployment following fixed-term jobs lies somewhere between the two extremes. Teacher summer unemployment spells strongly resemble furloughs, with relatively high average employment rates, but repeated re-entries into unemployment each year around the same time. The variation based on which year the spell started in (the crisis year 2009 or later) appears to have only a modest effect on the long-term trajectories.

Figure 27: Long-term outcomes after summer unemployment for teachers in 2009

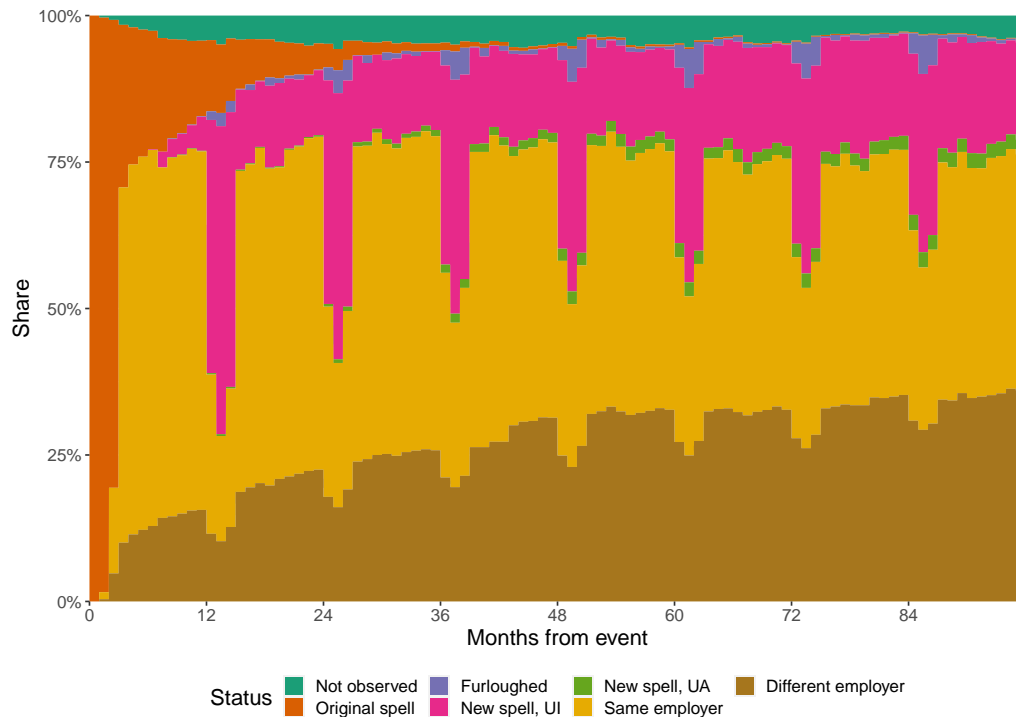


Figure 28: Long-term outcomes after collective dismissal-based UI entries in 2009

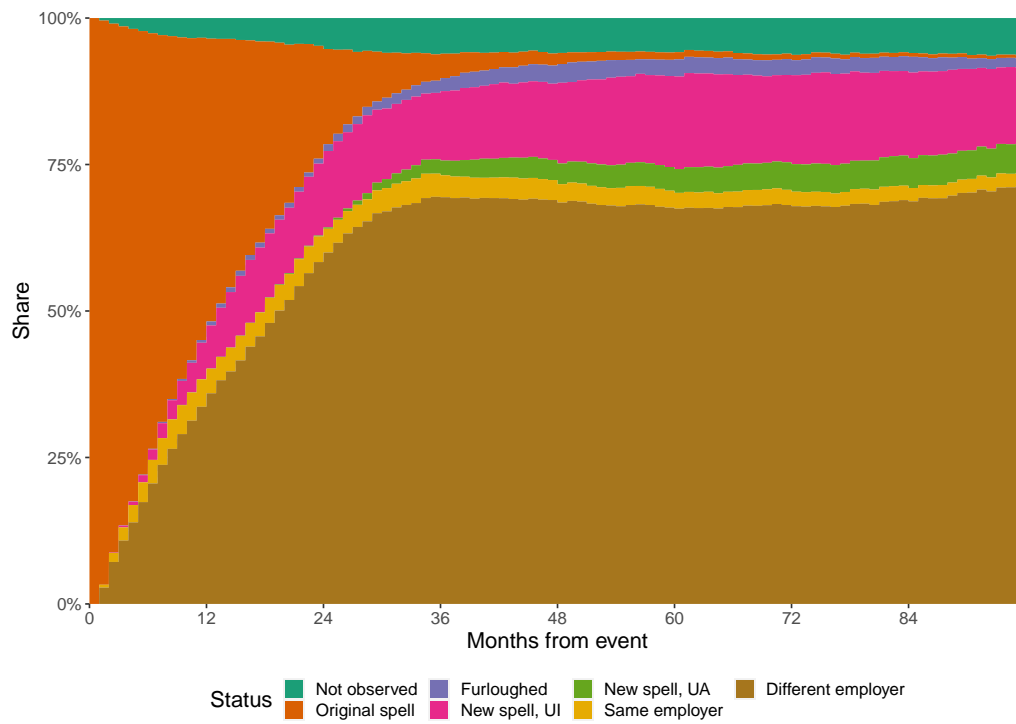


Figure 29: Long-term outcomes after fixed-term job-based UI entries in 2009

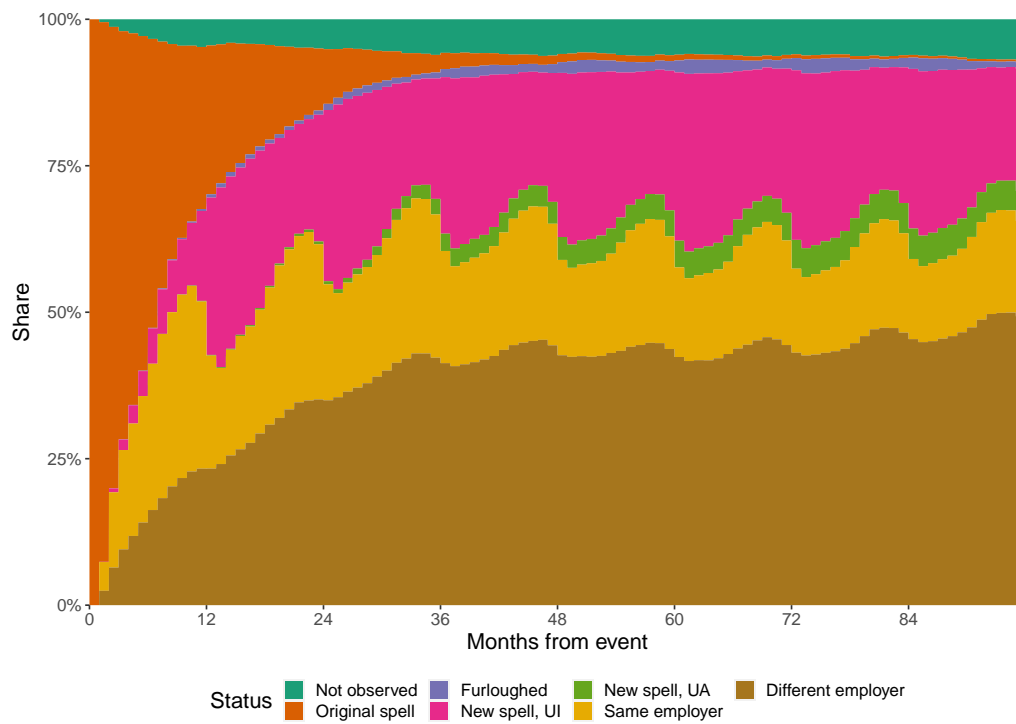


Figure 30: Long-term outcomes after UI entries for unknown reasons in 2009

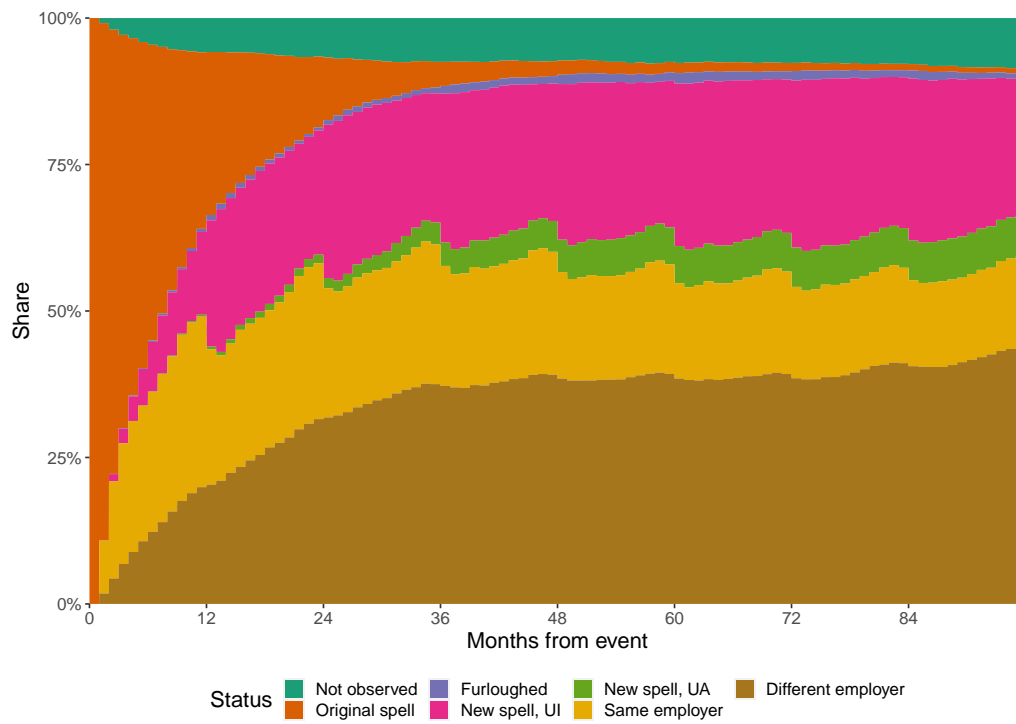


Figure 31: Long-term outcomes after furloughs in 2011

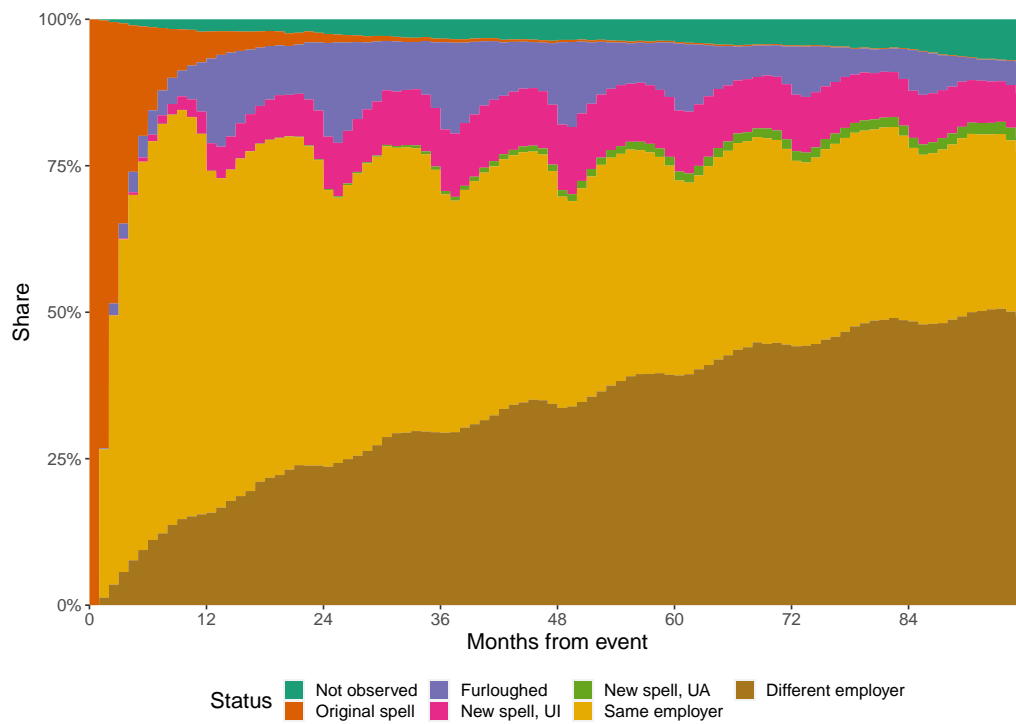


Figure 32: Long-term outcomes after summer unemployment for teachers in 2011

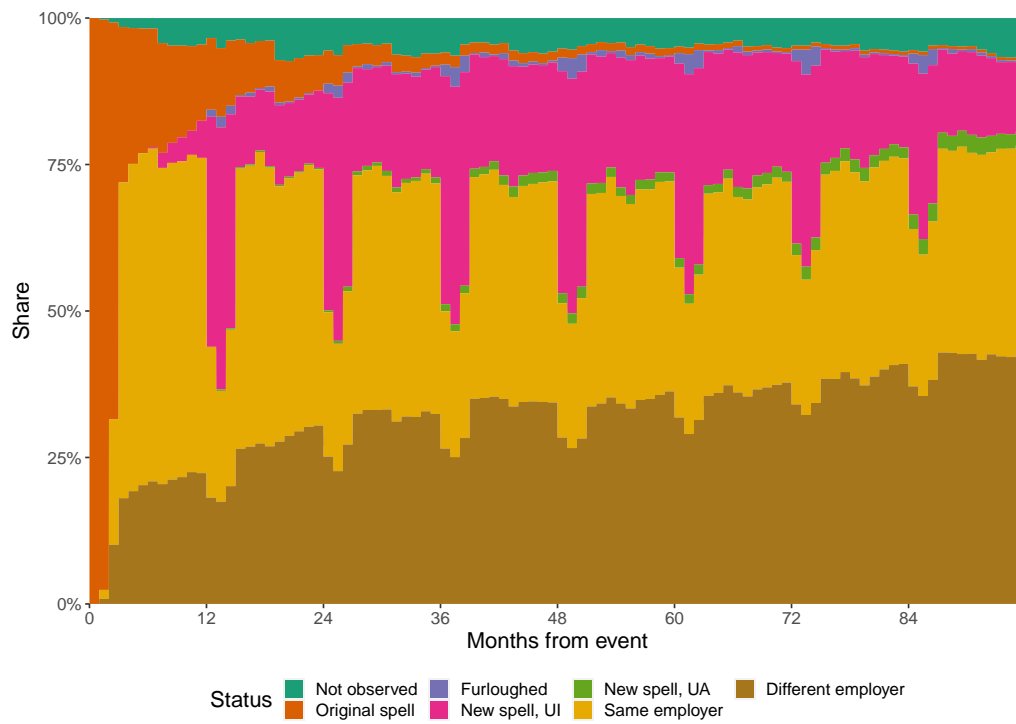


Figure 33: Long-term outcomes after entries into UA from activity in 2011

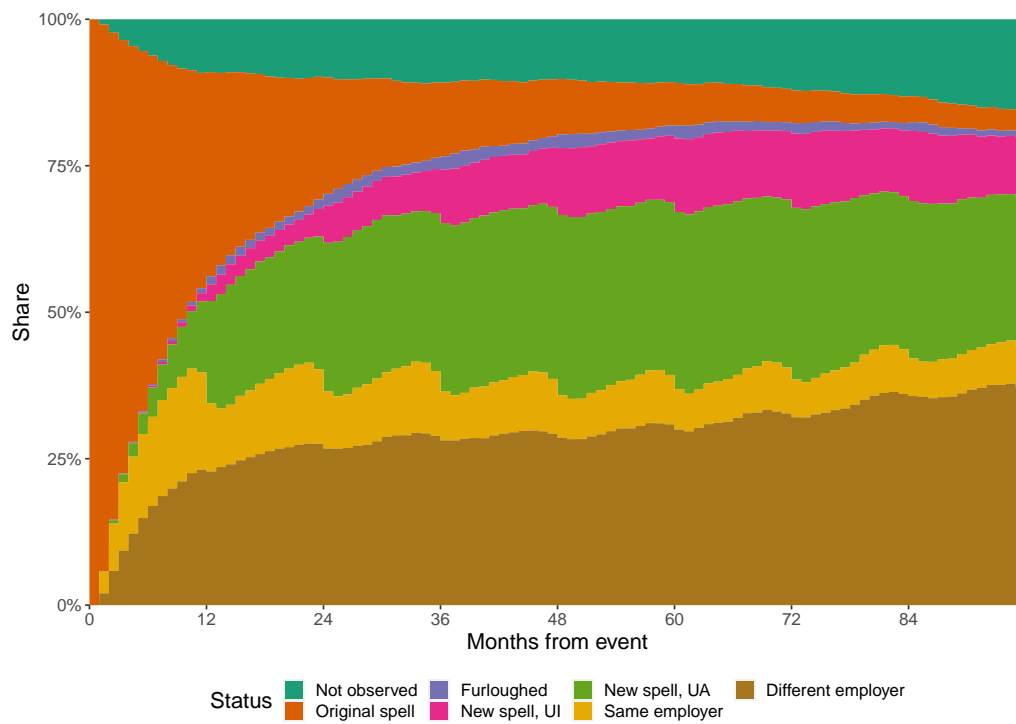


Figure 34: Long-term outcomes after entries into UA for miscellaneous reasons in 2011

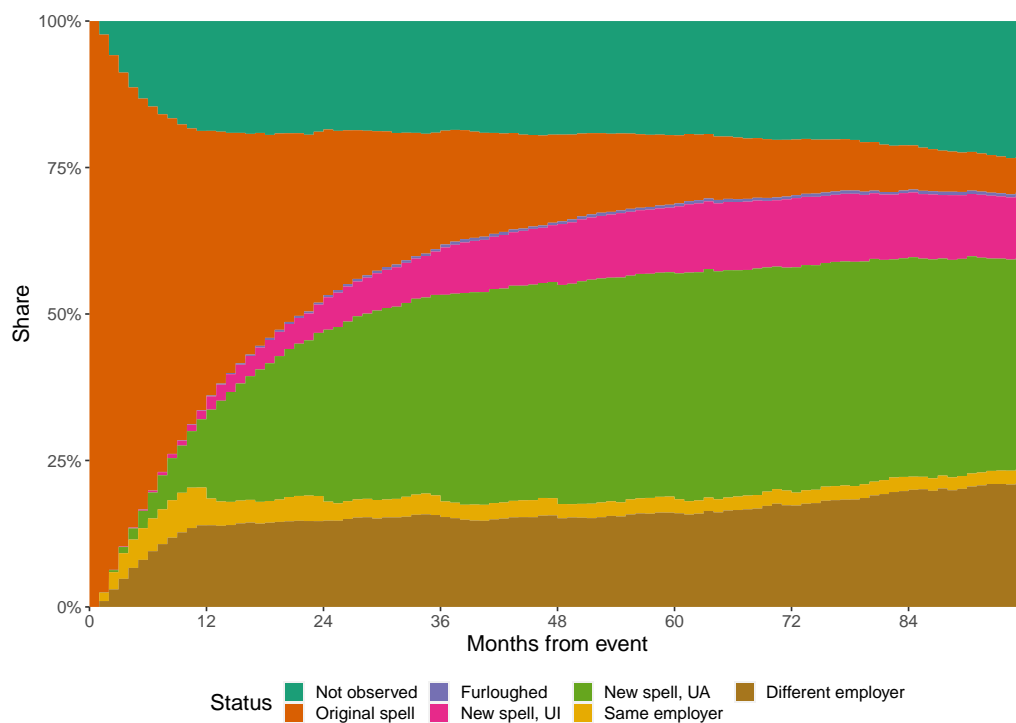


Figure 35: Long-term outcomes after collective dismissal-based UI entries in 2011

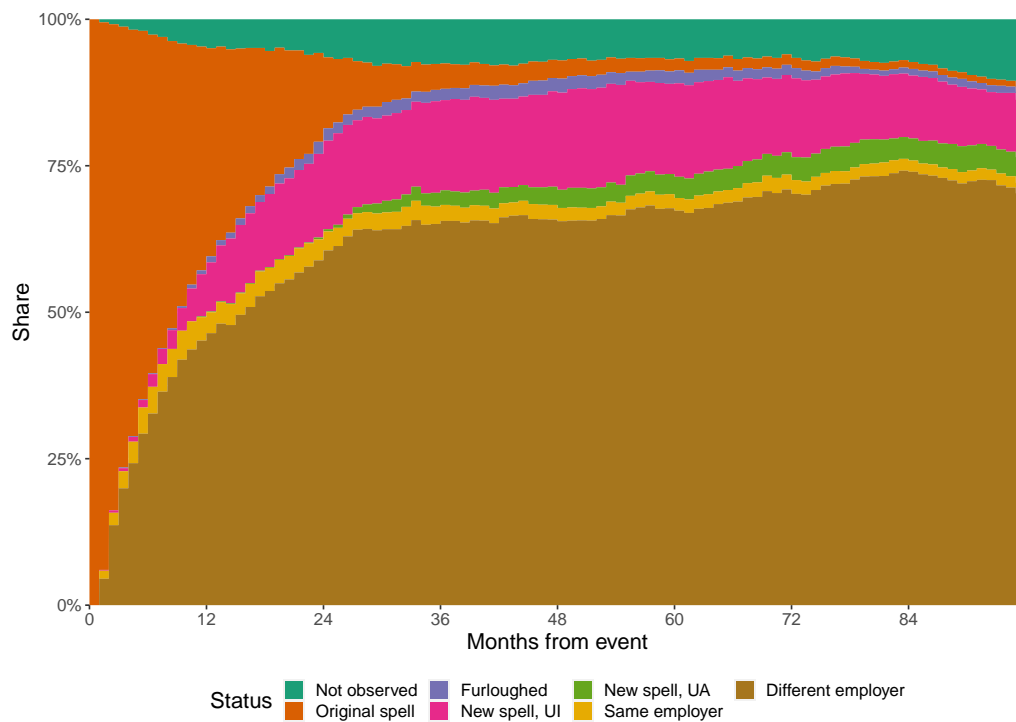


Figure 36: Long-term outcomes after after fixed-term job-based UI entries in 2011

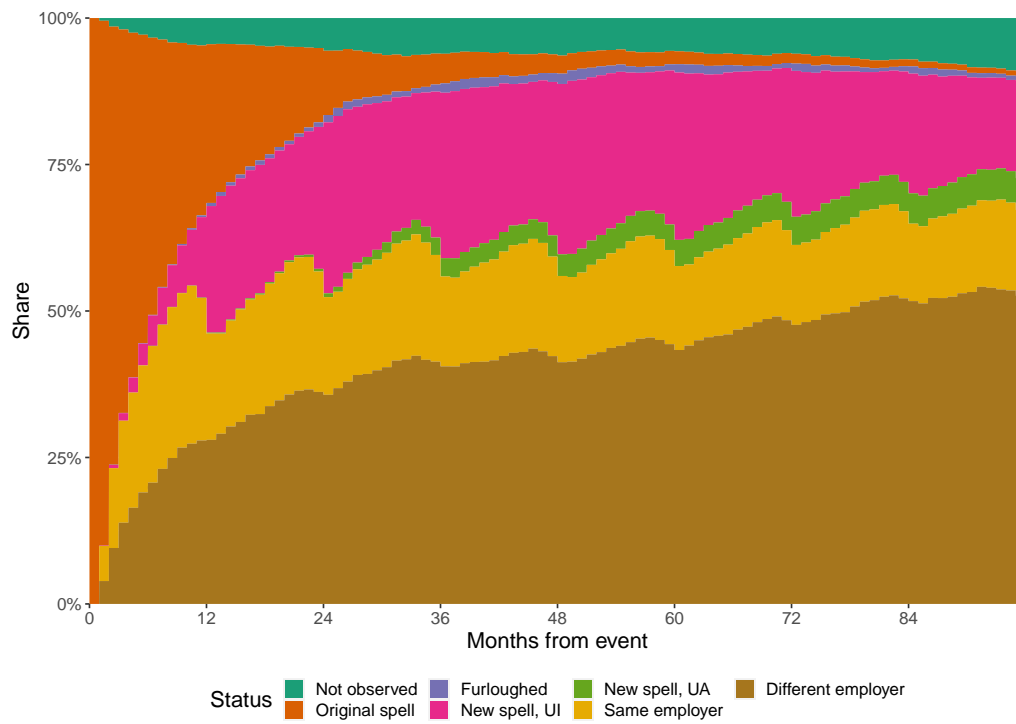
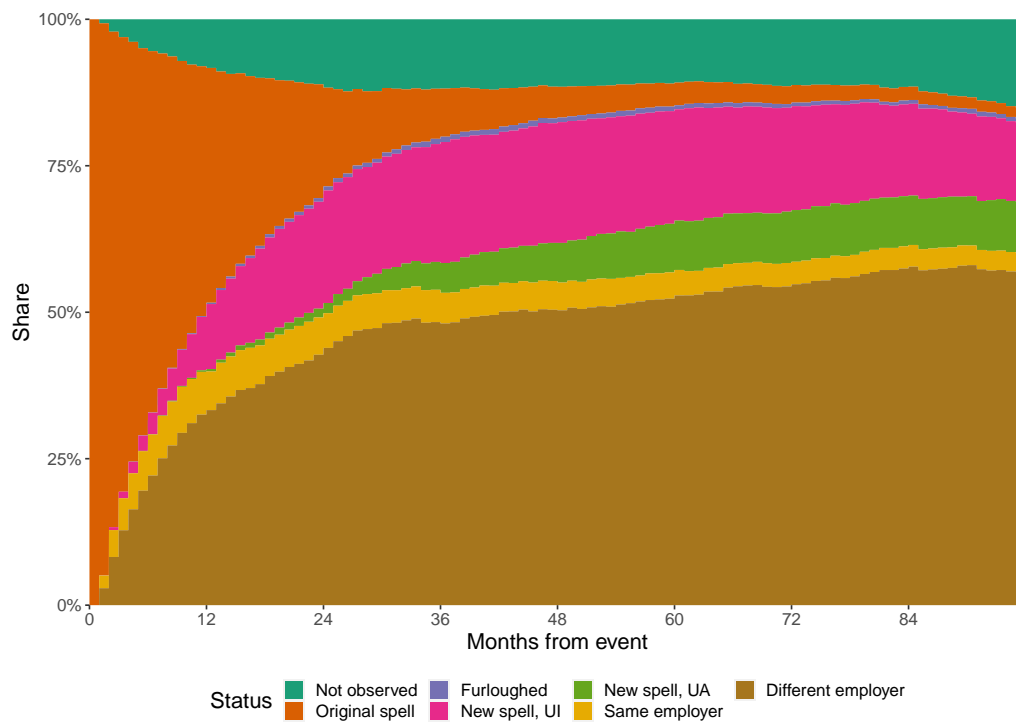


Figure 37: Long-term outcomes after miscellaneous UI spells in 2009



## Appendix K Daily furlough follow-ups by age, industry and profession

The main text presented daily follow-ups for one year after a furlough by furloughing year. Figures 38–42 illustrate follow-ups by age, person’s designation as in section 5 of the main text, industry and profession. Professions have been coarsened starting from the 3-digit level similarly to industries, whose coarsening is covered in the attachment N.

While some manufacturing industries and construction both commonly use furloughs, the patterns clearly vary. In two of the listed construction industries, furloughs last longer, the workers are more likely to be furloughed again in a years’ time, and the workers are more likely to switch than in the listed manufacturing industries. One year from the start of the furlough, this translates to active employment rates of 62%–65% for some construction industries, and 76%–85% for manufacturing. Age has much less effect.

Figure 38: Daily follow-ups, all furlough spells 1999–2020

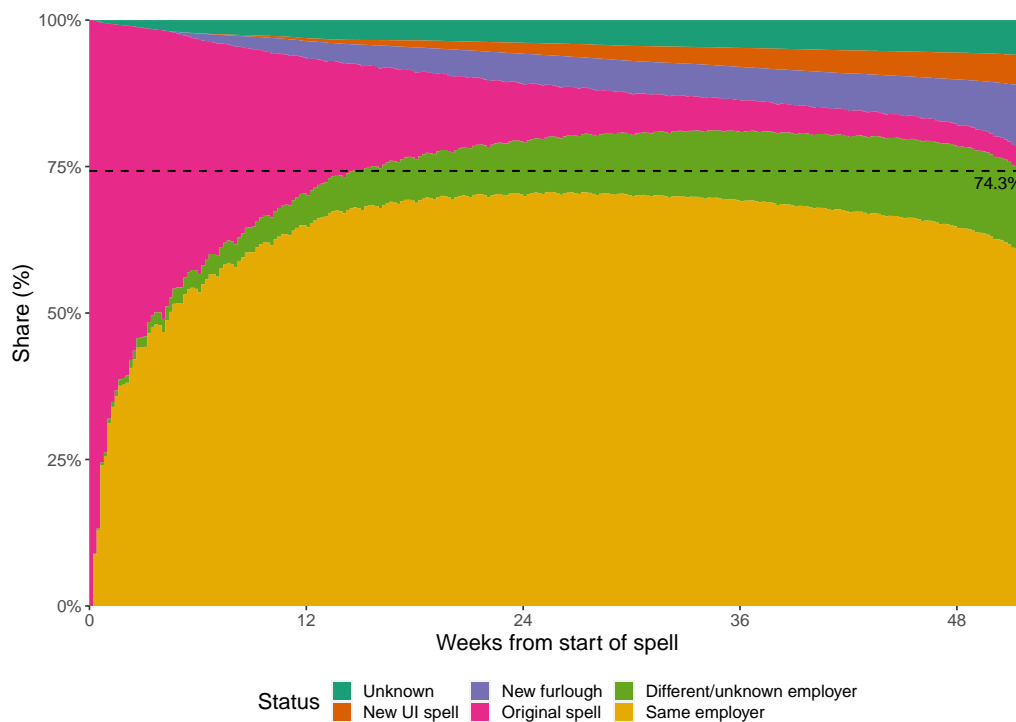


Figure 39: Daily follow-ups after a furlough, by age

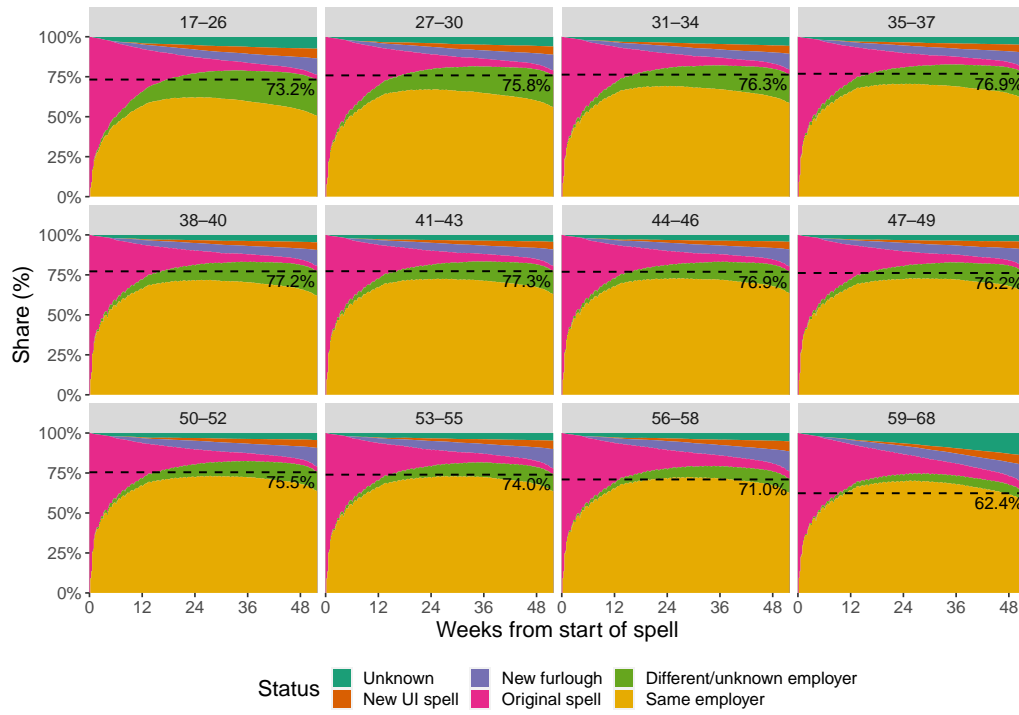


Figure 40: Daily follow-ups after a furlough, by person's classification

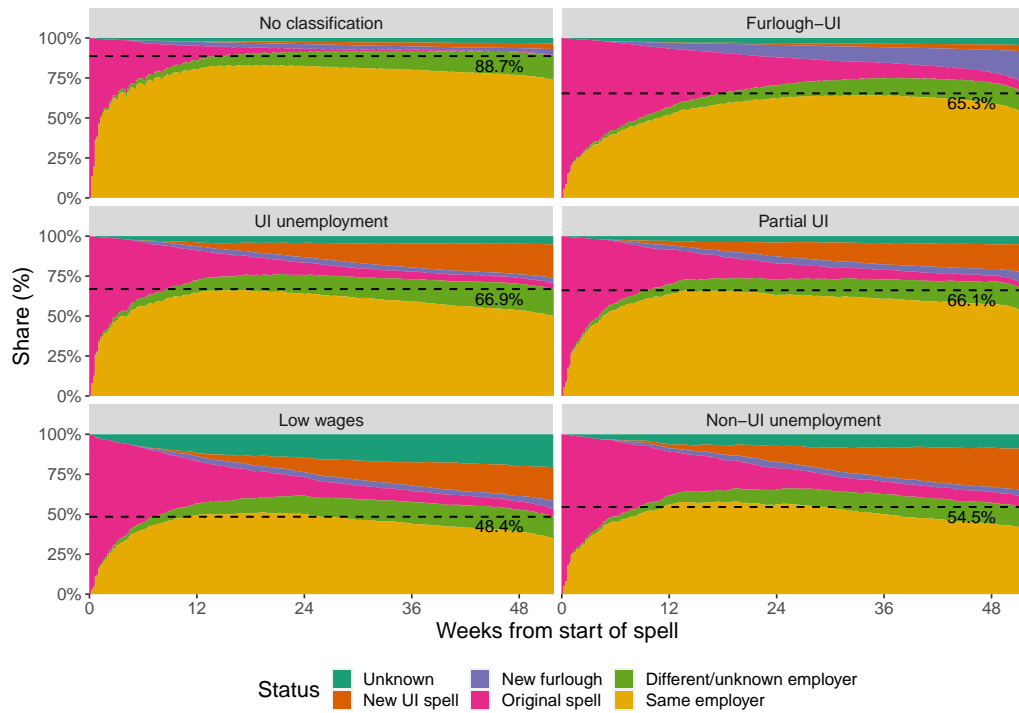




Figure 41: Daily follow-ups after a furlough, by industry

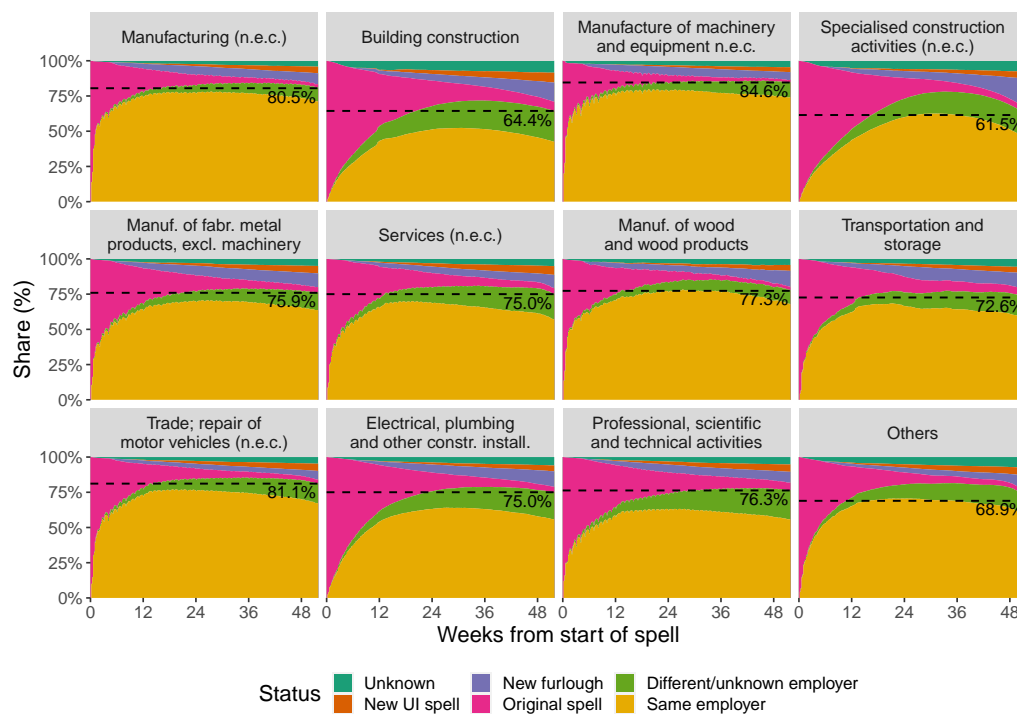
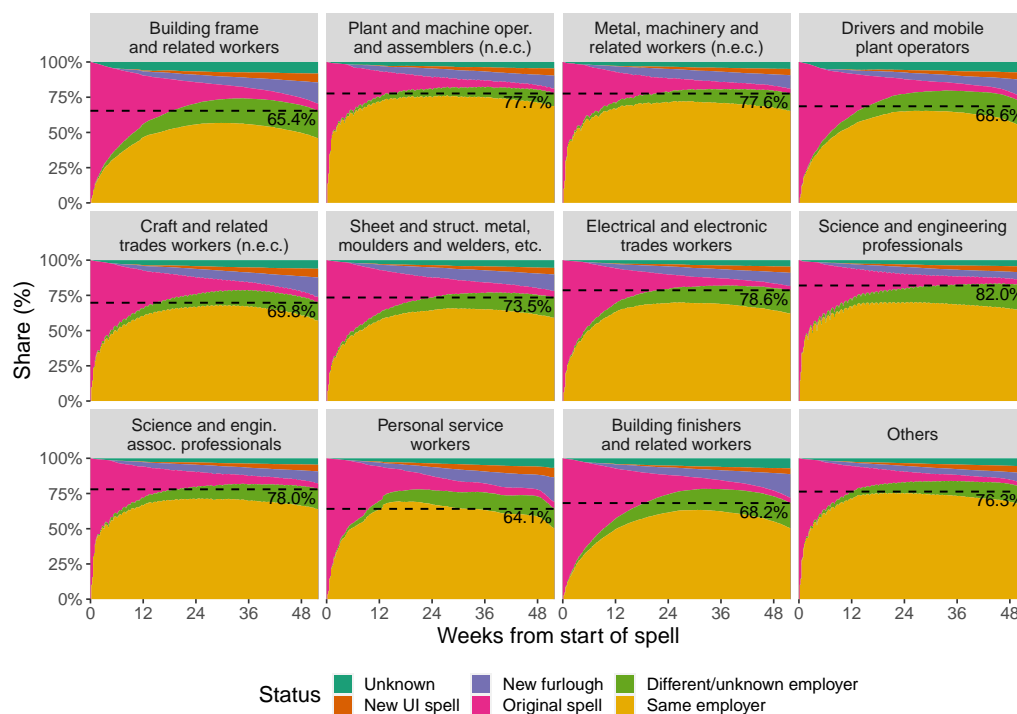


Figure 42: Daily follow-ups after a furlough, by profession



## Appendix L Teacher summer unemployment

In Finland, tenured teachers on various long-term leaves of absence, primarily family leaves, can temporarily return to their jobs for the summer time. Historically, teachers were only paid for the active teaching periods, or 9 months per year. In 1959, it was agreed that teachers' wages would instead be distributed evenly over the entire year. Most teachers are not covered by the annual holiday act, and most of their summer time is instead considered a suspension of work. Courts have confirmed that teachers cannot be furloughed during this time.<sup>6</sup>

Individuals hired as substitutes for absent teachers are only hired into 9-month fixed-term contracts, and become unemployed for the summer. This practice has also been confirmed in case law.<sup>7</sup> This causes thousands of new entries into unemployment in a single week around start of June, a surge that is visually apparent in aggregate statistics.

Most of the substitutes do not exit unemployment during the summer, but overwhelmingly return to work at the end of summer, often to a new similar fixed-term contract, as seen in figures 27 and 32.

A smaller group of other public sector workers also enter unemployment at the same time at the start of summer, stay unemployed for the summer, and then re-enter work at the start of autumn. While the institutional basis for this pattern is less well documented for the other professional groups, the empirical patterns were strong enough – exceptionally low rates of exits from unemployment during the first months, followed by exceptionally high rates of exits at the end of summer – for them to be grouped together here.

For this paper, summer unemployment was defined as unemployment benefit waiting period starting between 23rd of May and 15th of June, and one of the following joint conditions was true:

- The individual was a member of the Teacher's unemployment fund
- The individual reported one of the following as their profession:
  - Child care workers
  - Teachers' aides
  - Secondary education teachers
  - Primary school teachers
  - Social work associate professionals
  - Early childhood educators
  - Vocational education teachers
  - Special needs teachers
  - Bus and tram drivers

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<sup>6</sup>Labour Court of Finland decisions 1994:28 and 2013:93.

<sup>7</sup>The Supreme Administrative Court decision 19.12.2018/5980.

- Visual artists
  - Fitness and recreation instructors and program leaders
  - University and higher education teachers
  - Film, stage and related directors and producers
  - Other arts teachers
  - Product and garment designers
  - Teaching professionals not elsewhere classified
  - Other music teachers
  - Weaving and knitting machine operators
  - Education methods specialists
  - Other language teachers
- The individual's last job lasted between 8.5 and 10.5 months, ended within 30 days of the start of the waiting period, and terminated due to the expiration of a fixed-term contract

## Appendix M Fixed-term contracts vs. furloughs

The preceding appendix [L](#) showed that in some distinct cases, fixed-term contracts appear to fill a very similar role in labour demand management as furloughs. While the pattern and its institutional basis is particularly clear for teachers, overall teachers only explain a small part of recall unemployment following fixed-term contracts. It is worth emphasizing that the choice to sign fixed-term contracts, rather than open-ended ones, is not at the employer's discretion, whether the employer is in the public or the private sector.

Rather, the law explicitly recognized that signing repeated fixed-term contracts one after another may indicate that the employer's demand for labour (*työvoiman tarve*) has in fact been persistent. If the expiration of such a chain of subsequent contracts is legally disputed, the provision about a fixed-term may be deemed legally unjustified, defaulting the contract to an open-ended one. The dismissed employee may then be entitled to return to their job or to receive compensation for a wrongful dismissal. However, the case law also includes cases where even repeated fixed-term contracts have not constituted an open-ended one; the overarching question is about whether the employer's demand for labour is only temporary or not.

The law does not explicitly list which justifications for fixed-term contracts are valid. According to Tiitinen and Kröger ([2015](#)) and Bruun ([2022](#)), a contract tied to a specific task or to substituting a permanent employee would be some of the clearest ones. Strong seasonality of a job is one potential valid reason, but only if the demand for work is reasonably short. The government bill explicitly indicates that repeated demand for work for 9 to 10 months each year does not warrant a fixed-term contract, and the employer should rather consider whether they can offer other work for the remainder or whether the contract itself could allow for a short suspension of work and wages.

In some cases, the unpredictability of financing may allow for the use of fixed-term contracts. Many public sector projects rely upon various fixed-term sources of funding, which have prompted public sector employers to try to tie the duration of the contract to the availability of funding. The available case law indicates that limited-term financing *alone* does not constitute a sufficient justification, and need to be considered in the context of the work itself. In particular, the courts indicate that public sector employers should accept risks to the same extent as other employers.

Another potentially valid justification deals with the "nature of the job" and "other reasons related to the firm's activities". In particular, this encompasses "industry practice". As a rare example of such cases, case law has explicitly considered practices in road construction. The courts have deemed that since most work in this industry is organized as individual projects *and* most employers in the industry sign contracts for a fixed duration, even the repeated use of fixed-term contracts can be legal, as long as the total duration of consequent contracts is not unreasonably long. The court also recognized the trade

union’s opinion on the matter, as the union stated that such use of fixed-term contracts is an accepted industry practice. The road construction industry has also contributed, compared to their wages, a significant number of UI spells after the expiration of fixed-term contracts over 1999–2021.

Overall, the widespread use of fixed-term contracts in some sectors but not others remains something of a puzzle. Neither statutory nor case law indicates that the public and the private sector should have more leeway for the use of fixed-term contracts or furloughs.

The data indicates that public and private sectors tend to use distinct mechanisms to manage labor demand. In the public sector, furloughs are rare, while fixed-term contracts expirations are a common cause of unemployment for public sector employees, often followed by later recalls to the same employer. In the private sector, the opposite is true. Whatever the institutional basis for these differences, any safeguards that seek to constrain the use of industry- or employer-specific reserve unemployment (or have employers internalize its costs) should ideally deal with both mechanisms.

## Appendix N Furloughs by industry: coarsening and additional descriptives

Industries were progressively coarsened, starting from the 4-digit level, to focus on industries that are either major employers or are particularly prone to rely on furloughs, other types of recall spells, or partial unemployment. Industry proneness for these events was determined by comparing the costs for UI spells where the employee last worked in a given industry to the wages of that industry. Table 8 lists the original industry labels and their coarsened counterparts. Besides the official 1- to 4-digit levels based on NACE rev. 2, a "0-level" grouping was used for services, loosely based on the Statistics Finland unofficial main industry grouping.<sup>8</sup> A subset of these industries were chosen for further analysis, based on their ability to demonstrate cross-industry variance in the use of furloughs or other mechanisms of labour demand management.

Section 6 in the main text and appendix P describe how employers were classified by their propensity for furloughs and other types of UI spells. Table 7 describes the share of each classification per coarsened industry.

Even within furlough-prone industries, there is significant dispersion in the furlough frequency. Table 10 demonstrates the shares of wages paid by employers who either had no significant furloughs or had significant furloughs on half of their years in operation.

Table 7: Employer classification by industry

Industry	Furloughs	Collective dis- missals	Partial UI	Fixed- term	Other UI	No classifi- cation
Manufacturing (n.e.c.)	18.7%	4.9%	0.9%	3.2%	2.4%	70.0%
Services (n.e.c.)	4.3%	2.8%	4.7%	5.6%	8.2%	74.3%
Human health activities	0.4%	0.2%	5.6%	11.3%	17.4%	65.1%
Education	0.6%	0.1%	6.5%	23.1%	15.5%	54.2%
Public admin. and defence, social security	0.0%	0.0%	2.0%	12.6%	10.2%	75.2%
Trade; repair of motor vehicles (n.e.c.)	5.6%	5.6%	1.6%	3.0%	3.4%	80.8%
Professional, scientific and technical activities	11.3%	3.2%	3.5%	5.8%	4.8%	71.4%
Transportation and storage	16.8%	3.2%	6.6%	3.3%	10.2%	60.0%
Retail trade, excl. motor vehicles	3.5%	4.4%	13.1%	2.8%	26.6%	49.5%
Residential care activities	0.4%	0.5%	10.3%	21.1%	34.5%	33.2%
Industrial or construction (n.e.c.)	16.5%	0.9%	0.9%	8.1%	5.8%	67.8%
Manufacture of machinery and equipment n.e.c.	28.5%	1.8%	0.3%	0.4%	0.5%	68.5%
Other social work without accomm.	0.3%	0.3%	9.2%	32.9%	22.4%	34.9%
Industry unknown	2.0%	1.2%	5.7%	20.5%	15.6%	55.0%
Building construction	65.3%	3.2%	0.6%	3.3%	2.3%	25.3%
Other service activities	3.1%	2.0%	11.1%	20.2%	7.5%	56.0%
Manuf. of fabr. metal products, excl. machinery	45.5%	3.4%	0.4%	2.1%	2.3%	46.4%
Services to buildings and landscape activities	4.1%	1.6%	19.3%	12.5%	30.7%	31.7%
Food and beverage service activities	17.1%	3.7%	11.6%	9.4%	21.2%	37.1%
Electrical, plumbing and other constr. install.	55.0%	2.5%	0.8%	1.9%	1.8%	38.0%
Specialised construction activities (n.e.c.)	53.1%	3.0%	1.0%	5.4%	3.8%	33.7%
Manuf. of wood and wood products, excl. furniture	58.9%	2.4%	0.4%	1.7%	1.7%	34.9%
Temporary employment agency activities	3.1%	1.1%	18.1%	42.0%	10.8%	24.9%

The columns refer to the share of employers, weighted by their wages, in the given classification per industry.

<sup>8</sup>The experimental nowcast estimates for "main industries" group together industrial production B-E, construction F, trade G, and other service activities HIJLMRNS.

Table 8: Industry coarsening

Coarsened label	Original level	Coarsening level	Share of empl.	Employer units	Original industry labels
Services (n.e.c.)	1	0	11.7%	92,134	Accommodation and food service activities Administrative and support service activities Arts, entertainment and recreation Financial and insurance activities Human health and social work activities Information and communication Real estate activities
Manufacturing (n.e.c.)	2	1	11.1%	23,761	Manufacture of basic metals Manufacture of basic pharmaceutical products and pharmaceutical preparations Manufacture of beverages Manufacture of chemicals and chemical products Manufacture of coke and refined petroleum products Manufacture of computer, electronic and optical products Manufacture of electrical equipment Manufacture of food products Manufacture of furniture Manufacture of leather and related products Manufacture of motor vehicles, trailers and semi-trailers Manufacture of other non-metallic mineral products Manufacture of other transport equipment Manufacture of paper and paper products Manufacture of rubber and plastic products Manufacture of textiles Manufacture of tobacco products Manufacture of wearing apparel Other manufacturing Printing and reproduction of recorded media Repair and installation of machinery and equipment
Human health activities	2	2	7.6%	16,475	Human health activities
Education	2	2	7.2%	7,241	Education
Retail trade, excl. motor vehicles	2	2	6.2%	42,857	Retail trade, except of motor vehicles and motorcycles
Transportation and storage	1	1	5.9%	36,263	Transportation and storage
Public admin. and defence, social security	2	2	5.7%	2,804	Public administration and defence; compulsory social security
Trade; repair of motor vehicles (n.e.c.)	2	1	5.4%	40,854	Wholesale and retail trade and repair of motor vehicles and motorcycles Wholesale trade, except of motor vehicles and motorcycles
Professional, scientific and technical activities	1	1	5.2%	58,518	Professional, scientific and technical activities
Industry unknown	4	4	3.7%	140,084	Industry unknown
Other social work without accomm.	3	3	3.5%	6,751	Other social work activities without accommodation
Residential care activities	2	2	3.5%	3,319	Residential care activities
Services to buildings and landscape activities	2	2	2.7%	15,195	Services to buildings and landscape activities
Food and beverage service activities	2	2	2.6%	27,263	Food and beverage service activities
Other service activities	1	1	2.3%	30,531	Other service activities

Table 9: Industry coarsening (cont'd)

Coarsened label	Original level	Coarsening level	Share of empl.	Employer units	Original industry labels
Manufacture of machinery and equipment n.e.c.	2	2	2.2%	4,453	Manufacture of machinery and equipment n.e.c.
Industrial or construction (n.e.c.)	1	0	2.2%	8,914	Construction Electricity, gas, steam and air conditioning supply Mining and quarrying Water supply; sewerage, waste management and remediation activities
Building construction	4	4	2.2%	33,056	Construction of residential and non-residential buildings
Manuf. of fabr. metal products, excl. machinery	2	2	1.9%	8,157	Manufacture of fabricated metal products, except machinery and equipment
Specialised construction activities (n.e.c.)	3	2	1.7%	23,845	Building completion and finishing Demolition and site preparation Other specialised construction activities
Temporary employment agency activities	4	4	1.6%	3,113	Temporary employment agency activities
Electrical, plumbing and other constr. install.	3	3	1.6%	14,037	Electrical, plumbing and other construction installation activities
Unused (due to concerns about the quality of the classification and the data)	1	0	1.5%	98,693	Activities of extraterritorial organisations and bodies  Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use Agriculture, forestry and fishing
Manuf. of wood and wood products, excl. furniture	2	2	1.1%	3,976	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials



Table 10: Frequently and rarely furloughing employers by industry

Industry	Shares of wages by employers with:				Employer-year pairs	Employer units
	No significant furloughs	No signif. furloughs before 2020	Signif. furloughs on half the years			
Electrical, plumbing and other constr. install.	26.8%	29.4%	27.7%	142,778	18,091	
Specialised construction activities (n.e.c.)	26.3%	27.7%	22.9%	253,166	33,413	
Manuf. of wood and wood products, excl. furniture	18.3%	19.6%	19.8%	42,156	5,255	
Building construction	23.8%	25.5%	17.5%	281,372	44,008	
Food and beverage service activities	51.6%	69.2%	12.2%	200,498	32,405	
Industrial or construction (n.e.c.)	52.2%	52.7%	10.9%	86,442	12,007	
Manuf. of fabr. metal products, excl. machinery	21.2%	28.3%	9.0%	87,504	10,320	
Manufacturing (n.e.c.)	46.6%	50.7%	3.9%	261,486	34,921	
Manufacture of machinery and equipment n.e.c.	27.3%	42.0%	3.8%	39,713	5,587	
Education	46.2%	47.7%	3.4%	89,219	11,006	
Temporary employment agency activities	60.1%	81.7%	2.1%	18,845	3,492	
Professional, scientific and technical activities	66.8%	71.4%	1.7%	536,015	83,309	
Services to buildings and landscape activities	56.5%	63.2%	1.0%	149,356	22,567	
Transportation and storage	48.6%	58.9%	0.6%	418,915	43,916	
Retail trade, excl. motor vehicles	53.8%	64.5%	0.6%	395,241	59,803	
Trade; repair of motor vehicles (n.e.c.)	64.8%	72.7%	0.5%	405,524	53,770	
Other service activities	77.8%	85.6%	0.5%	490,240	64,977	
Services (n.e.c.)	73.1%	79.2%	0.4%	741,763	124,265	
Other social work without accomm.	37.5%	40.1%	0.2%	69,900	8,790	
Public admin. and defence, social security	81.4%	81.4%	0.1%	48,034	2,929	
Residential care activities	71.1%	71.8%	0.1%	49,758	3,431	
Human health activities	68.8%	71.4%	0.0%	248,874	31,505	

The threshold for significant threshold is that furlough UI costs to wages exceeds 1% per an (employer, year) pair. Employer shares are weighted by cumulative wages from 1999 to 2021. The determination of having furloughs on half the years is made at the employer level, and compares significant furlough years to the years that particular employer paid wages.

The main text described the annual furloughing propensities by these industry groupings. Figures 43–45 focus on within-industry variation, and represent a generalization of the Lorenz curve applied to employers. Because employers come in very different sizes and lifetimes, the running variable on the  $x$ -axis is not the cumulative share of employer units, but the share of wages paid. Thus, the figures tell us, for example, that in specialised construction activities employers responsible for 27% of the wages caused 50% of the furloughs. Figures 46–48 demonstrate the total variation in the use of the different instruments across all employers. Overall, the variation within the most furlough-prone industries is smaller than between industries, and the use of furloughs is in general much more skewed than the use of other recall unemployment.

Finally, figures 49 and 50 demonstrate the monthly use of non-furlough recall UI spells and partial unemployment in the selected industries.

Figure 43: Generalized Lorenz curves for furloughs by industry

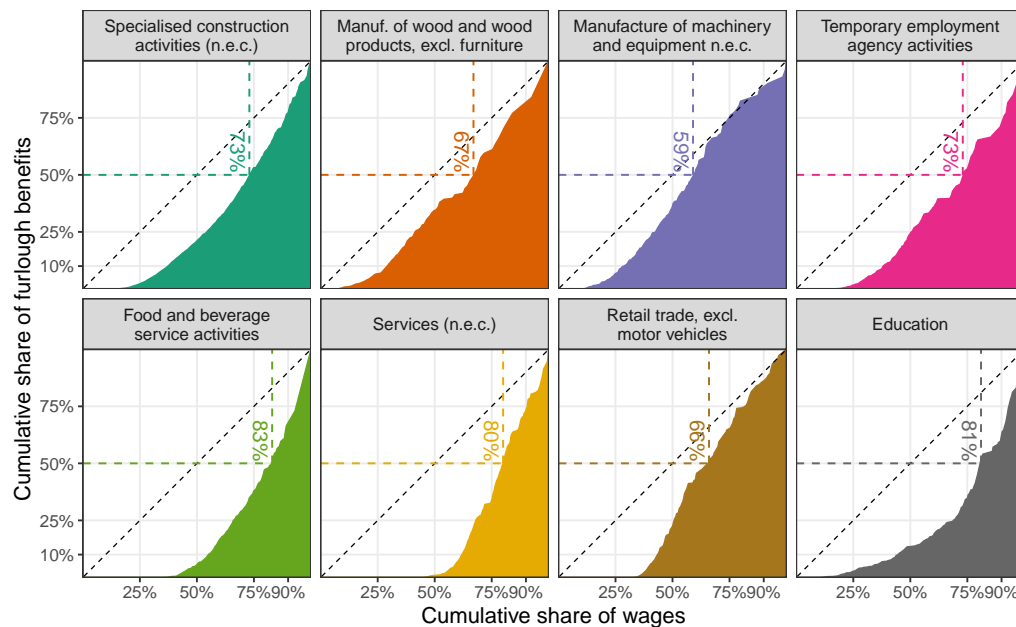


Figure 44: Generalized Lorenz curves for non-furlough recall UI by industry

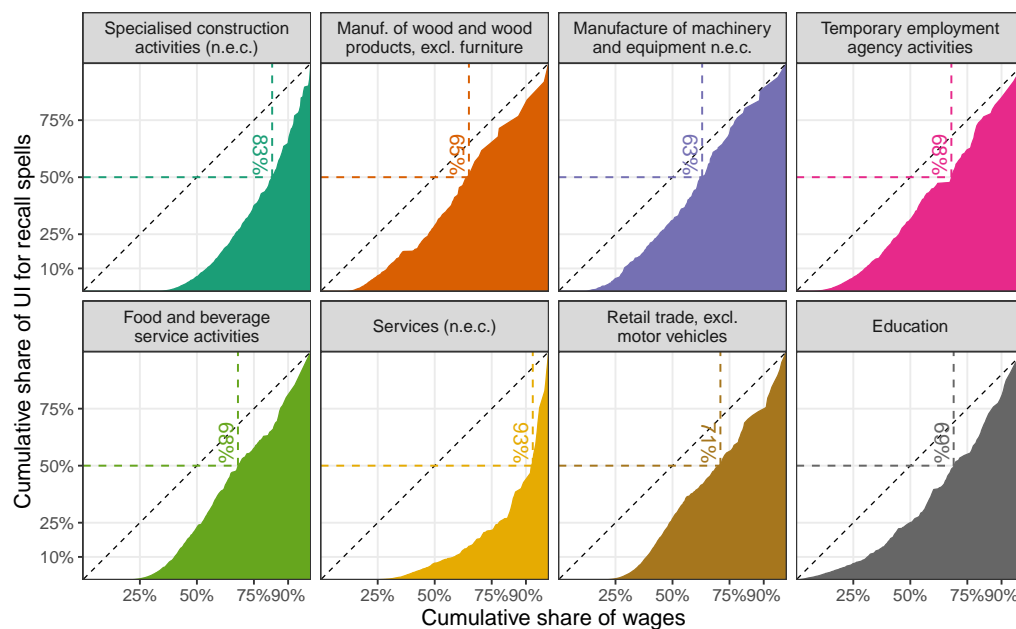


Figure 45: Generalized Lorenz curves for partial UI by industry

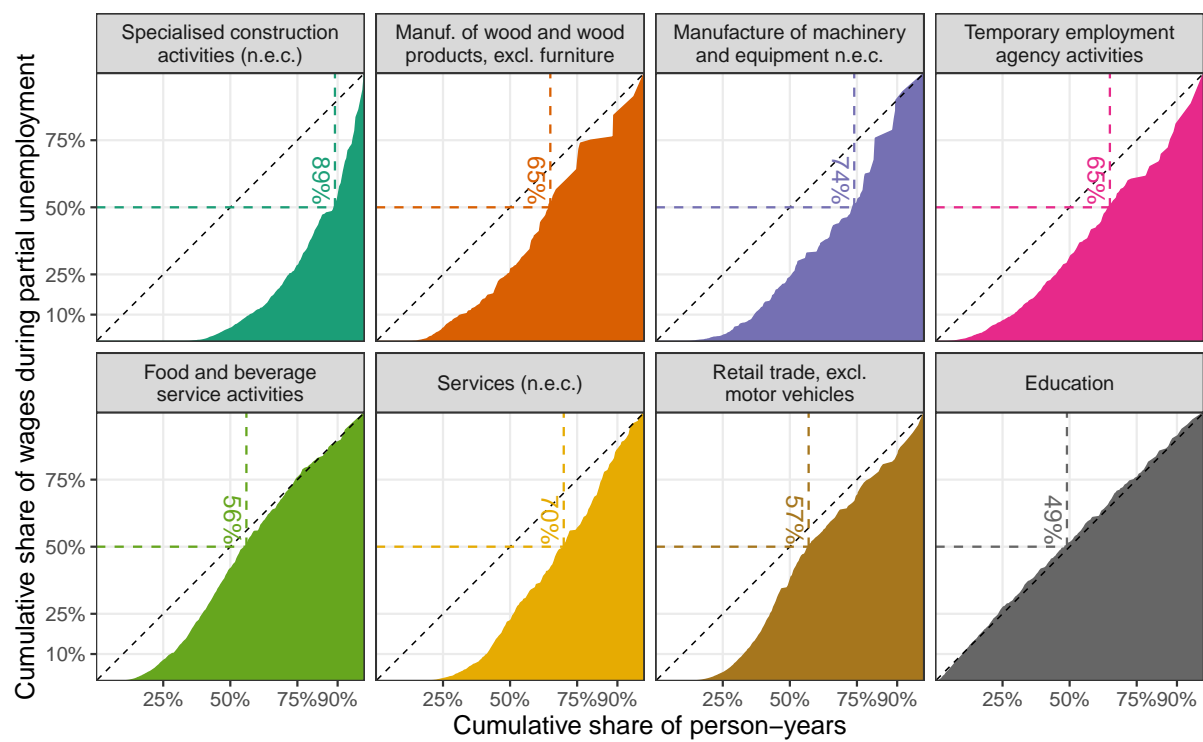


Figure 46: Generalized Lorenz curve for all employers, furloughs

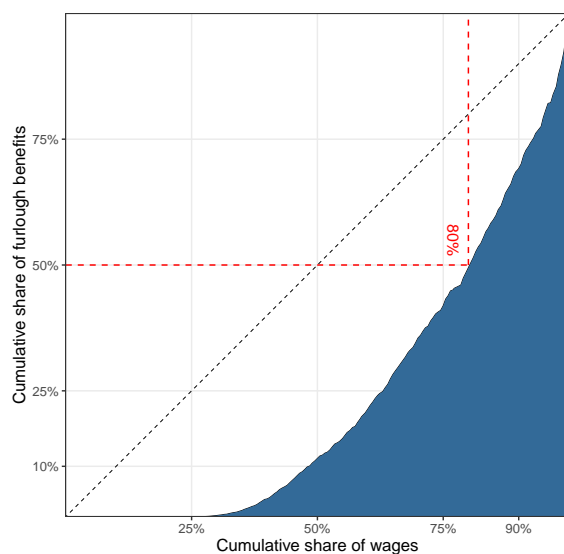


Figure 47: Generalized Lorenz curve for all employers, non-furlough recall UI

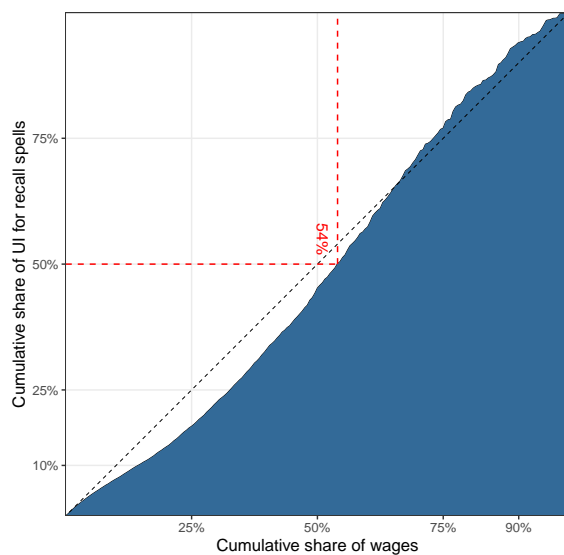


Figure 48: Generalized Lorenz curve for all employers, partial UI

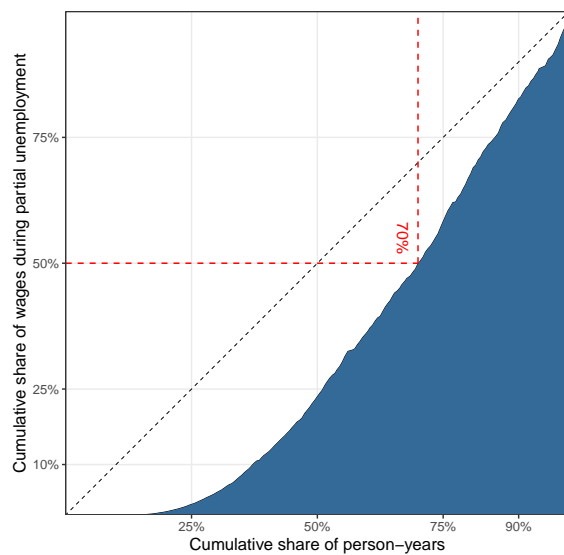


Figure 49: Monthly non-furlough recall unemployment in selected industries

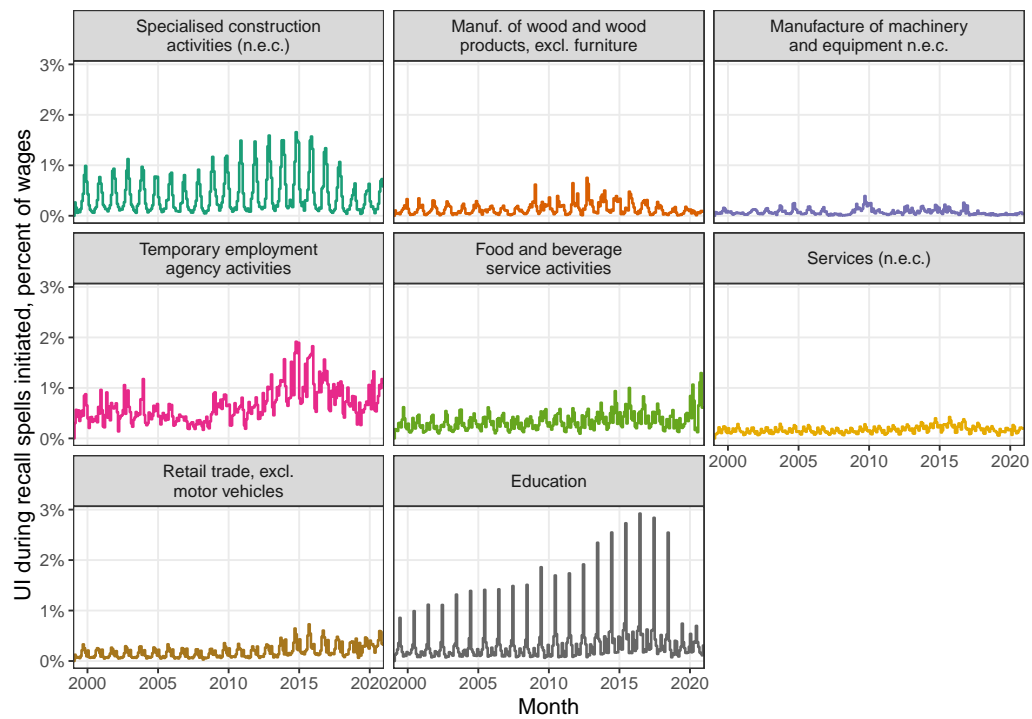
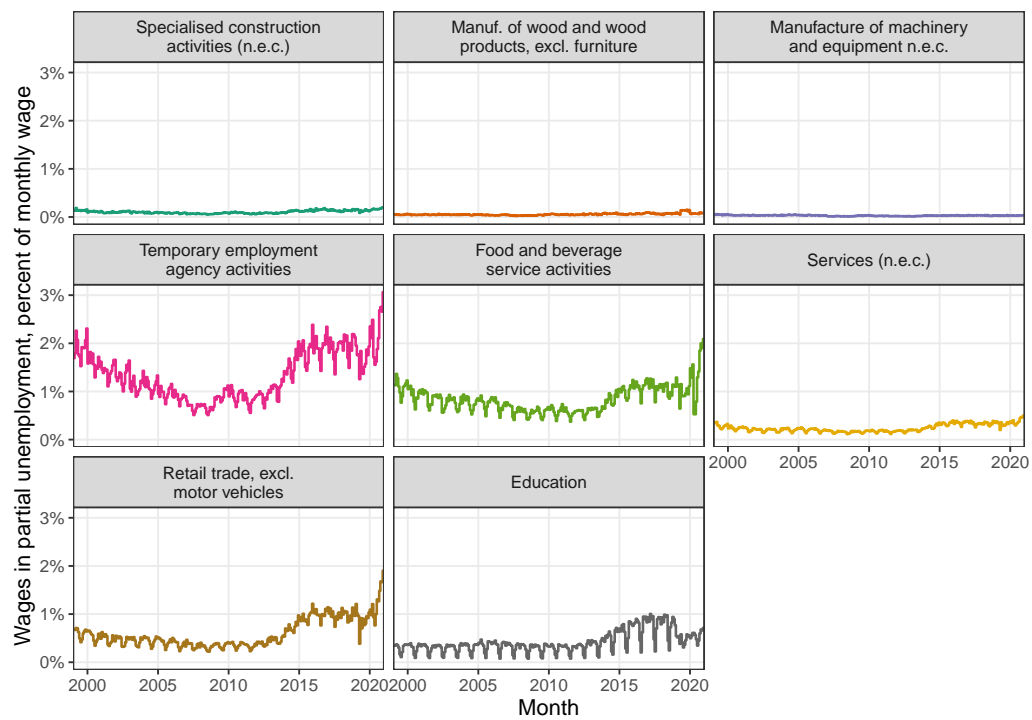


Figure 50: Monthly partial unemployment in selected industries



## Appendix O   Definitions and additional descriptives: the often furloughed

For the panel of individuals born in 1960–1976, table 11 complements the descriptives in the main text.

Years of education were estimated based on the level of finished educations (past primary school), using the data of how long said education level is expected to usually take in Finland, rather than years actually spent registered in an educational institution. This determination was mostly done at the 2-digit level of the national education classification. If the first observed qualification is beyond a secondary level, the entry qualification is assumed to have been attained before.

For years 1999–2009, unemployment assistance received was estimated as the difference of annual unemployment benefits (coming from annual income data) and annual UI benefits (coming from payment-level benefit data).

Data on having children is based on the years since 1999 that the person had underage children living in their household.

Table 11: Additional descriptives for a panel of individuals over 1999–2021.

Variable	No classification	Furlough-UI	UI unemployment	Partial UI	Non-UI unemployment	Low wages
Has a bachelor's degree or higher (2021)	33.9%	11.3%	27.2%	18.8%	8.1%	12.3%
Years of education (2021)	13.8 (2.7)	12.3 (2.1)	13.3 (2.5)	12.9 (2.2)	11.5 (2.2)	11.9 (2.4)
Years of partial UI	0.40 (0.41)	0.60 (1.08)	0.59 (0.49)	3.56 (2.08)	0.39 (0.40)	0.48 (0.44)
Annual wages during partial UI	235.1 € (282 €)	337.5 € (690 €)	302.1 € (307 €)	2,099.6 € (1,449 €)	187.2 € (224 €)	220.8 € (240 €)
UI-to-contributions ratio (mean)	2.05 (4.5)	16.63 (24.5)	31.17 (21.0)	26.72 (29.7)	32.08 (59.8)	24.78 (58.7)
At least one low-wage year	61.8%	73.6%	98.5%	93.0%	100.0%	100.0%
At least one normal wage year	100.0%	99.5%	99.5%	97.1%	51.6%	45.6%
At least one non-UI unemployment event	45.8%	79.3%	94.7%	89.7%	100.0%	63.8%
At least one non-furlough UI event	36.9%	73.1%	100.0%	100.0%	46.8%	33.8%
At least one BUA event	4.3%	5.5%	6.4%	3.0%	37.8%	10.0%
Years of partial UI&UA	0.56 (0.84)	0.69 (1.11)	0.92 (1.24)	2.80 (1.93)	1.54 (1.99)	1.20 (1.45)
Average entrepreneurial income	378.6€ (1,304€)	725.9€ (3,046€)	415.1€ (2,076€)	663.9€ (2,714€)	372.5€ (1,783€)	1,086.5€ (2,344€)
Average property income	648€ (1,423€)	781€ (3,978€)	1,137€ (8,143€)	589€ (5,025€)	223€ (1,771€)	1,991€ (2,685€)
Years with non-UI unemployment	1.2 (2.0)	3.2 (3.4)	4.9 (3.0)	4.2 (3.0)	16.2 (4.0)	3.8 (4.1)
Estimated years of education (2022)	13.8 (2.7)	12.3 (2.1)	13.3 (2.5)	12.9 (2.2)	11.5 (2.2)	11.9 (2.4)
Consecutive years with distinct spells (2010–)	0.2 (0.7)	1.8 (2.4)	1.8 (2.4)	2.5 (2.7)	0.8 (1.3)	0.4 (1.1)
FTE years since 2010:						
Furloughed	0.02 (0.09)	0.91 (0.99)	0.05 (0.21)	0.04 (0.17)	0.01 (0.10)	0.01 (0.08)
UI, other	0.15 (0.56)	0.50 (1.17)	2.02 (1.78)	1.79 (1.73)	0.66 (1.40)	0.42 (1.31)
UI, fixed-term	0.04 (0.25)	0.16 (0.55)	0.79 (1.17)	0.40 (0.77)	0.11 (0.53)	0.10 (0.49)
UI, collective dismissal	0.03 (0.23)	0.07 (0.34)	0.18 (0.58)	0.07 (0.32)	0.02 (0.22)	0.01 (0.14)
UA	0.09 (0.74)	0.21 (0.91)	0.33 (1.00)	0.13 (0.58)	3.28 (2.60)	0.61 (2.08)
Distinct spells since 2010:						
Furloughed	0.30 (0.91)	3.53 (3.95)	0.27 (0.80)	0.28 (0.91)	0.03 (0.25)	0.03 (0.24)
UI, other	0.24 (0.83)	0.79 (1.71)	2.64 (2.82)	4.90 (4.99)	0.46 (1.10)	0.45 (1.36)
UI, fixed-term	0.09 (0.50)	0.31 (1.02)	1.25 (2.10)	0.92 (1.68)	0.10 (0.46)	0.13 (0.64)
UI, collective dismissal	0.04 (0.20)	0.09 (0.34)	0.14 (0.44)	0.08 (0.30)	0.01 (0.11)	0.01 (0.09)
UA	0.13 (0.66)	0.26 (0.85)	0.49 (1.02)	0.16 (0.56)	2.43 (2.22)	0.66 (1.33)

All values are frequencies, counts or means. Standard deviations in parentheses.



Figures 51–52 illustrate outcomes at the level of the entire panel. The first demonstrates the share of the panel in one of four statuses per month: furloughed (collecting UI during a furlough), employed and unemployed (collecting both wages and non-furlough UI), other UI (collecting non-furlough UI, not employed), employed (collecting wages, no UI) or not observed. Note that the figure does not include unemployment assistance, as it is not available at a monthly level prior to 2020. The second demonstrates, for each year, the cumulative share of the panel that had experienced one of the statuses at least once. More than half of the panel collect unemployment benefits at least once, and almost a quarter are furloughed at once.

Figures 53–59 illustrate the evolution of incomes and unemployment benefits collected by year and group; figure 60 shows the estimated average educational attainment in years. While the furlough-prone group and the residual "no classification" group (regular wage earners with only occasional unemployment) both enjoy high employment rates on average, many in the residual group are still finishing their studies or nurturing small children at the start of the follow-up. Later, they catch up and surpass the wages and employment in the furlough-prone group. In the group with low wages but only occasional unemployment benefits, a growing share collects various pensions, such as disability pensions.

There is clear regional variation in the residence by the different groups. 61 shows a heatmap of the share of cumulative *person-years* of residence by sub-regional unit. Note that this tries to capture long-term patterns, and the cumulative spatial distribution may be different from the distribution in any given year.

Figures 62–65 demonstrate variations of the Lorenz curve where individuals are first ordered by either the count of distinct spells or the duration of the longest spell in weeks, and then by benefits paid. Half of all furlough benefits are paid to less than a fifth of all furloughed individuals who experience 5 spells or more; for the other spell types, the majority of the benefits is collected by a few long spells.

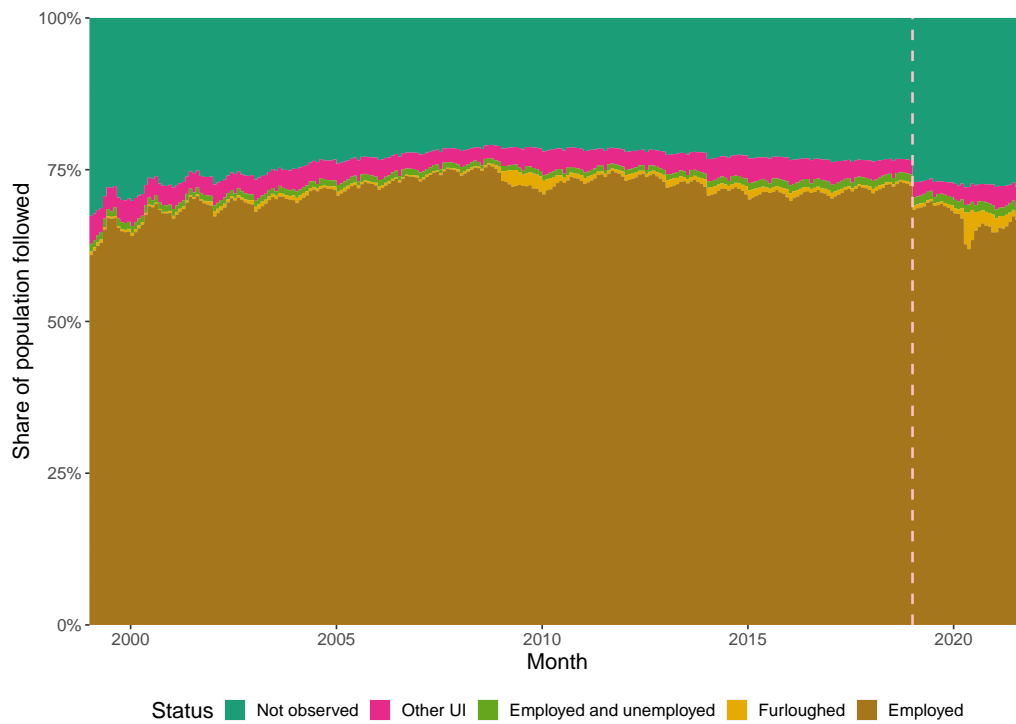
Finally, figures 66–74 show the Lorenz curves for benefits claimed during various types of unemployment spells. They replicate and accompany the same curves illustrated for furloughs, all UI and all unemployment benefits in the main text.

Table 12: Top education levels, main industries and main professions by group.

Variable	Classification	Top three values per classification
Level of education	No classification	Vocational upper secondary education and training (30.7%) Post-secondary non-higher vocational education (14.1%) Higher university degree (Master) (13.5%)
	Furlough-UI	Vocational upper secondary education and training (51.3%) No post-basic education obs. (14.1%) Further qualification (11.6%)
	UI unemployment	Vocational upper secondary education and training (39.7%) Further qualification (15.6%) Higher university degree (Master) (10.2%)
	Partial UI	Vocational upper secondary education and training (42.0%) Further qualification (18.2%) Post-secondary non-higher vocational education (9.9%)
	Non-UI unemployment	Vocational upper secondary education and training (40.9%) No post-basic education obs. (33.8%) Further qualification (9.0%)
	Low wages	Vocational upper secondary education and training (39.3%) No post-basic education obs. (27.5%) Further qualification (7.3%)
Main industry	No classification	Manufacturing (n.e.c.) (13.1%) Services (n.e.c.) (12.6%) Human health activities (9.4%)
	Furlough-UI	Manufacturing (n.e.c.) (20.7%) Building construction (9.9%) Transportation and storage (8.9%)
	UI unemployment	Manufacturing (n.e.c.) (17.0%) Services (n.e.c.) (13.8%) Education (8.2%)
	Partial UI	Education (13.2%) Services (n.e.c.) (11.9%) Retail trade, excl. motor vehicles (10.8%)
	Non-UI unemployment	Services (n.e.c.) (10.7%) Other service activities (8.6%) Other social work without accomm. (8.5%)
	Low wages	Services (n.e.c.) (11.8%) Retail trade, excl. motor vehicles (7.5%) Education (6.7%)
Main profession	No classification	Others (12.3%) Professionals (n.e.c.) (8.6%) Business and administration associate professionals (8.5%)
	Furlough-UI	Building frame and related trades workers (11.8%) Plant and machine operators, and assemblers (n.e.c.) (11.0%) Drivers and mobile plant operators (7.9%)
	UI unemployment	Others (11.9%) Clerical support workers (8.2%) Plant and machine operators, and assemblers (n.e.c.) (7.8%)
	Partial UI	Others (12.8%) Personal care workers in health services (10.8%) Domestic, hotel and office cleaners and helpers (10.0%)
	Non-UI unemployment	Others (14.6%) Domestic, hotel and office cleaners and helpers (10.6%) Personal care workers in health services (8.3%)
	Low wages	Others (12.4%) Personal care workers in health services (9.5%) Domestic, hotel and office cleaners and helpers (7.7%)

The education data is from 2022. Industry and profession data are defined for each person as a wage-weighted average over the years 1999–2021.

Figure 51: Status per month, panel born 1960–1976



The vertical dashed line represents a break in the employment and wage data used.

Figure 52: Cumulative incidence per year, panel born 1960–1976

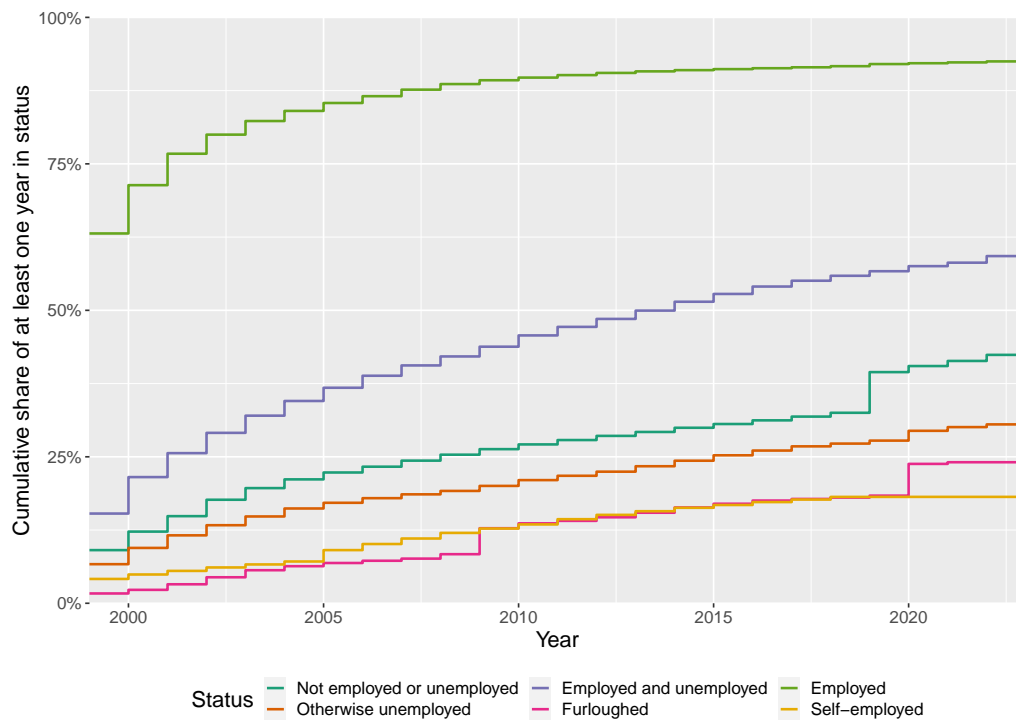


Figure 53: Net annual income for the panel

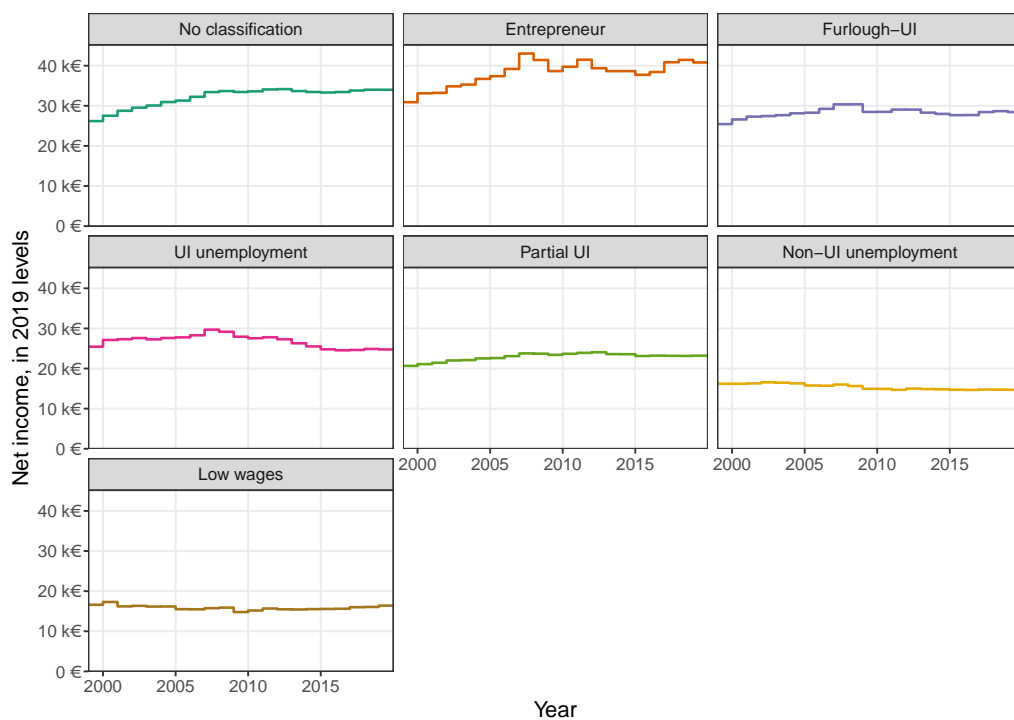


Figure 54: Probability of normal wages (at least half of median wage) for the panel

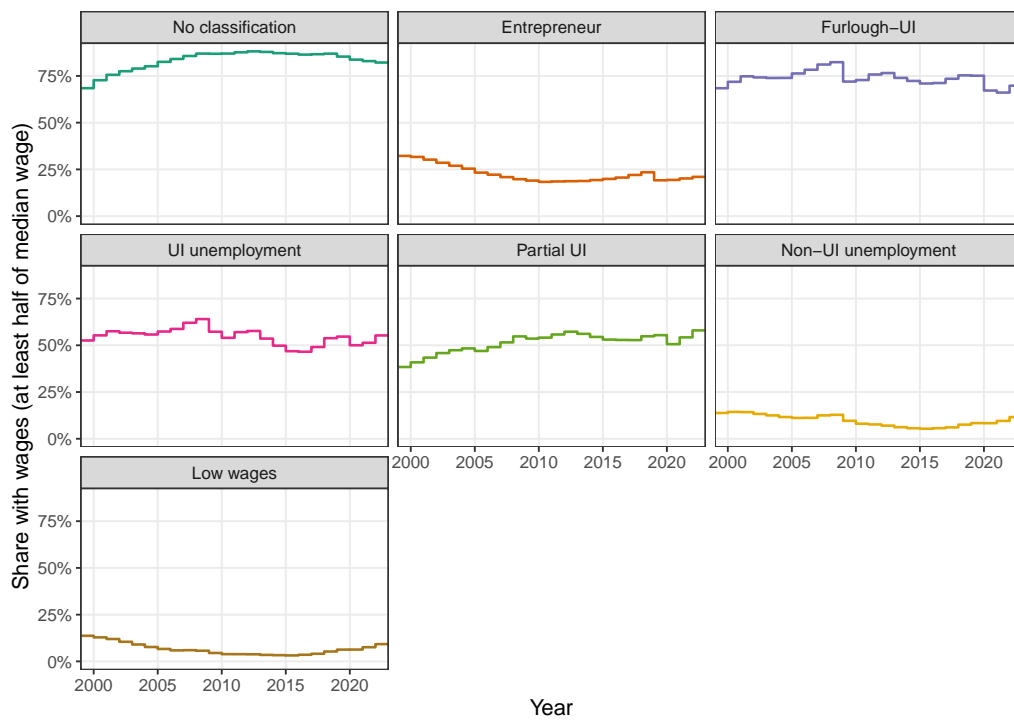


Figure 55: Probability of unemployment benefits per year

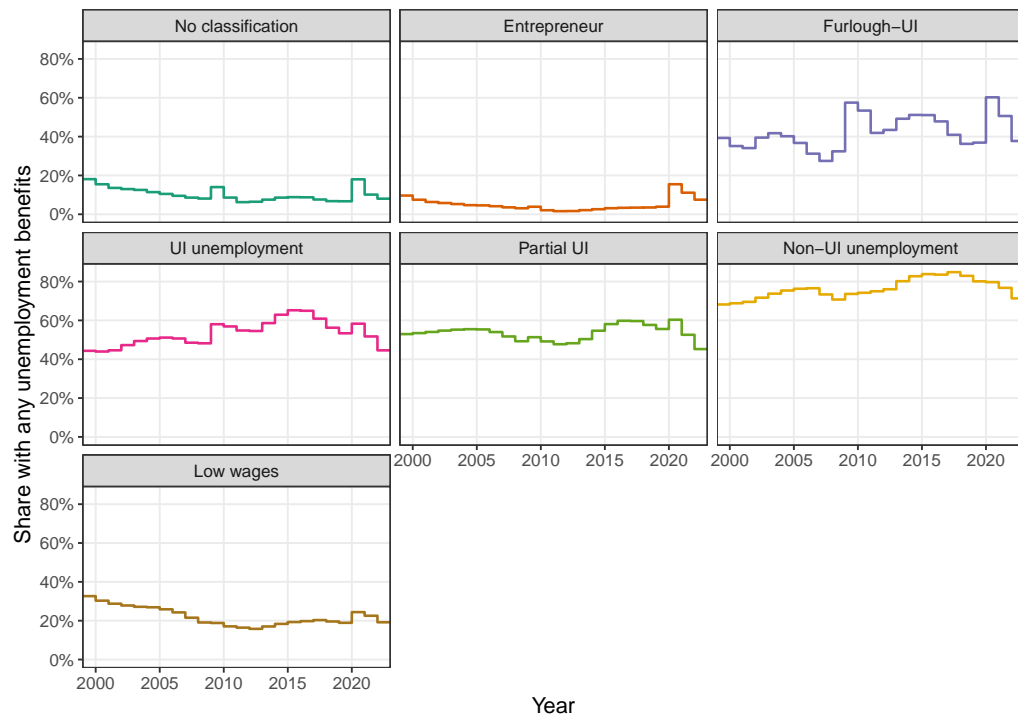
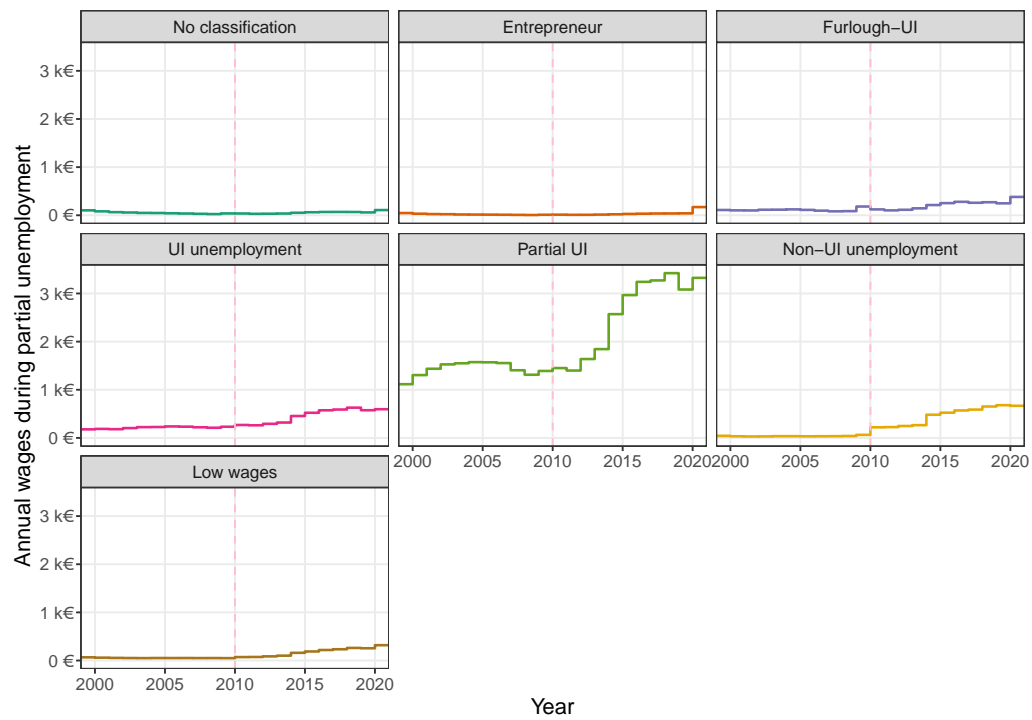


Figure 56: Annual wages during partial unemployment for the panel



For 1999–2009, partial UI only. After 2010 (indicated by the dashed vertical line) includes partial UA.

Figure 57: Parental benefits for the panel

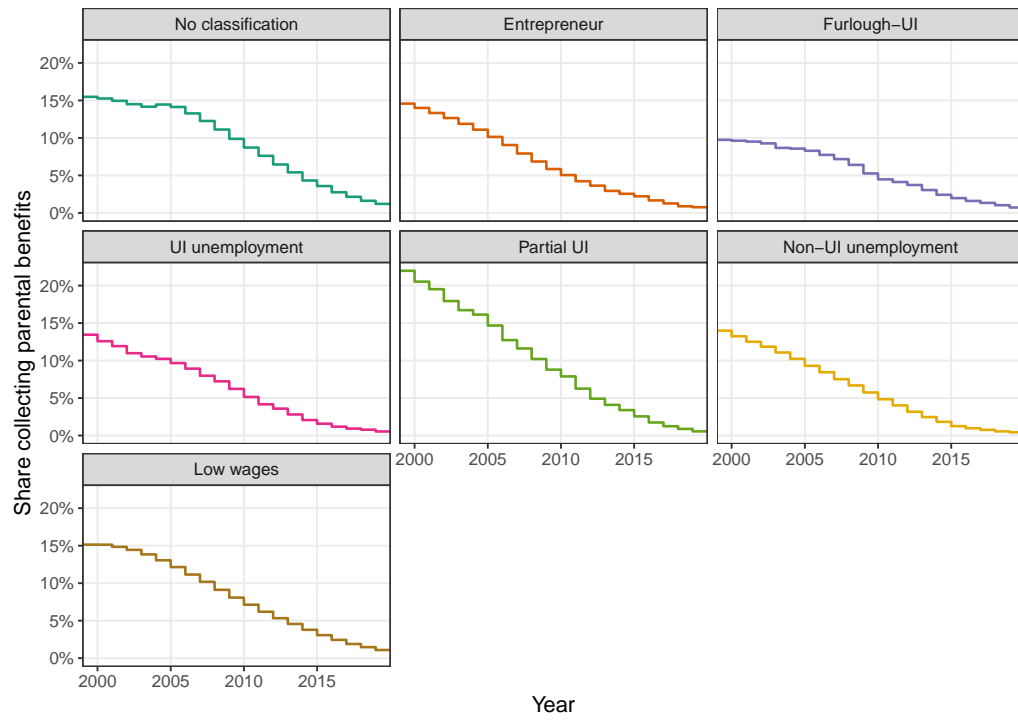


Figure 58: Pensions claimed by the panel

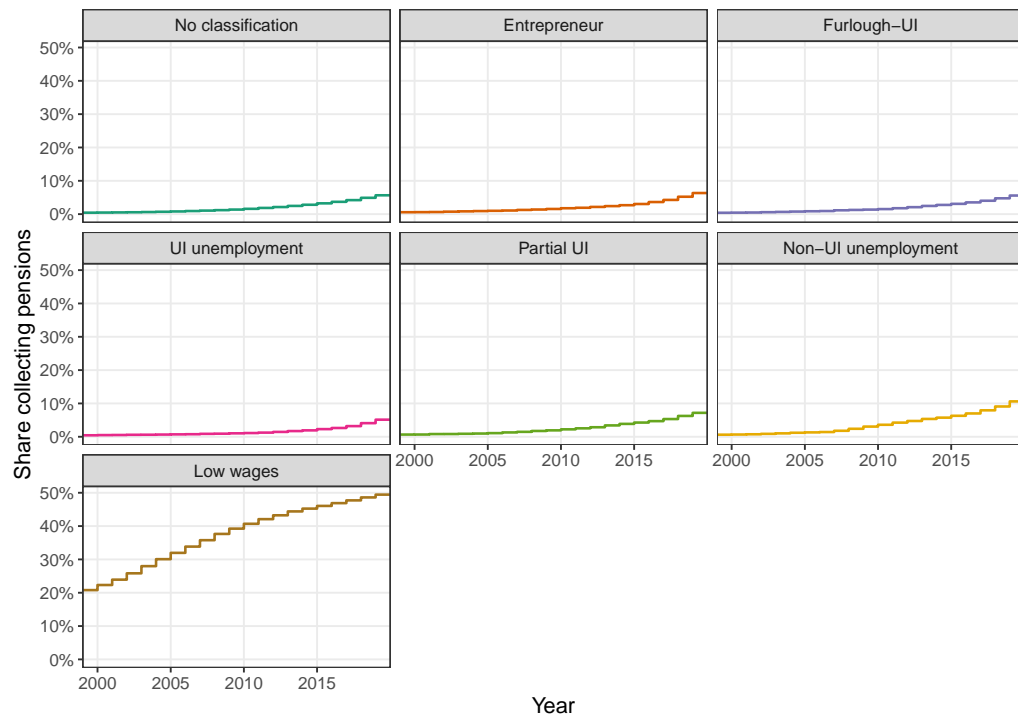


Figure 59: Study grant per year by the panel

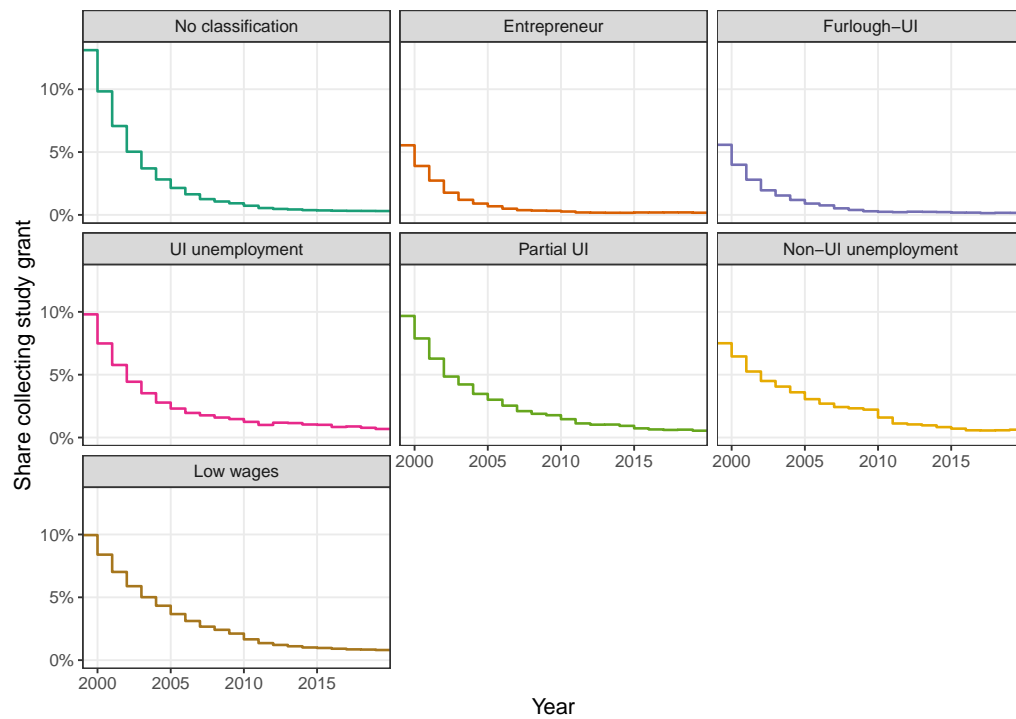


Figure 60: Education attainment by the panel

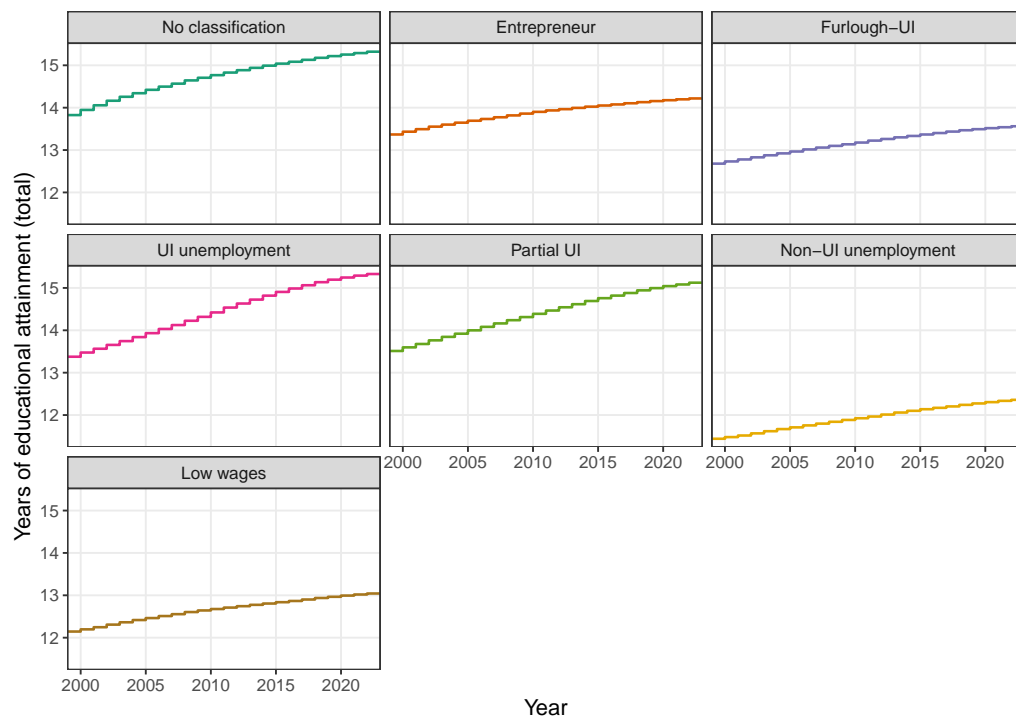


Figure 61: Cumulative share of person-years by panel classification and subregion

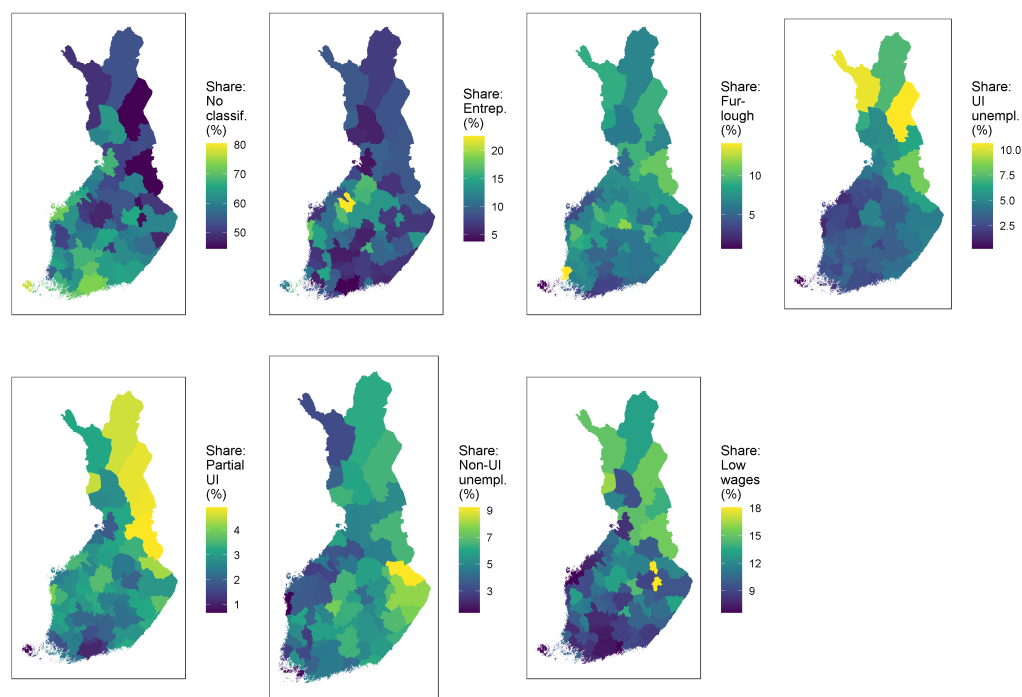




Figure 62: Lorenz curves by duration and count, furloughs

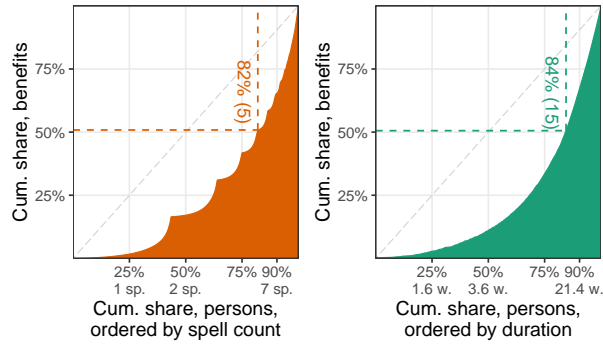


Figure 63: Lorenz curves by duration and count, UA following activity

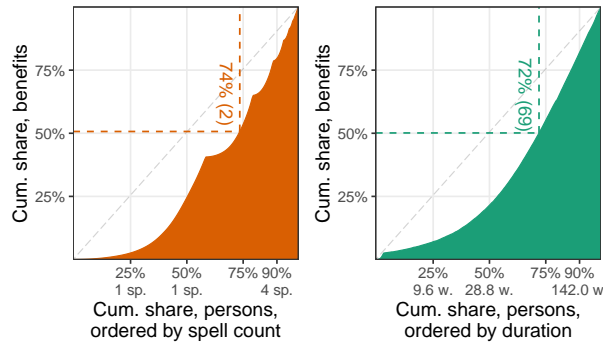


Figure 64: Lorenz curves by duration and count, UI following fixed-term jobs

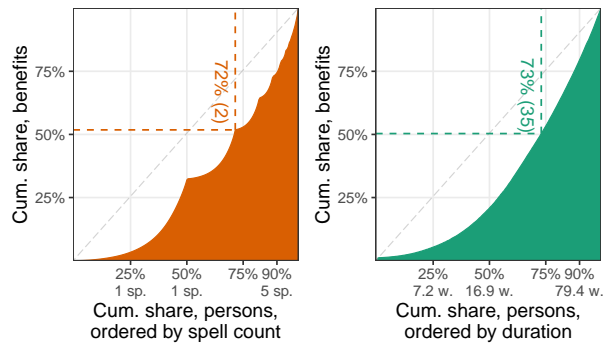


Figure 65: Lorenz curves by duration and count, UI following unknown activity

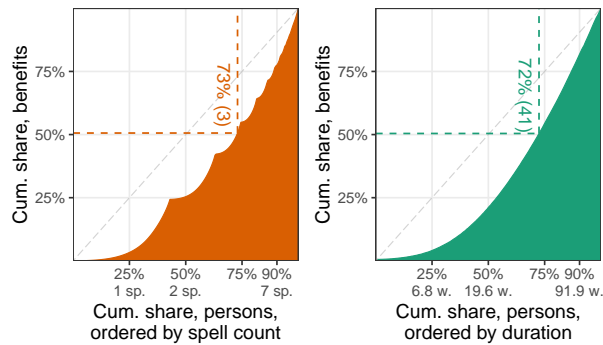


Figure 66: Lorenz curves for partial UI benefits, 1999-2021

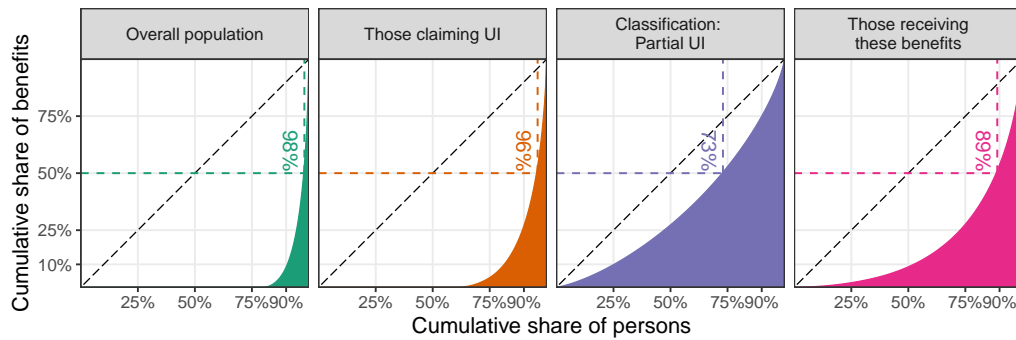


Figure 67: Lorenz curves for partial unemployment benefits, 2010-2021



Figure 68: Lorenz curves for all UA benefits, 1999-2021



Figure 69: Lorenz curves for UA spells following activity

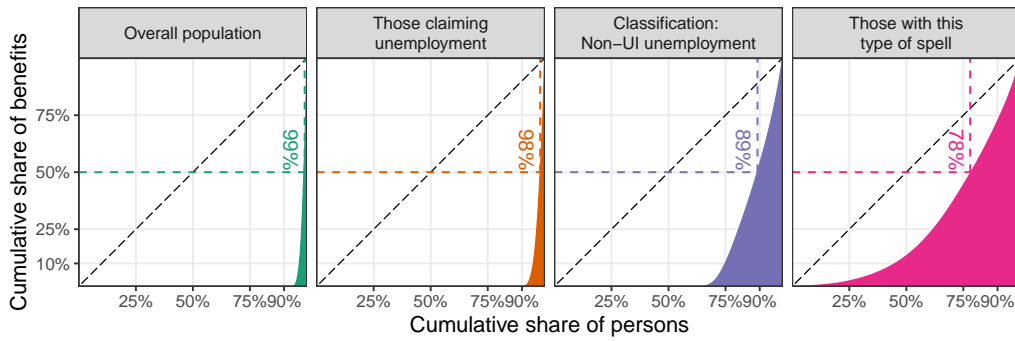


Figure 70: Lorenz curves for UA spells following miscellaneous activities

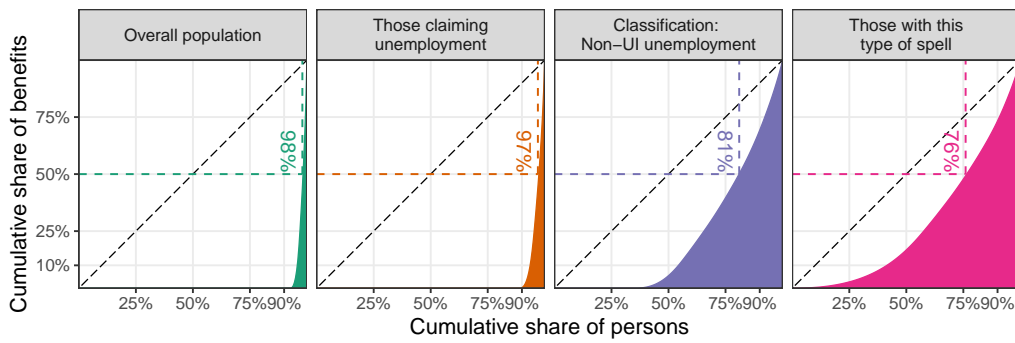


Figure 71: Lorenz curves for UI spells following collective dismissals

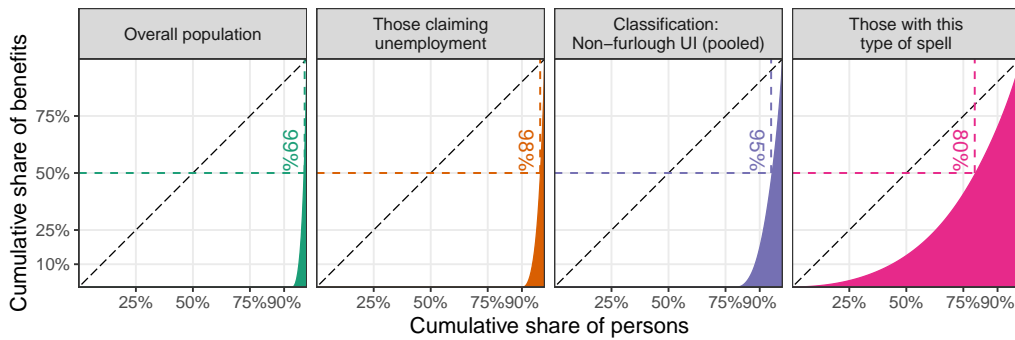


Figure 72: Lorenz curves for UI spells following fixed-term jobs



Figure 73: Lorenz curves for UI spells due to miscellaneous reasons

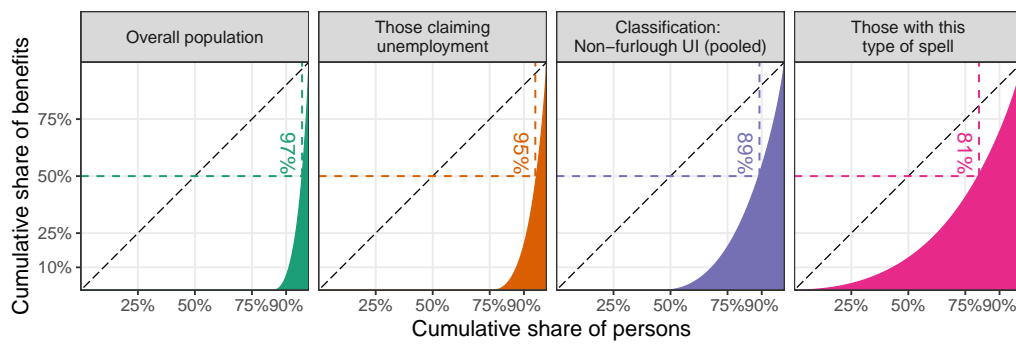
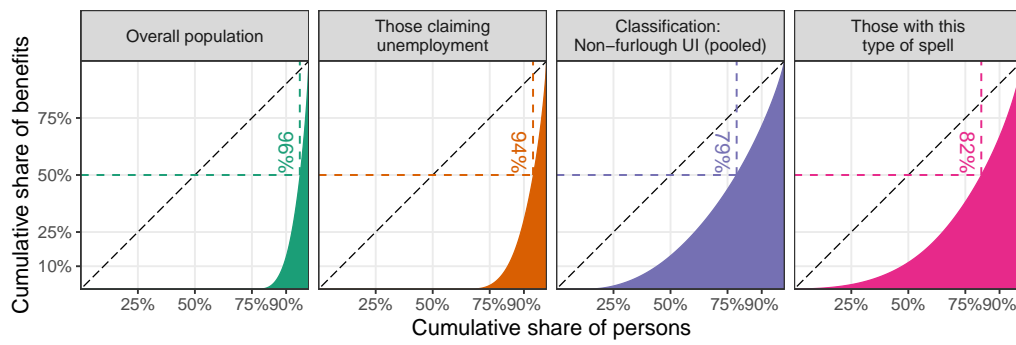


Figure 74: Lorenz curves for UI spells due to unknown reason



## Appendix P Definitions and additional descriptives: employer classification

To classify the employers, the following designations were used, in this order:

- Furloughs: attributable furlough costs exceeded .5% of a normalized wage bill
- Collective dismissals: expected costs from collective dismissals exceeded .5% of a normalized wage bill
- Partial UI: wages during part-time unemployment exceeded .5% of a normalized wage bill
- Fixed-term: expected costs from UI spells following fixed-term expirations exceeded .5% of a normalized wage bill
- Other UI: expected costs from other UI spells exceeded .5% of a normalized wage bill
- No classification: all other employers

The normalized wage bill was defined as the sum of annual headcounts, times the economy’s median annual wage in 2019. The reason for using a normalized wage bill rather than the actual wage costs was that workforce adjustments, such as furloughs, mechanically reduce the employer’s wage bill.

The sample includes a large amount of relatively small employers. With such employers, a small amount of very long spells might cause them to be designated “prone to dismiss”, even though the employer often has limited control over the duration of the unemployment experience of their former workers.<sup>9</sup> This is a minor problem with furloughs, which are much shorter and are directly controlled by the employer. For the other UI spells, an expected cost was calculated by multiplying the number of spells by the median costs for that spell type.

Figures 75–78 illustrate the incidence of the characteristic spells of unemployment per year, as well as overall recall unemployment (including furloughs). A similar figure for furloughs was presented in the main text.

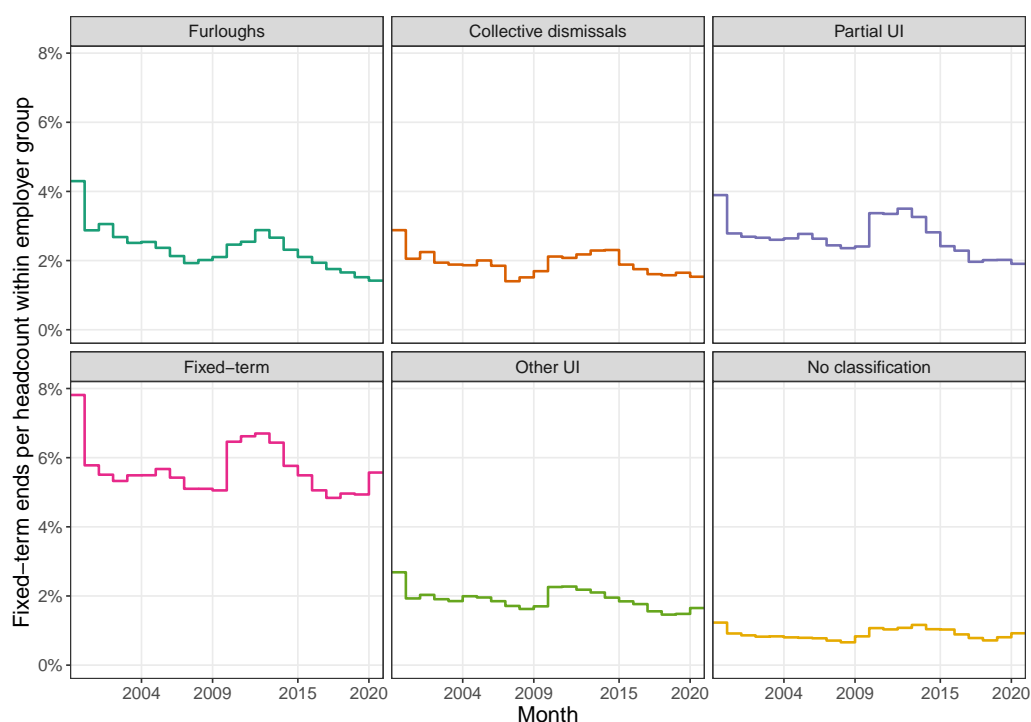
Figure 79 demonstrates the share of wages paid by public sector employers<sup>10</sup> in a given year by employer group. Public sector employers are practically never classified as frequent furloughers, but quite commonly cause UI spells that follow fixed-term contracts. (Note, however, that the figure shows the public sector’s share of wages within a classification, rather than the share of the characteristic spells.)

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<sup>9</sup>This is one argument presented by Miller and Pavosevich (2019) in favour of basing experience rating on variation in employment or wages, rather than attributable UI costs.

<sup>10</sup>Public sector employers are identified by their legal form and ownership. Majority public-owned enterprises are generally not classified as being in the public sector.

Figure 75: Fixed-term UI spells per employer group and year



In all the classifications, a non-trivial number of employers ceases to employ each year. Figure 80 shows an estimated death rate by group. An employer is considered to have died on year  $N$  if this was the last year the employer paid wages in the data. As the data source for wages changes in 2019, this appears to cause some spurious deaths; thus, deaths in 2018 (denoted by the vertical dashed line) are omitted. The death rates suggest that frequently furloughing employers are not particularly prone to exit, while those resorting to collective dismissals are.

A table in the main text listed a number of financial indicators, such as debt to equity and return on investment, calculated as a mean of annual group-level indicators for private sector employers. Figures 81–85 show more detailed annual distributions of these indicators. Indicators have been grouped into conventional health brackets. As employer units come in very different sizes, the shares are for wages paid, rather than for employer units in each bracket. In most cases, the differences in the distributions between the furlough-prone employers and the residual employer with rare unemployment incidence are not dramatic, but are consistent with the finding that the frequently furloughing employers tend to be less profitable.

Figure 76: Other UI spells per employer group and year

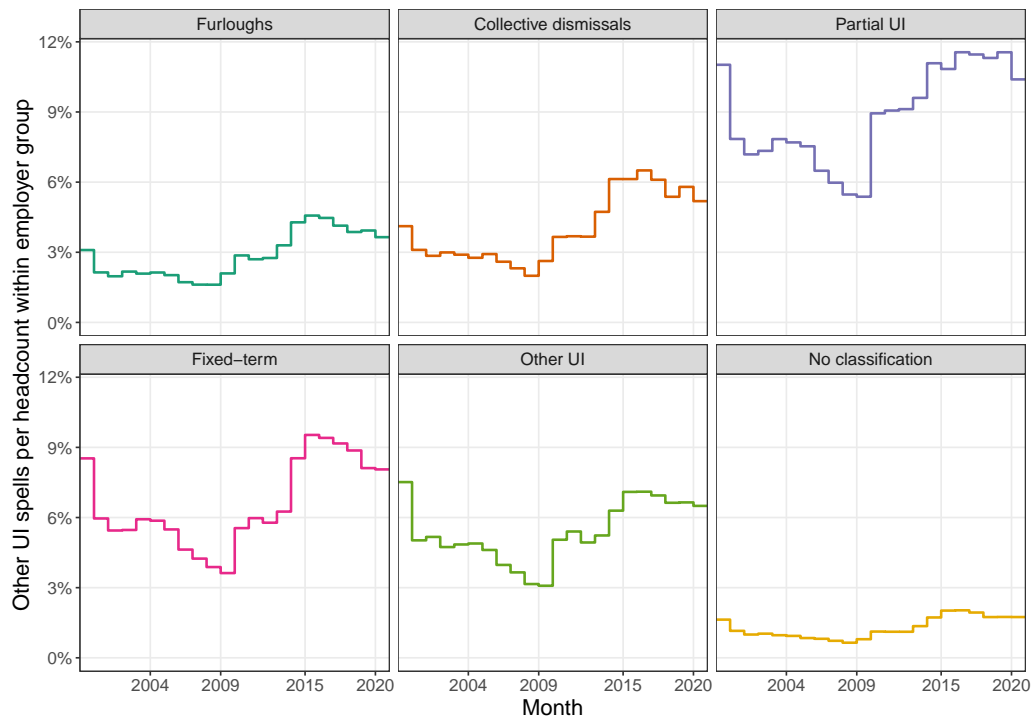


Figure 77: UI spells ending in a recall per employer group and year

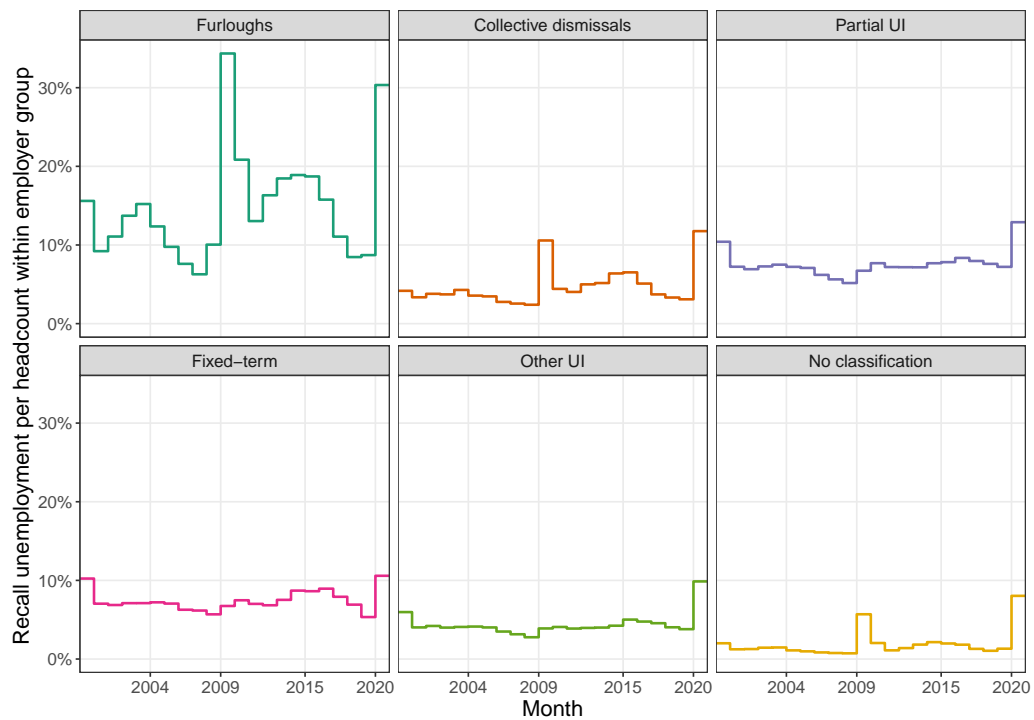


Figure 78: Wages paid to employees in part-time unemployment by employer group and year

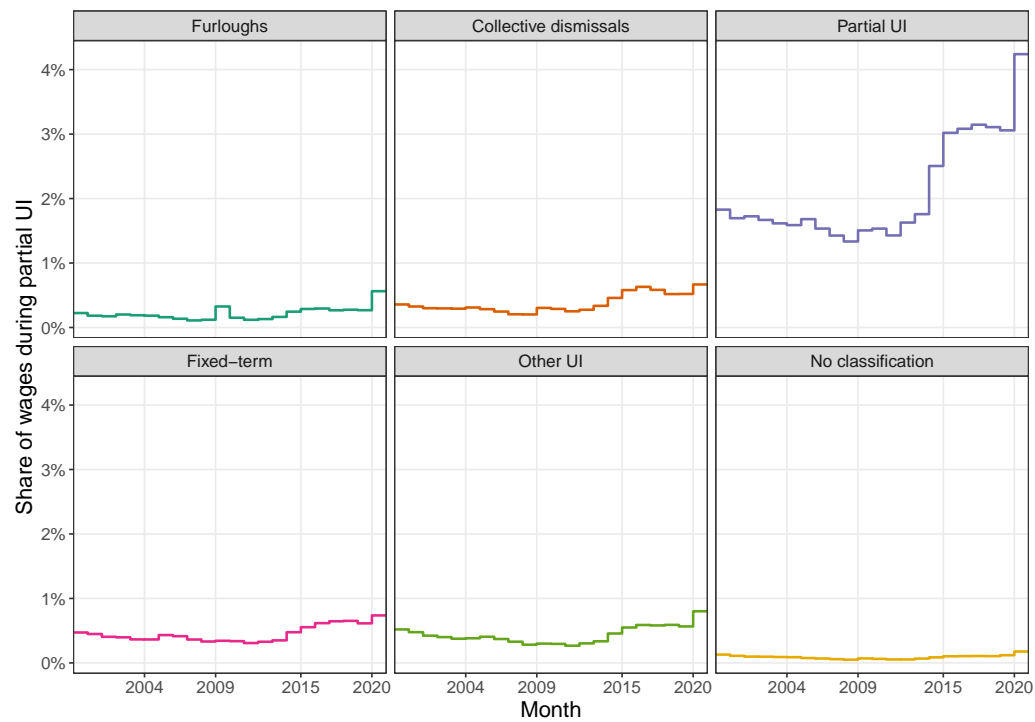


Figure 79: Public sector share of wages by employer group

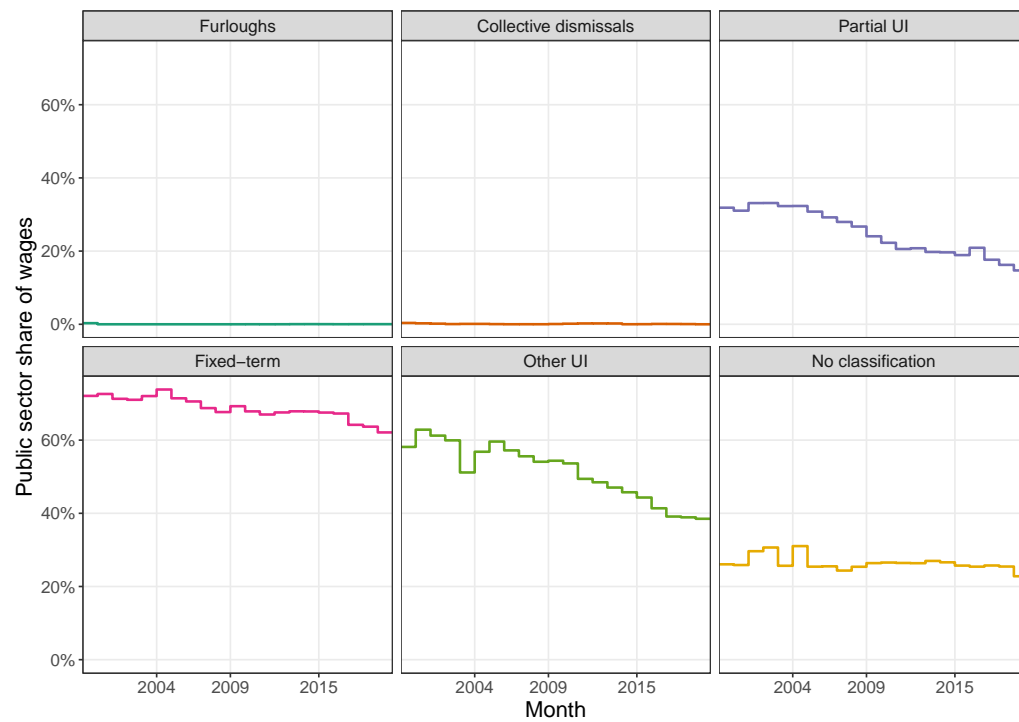
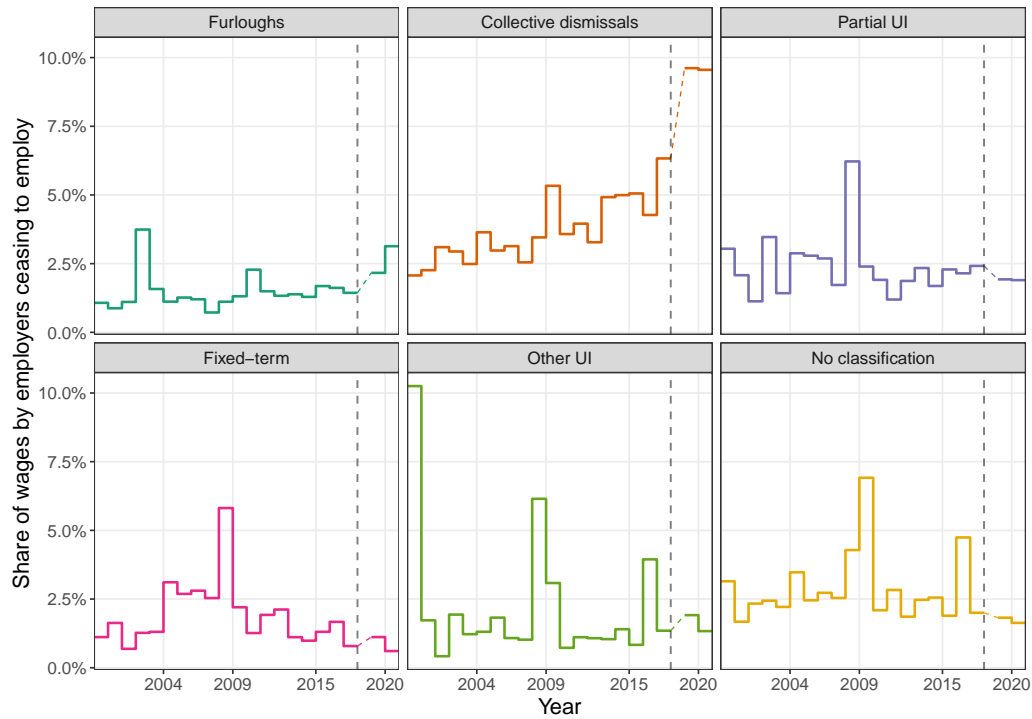




Figure 80: Death rates by employer group



An employer is taken to "die", or cease to employ workers with wages, on a year if that year was the last year they were observed as paying wages. Data for year 2018, indicated by the dashed vertical line, is omitted due to a break in the data source used for wages.

Figure 81: Employers by group, debt-to-turnover ratio and year

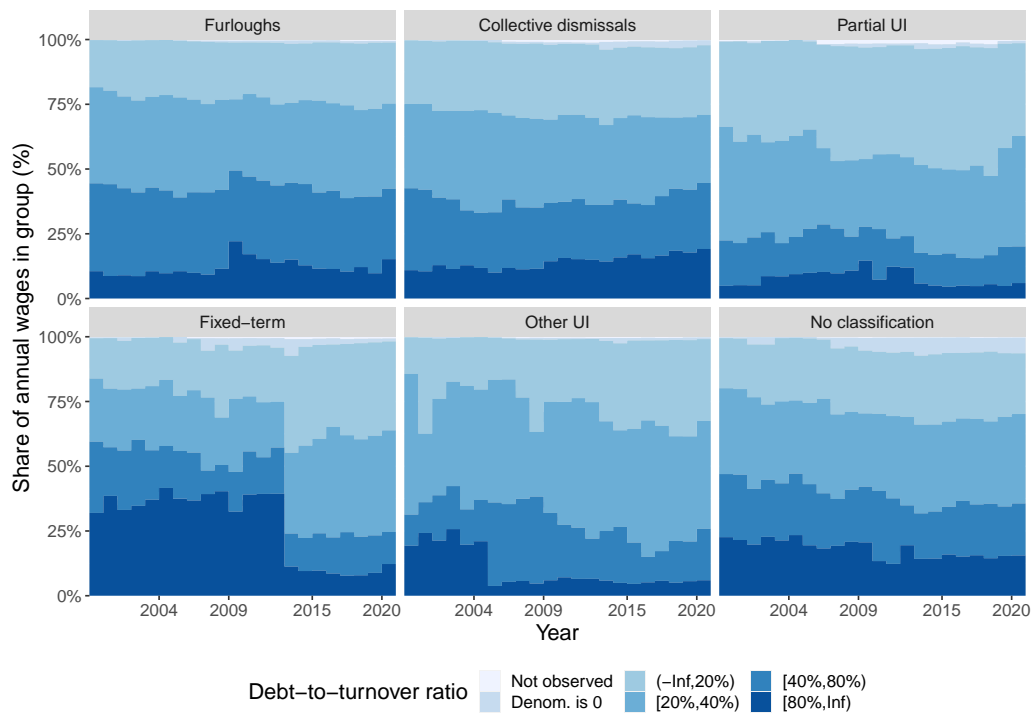


Figure 82: Employers by group, financing costs and year

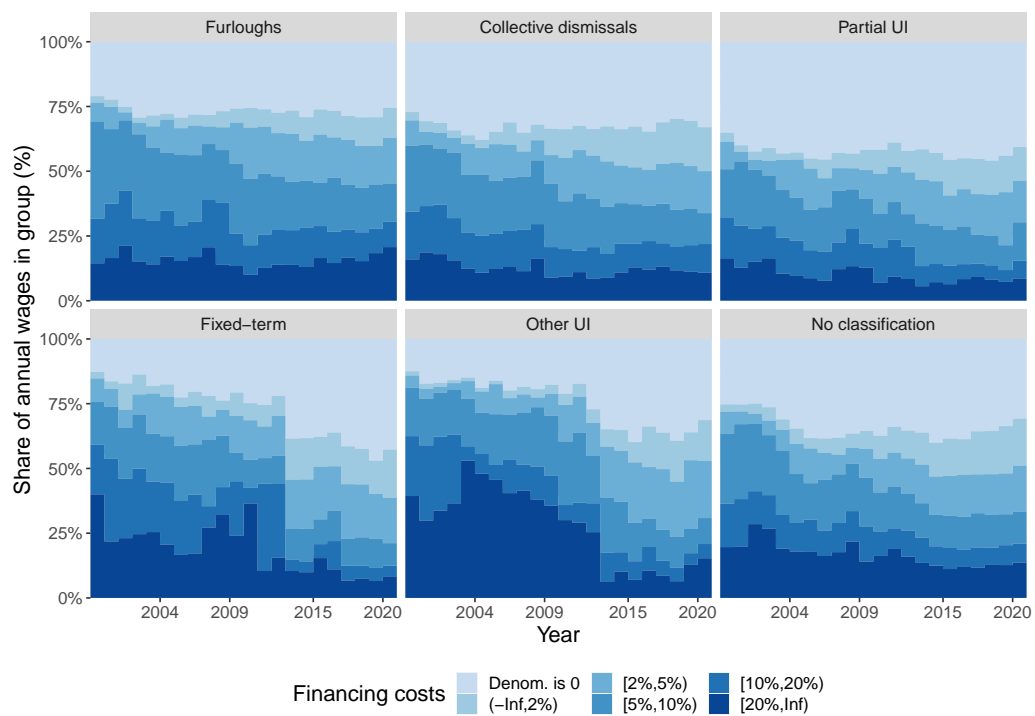


Figure 83: Employers by group, quick ratio and year

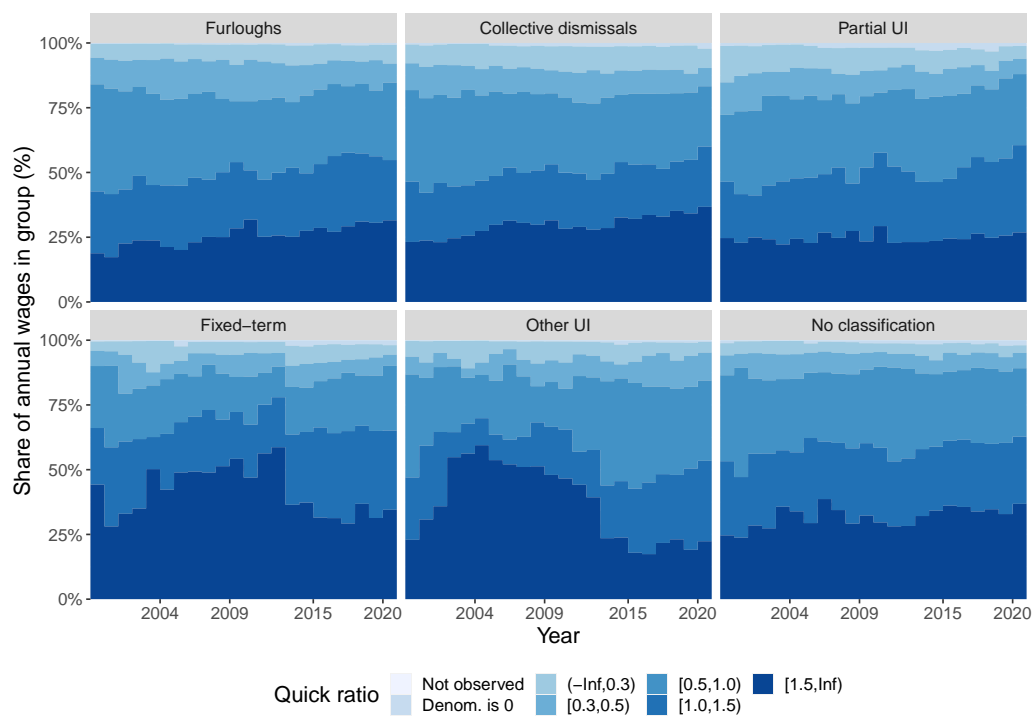


Figure 84: Employers by group, return on equity and year

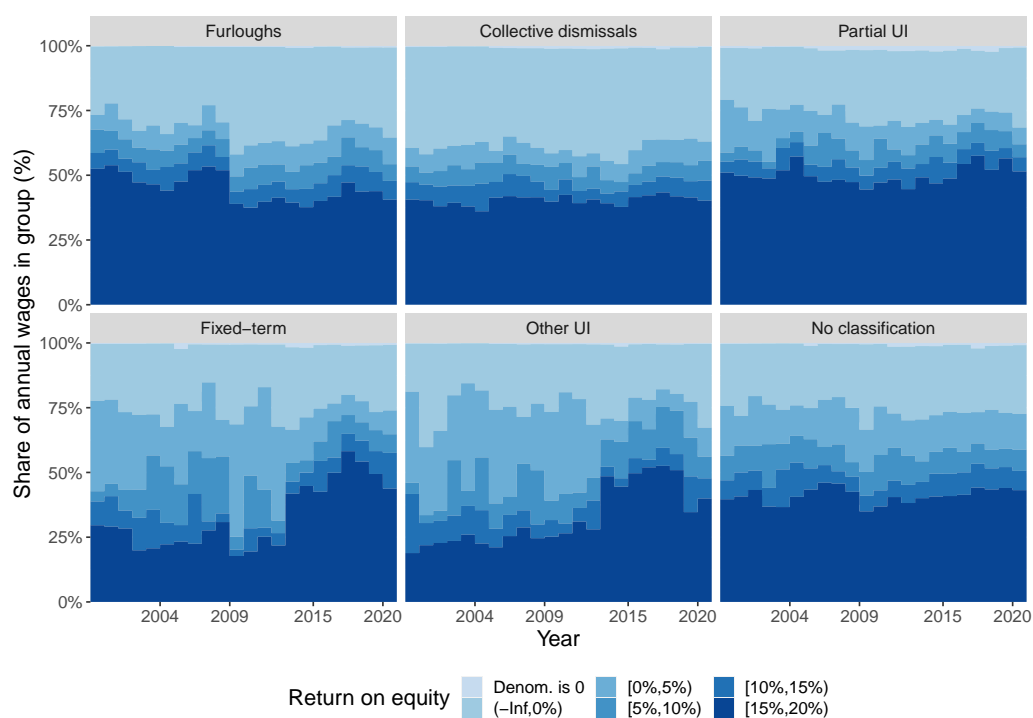
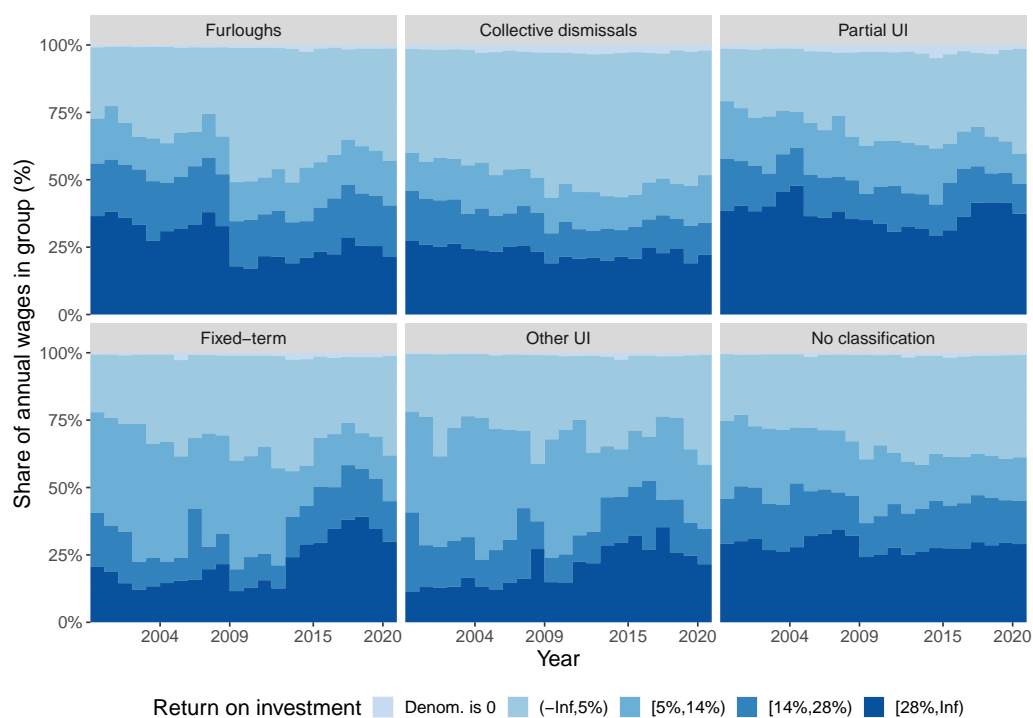


Figure 85: Employers by group, return on investment and year



## Appendix Q Matched individuals: the matching procedure and additional descriptives

Matching furlough-prone individuals to others, based on their outcomes by 2007, was done using Coarsened Exact Matching (CEM). The Love plots [86](#) and [87](#) list the variables used and their pre- and post-matching balance. For prior business and property income divided by observed years, cutpoints of (0, 1, 3 000, 10 000, 20 000) euros were used. Almost all furlough-prone units received a match.

A number of alternatives for matching were considered: CEM with nearest neighbour propensity score matching within CEM subclass based on the same variables, dropping some of the matching variables, or adding some additional variables (family characteristics or industry). Figure [88](#) shows the results for the different methods. For comparisons, the later outcome variable with the largest cross-method variance, wage per months employed, was used. The baseline is the matched population, and the weighted means were calculated using the default CEM weights (for  $k$ -to- $k$ , all units with a match received the weight of 1). Any means for the "overall population" use weights of 1 for all units in the original panel.

Table [13](#) describes the weighted cumulative outcomes over the observation periods by group. Wages per year actually worked are extremely similar across all three comparison groups. The furlough-prone individuals collect about 5% higher compensation in wages and UI, or about 200 euros more per month. Their net transfers to public funds are about 1,500 euros lower per year than the matched units, although the contributions are still clearly positive.<sup>11</sup> Compared to the scope of the UI subsidy, these differences are relatively small.

Figures [90–91](#) demonstrate the shares of the group by main income source in each year. Comparing the furlough-prone and the matched groups, the often furloughed are somewhat more likely to primarily rely on unemployment benefits per year, while more of the matched units depend on pensions or entrepreneurial income. This is partly due to the fact that the furlough-prone population has been selected on cumulative outcomes; a retired person is unlikely to be furloughed.

Figures [92](#) and [93](#) show the claimed furlough and overall UI benefits by group over time. Although the furlough-prone group was originally defined by their *cumulative* furlough propensity, they were being commonly furloughed well before the financial crisis, and the difference in furloughs appears to explain most of the differences in overall UI use.

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<sup>11</sup>The estimate somewhat understates the contributions to taxes paid, as the available data does not include employers' social security contributions and taxes on consumption, which will both depend on incomes and together amount to roughly a quarter of all taxes and levies. No effort was made to estimate the use of public services.

Table 13: Descriptives for the matched population

Variable	Furlough-prone population	Matched units	Overall ulation follow-up	pop- under
Observations	59,341	905,424	1,109,736	
Effective sample size	59,341	406,436		
Days employed 1987–2007	237.2	237.2	210.4	
Days employed 1999–2022	278.6	280.4	268.7	
Wage and UI per person-year worked 1999–2021	43,601€	41,418€	41,533€	
Wage per person-year worked 1999–2021	39,387€	39,587€	39,943€	
Wages 1987–2007	24,598€	24,582€	22,238€	
Wages 1999–2022	30,772€	31,616€	31,797€	
Wages and UI 1999–2021	33,315€	32,475€	32,486€	
Transfers received 1999–2019	4,390€	3,543€	4,329€	
Transfers paid 1999–2019	9,967€	10,574€	11,543€	
Net transfers 1999–2019	+5,577€	+7,030€	+7,214€	
Net income 1999–2019	28,209€	28,915€	31,084€	
FTE weeks furloughed 1999–2021	3.24	0.11	0.24	
FTE weeks of other UI 1999–2021	3.24	2.12	1.82	
FTE weeks of total UI 1999–2021	6.48	2.23	2.06	
Probability of furlough 1999–2021	25.12%	2.46%	2.85%	
Female	23%	23%	50%	
Public sector share, 1999–2022	4.6%	17.7%	25.0%	
Foreign background	2.63%	2.63%	3.00%	
Had children by 2007	56.66%	57.12%	61.89%	
Had children by 2020	56.71%	57.16%	61.93%	
Cum. years of highest education by 2007	12.1	12.1	13.1	
Cum. years of highest education by 2022	12.8	12.4	13.9	
Years of education by 2007	12.3	12.3	13.3	
Years of education by 2022	14.3	13.9	15.5	
Lived in an urban area in 2007	60.84%	60.84%	69.71%	
Lived in an urban area in 2020	61.00%	62.46%	70.04%	
Business income 1987–2007	425€	504€	1,249€	
Business income 1999–2019	726€	1,248€	2,196€	
Property income 1987–2007	344€	396€	950€	
Property income 1999–2019	781€	1,171€	2,348€	
Years aged 18 by 2007	18.6	18.6	18.5	

Values are weighted means. For the overall panel, each unit has a weight of one. All cumulative variables which cover multiple years are divided by the relevant year range to yield averages per year. Effective sample size measures loss of precision from weights, defined by Greifer and Stuart (2022) as  $ESS = \frac{(\sum_{i=1}^n w_i)^2}{\sum_{i=1}^n w_i^2}$ , where  $w_i$  are the weights. Public sector share measures public sector employers' share of wages paid.

Figure 86: Love plot for individual matching

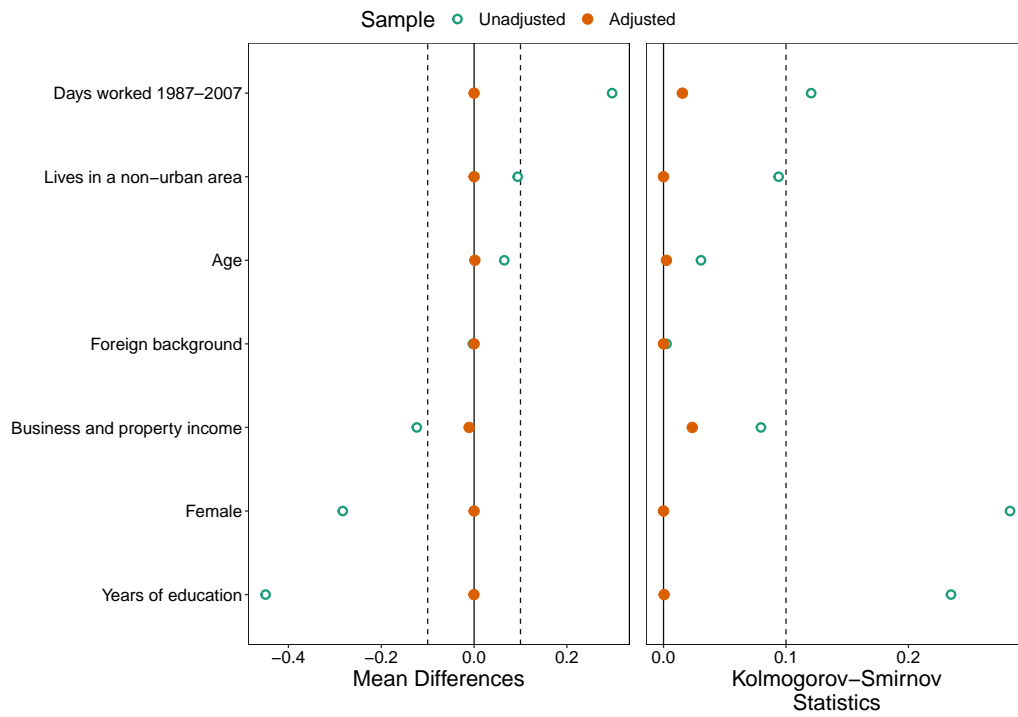


Figure 87: Love plot for individual matching, education

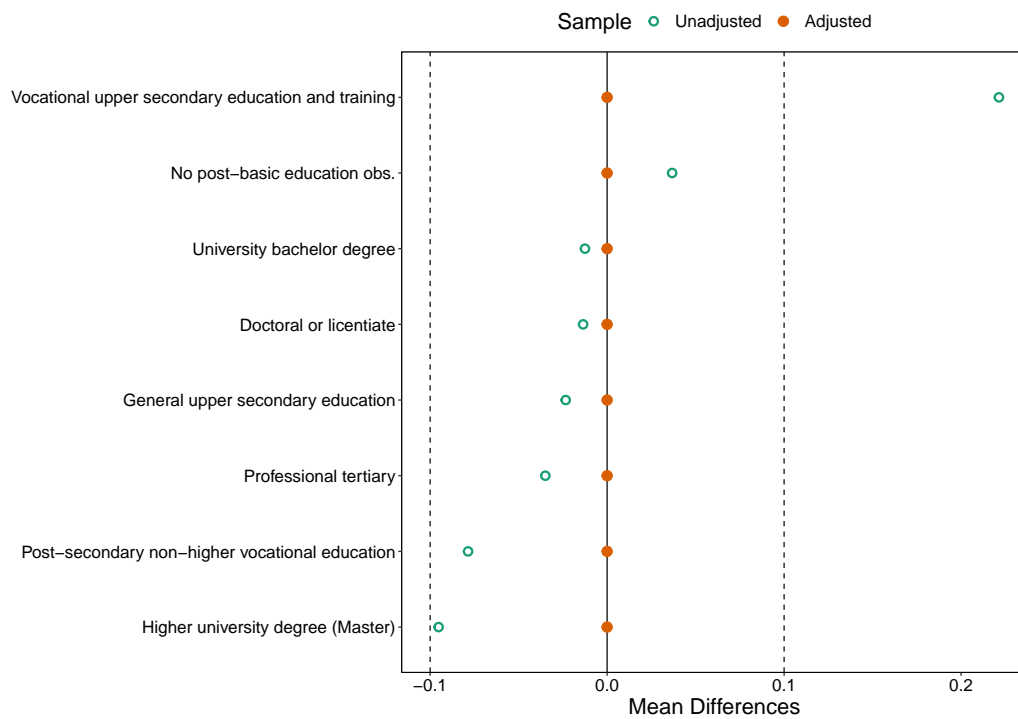


Figure 88: Comparison of matching methods

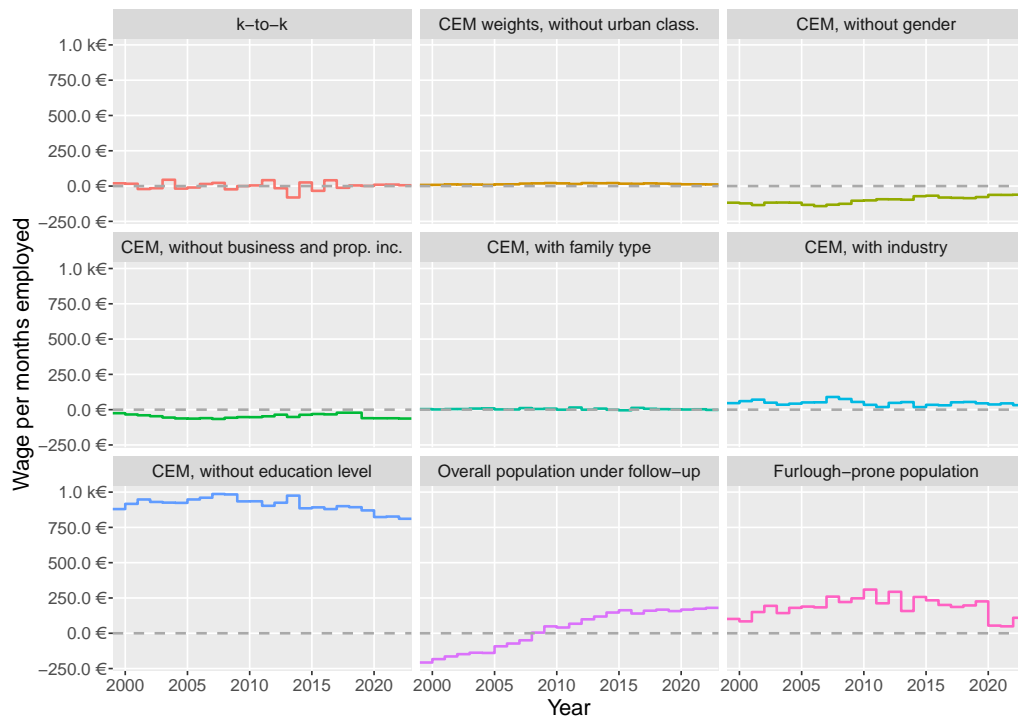


Figure 89: Main income source per year, the furlough-prone group

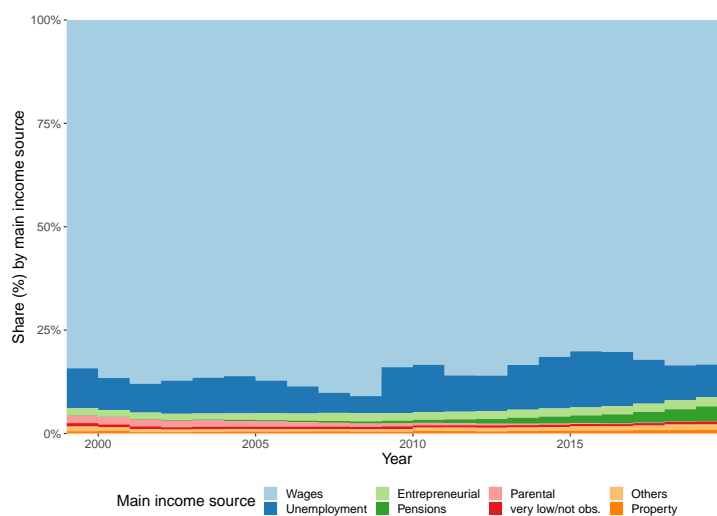


Figure 90: Main income source per year, the matched units

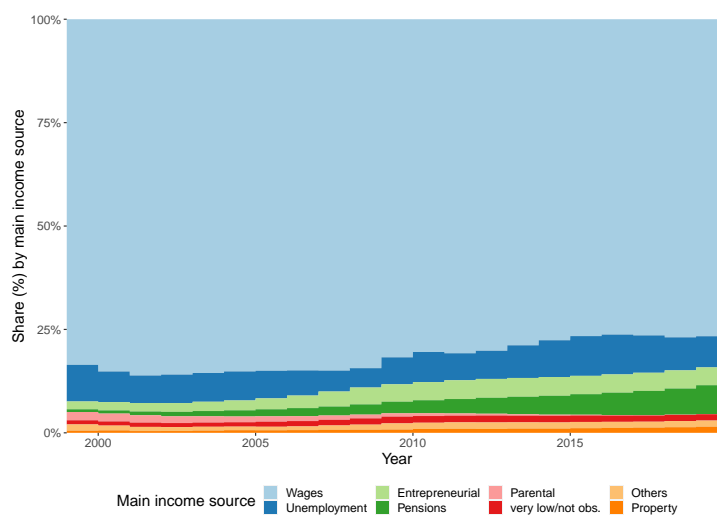


Figure 91: Main income source per year, the overall panel

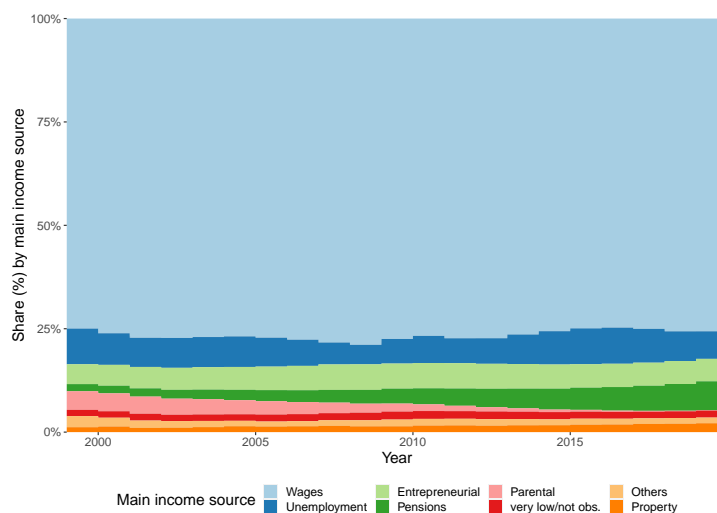




Figure 92: Weeks furloughed per year and group

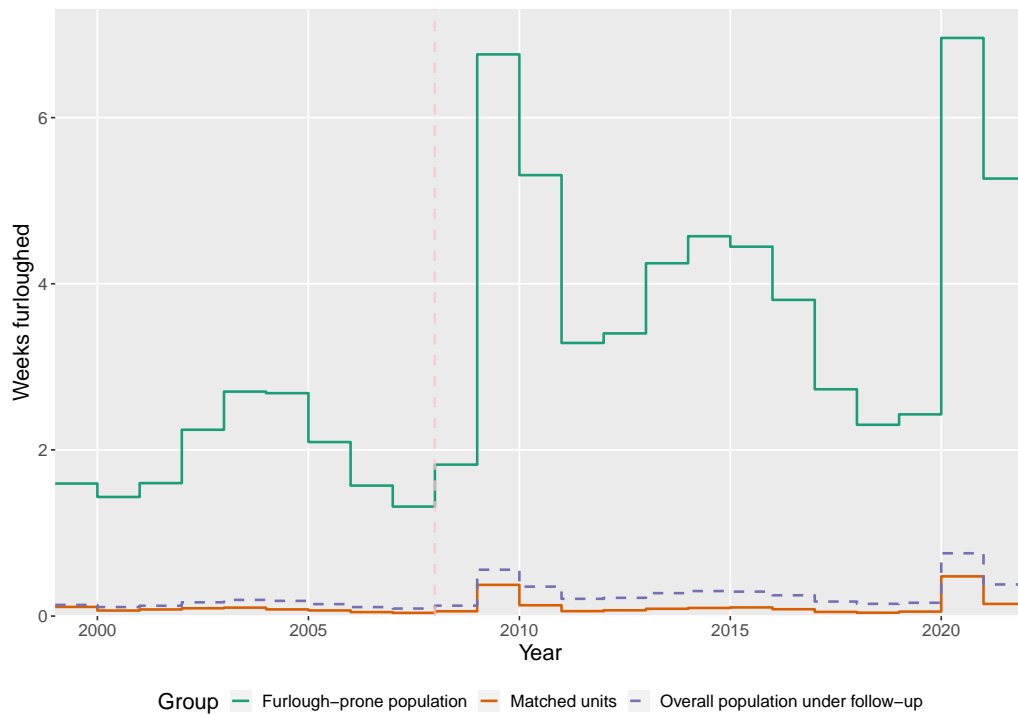
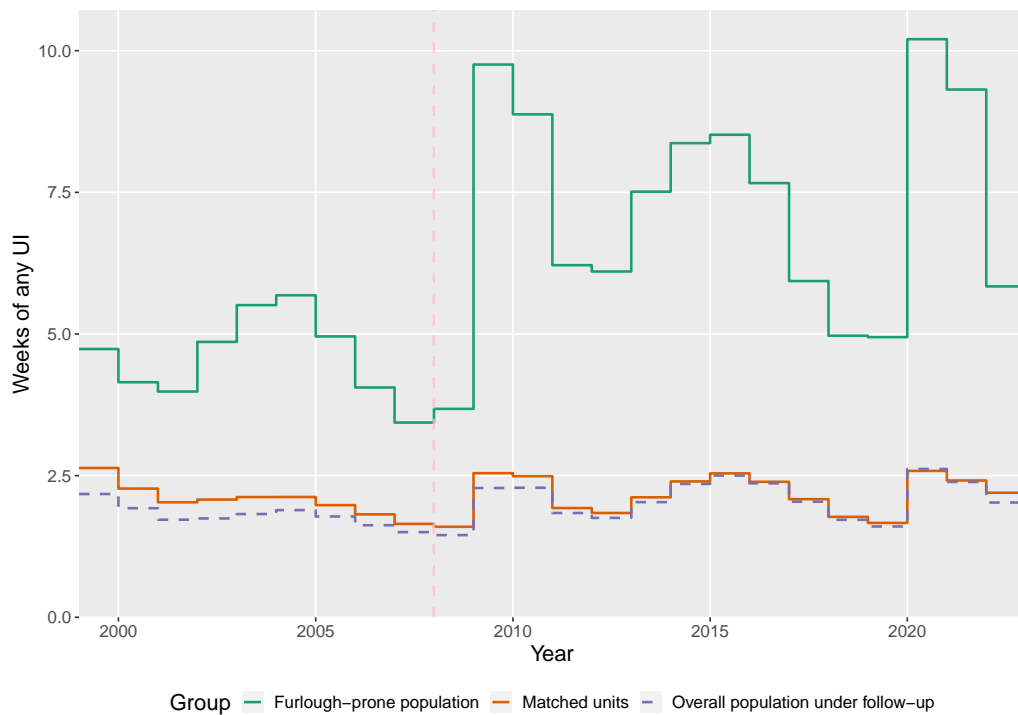


Figure 93: Weeks of any UI claimed per year and group



## Appendix R Matched firms: the matching procedure and additional descriptives

The main text compared employers that furloughed in 2007 to observably similar employers that did not. Table 14 complements the visual year-to-year analysis, and confirms that the matched firms had higher wages and, in particular, substantially higher profits over the longer run. Figure 94 compares the evolution of debt and liquid funds over time for the two groups.

For each variable, an annual weighted mean was calculated first. For variables that involve divisions (the debt-to-equity and debt-to-turnover ratios), the annual value is the weighted mean numerator divided by the weighted mean denominator. The means in the table are the average of the annual means.

Table 14: Weighted outcomes, prone furloughers in 2007 and matched non-furloughers

Variable	Furloughing in 2007	Matched firms
Turnover 2007–2019	25.8 M€	29.0 M€
Profit 2007–2019	324 k€	894 k€
Wages 2007–2019	4 M€	5 M€
Furloughs 2007–2019	22.3	7.2
After-fixed-term spells 2007–2019	3.1	2.4
Collective dismissals 2007–2019	1.1	0.8
Other UI spells 2007–2019	4.1	5.0
Debt-to-equity ratio 2007–2019	45.9%	39.3%
Debt-to-turnover ratio 2007–2019	42.4%	44.9%
Quick ratio 2007–2019	1.10	1.21

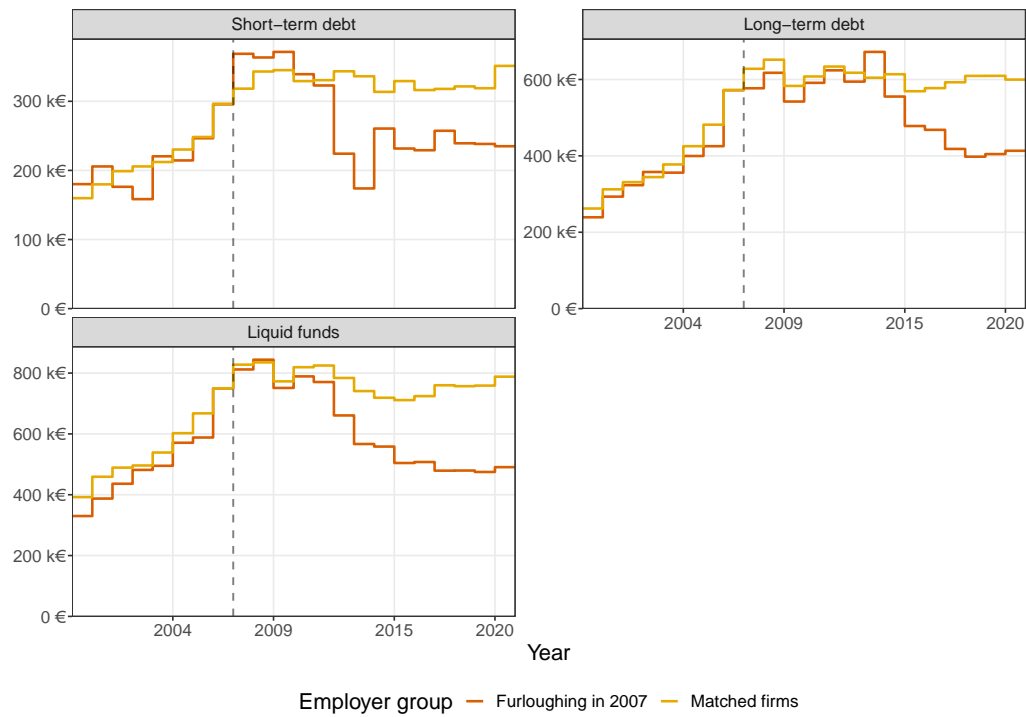
In 2009, many more employers furloughed; while the furlough-prone firms were *particularly* likely to furlough in that year and furloughed more employees, about 39% of the furloughs in that year can be attributed to atypical furloughers. Thus, for that year, another comparison was made between these atypical furloughers and non-furloughers.

The weighting specification was altered slightly for the 2009 comparison, as trying to balance all the variables exactly resulted in some extreme weights. Table 15 collects the variables used for weighting by group. Attempts at matching by coarsened exact matching with the listed continuous variables resulted in either much weaker balance for at least some of the variables, or high numbers of discarded units. Nearest neighbour propensity score matching suffered some similar issues.

Tables 16 and 17 examine the subsequent cumulative outcomes for the two comparisons using the entropy balancing weights.

Comparing the atypical furloughers and matched non-furloughers, most of the long-term outcomes are quite similar in terms of wages and profits. The non-furloughers were taking on more debt over the long run. However, this appears to be related to developments in later years, rather than an immediate reaction to the financial crisis. While there also differences in collective dismissals, they remain quite rare overall for

Figure 94: Debt and liquid funds, prone furloughers in 2007 vs. non-furloughers



both groups. Figures 95–97 illustrate the evolution of wages, survival, profitability and financial health for the two groups over time.

As for prone furloughers and matched non-furloughers, the analysis is qualitatively similar to that from 2007: although both groups experienced a similar fall in turnover in 2009, and had similar characteristics in 2008, the prone furloughers had lower profits and wages over the follow-up. The differences in both respects are, however, less stark than they were for the similar comparison in 2007, which may be due to different selection even within the furlough-prone group.

Table 15: Weighting variables and sample sizes for firms

Variable	2007, any furloughers vs. everyone	2009, atypical furloughers vs. everyone	2009, prone furloughers vs. everyone
Turnover in year $t - 1$	Yes	Yes	Yes
Turnover in year $t$	Yes	Yes	Yes
Wages, $t - 1$	Yes	Yes	Yes
Short-term debt, $t - 1$	Yes	Yes	Yes
Long-term debt, $t - 1$	Yes	Yes	Yes
Liquid funds, $t - 1$	Yes	Yes	Yes
Gross financing costs, $t - 1$	Yes	Yes	-
Equity, $t - 1$	Yes	Yes	-
Profits, $t - 1$	Yes	Yes	-
Profits, 1999 to $t - 1$	Yes	Yes	Yes
Wages, 1999 to $t - 1$	Yes	Yes	Yes
Unattributed furloughs	1,285	3,623	
Furloughs, employers without financial data	5,263	8,952	
Furloughs, employers with excluded financial data	1,338	5,355	
Furloughs, outside common support etc.	1,576	960	1,457
Furloughs, by selected empl.	22,188	97,768	128,067
Wages, selected	5.0 G€	11.6 G€	7.6 G€
Employers, selected	5,808	5,054	9,650
Wages, matched	37.3 G€	29.2 G€	26.7 G€
Employers, matched	89,894	76,481	84,737

Table 16: Weighted outcomes, atypical furloughers in 2009 and matched non-furloughers

Variable	Non-prone furloughers in 2009	Matched non-furloughers
Turnover 2009–2019	35.34 M€	36.08 M€
Profit 2009–2019	1 M€	928 k€
Wages 2009–2019	5.25 M€	5.42 M€
Furloughs 2009–2019	6.5	2.4
After-fixed-term spells 2009–2019	2.9	2.8
Collective dismissals 2009–2019	1.1	0.5
Other UI spells 2009–2019	5.4	5.7
Debt-to-equity ratio 2009–2019	34.3%	40.0%
Debt-to-turnover ratio 2009–2019	48%	65%
Quick ratio 2009–2019	1.071	1.104

Table 17: Weighted outcomes, prone furloughers in 2009 and matched non-furloughers

Variable	Prone furloughers in 2009	Matched firms
Turnover 2009–2019	19.1 M€	21.9 M€
Profit 2009–2019	575 k€	743 k€
Wages 2009–2019	3.48 M€	4.06 M€
Furloughs 2009–2019	22.4	2.9
After-fixed-term spells 2009–2019	2.5	2.1
Collective dismissals 2009–2019	0.8	0.5
Other UI spells 2009–2019	3.6	4.8
Debt-to-equity ratio 2009–2019	28%	44%
Debt-to-turnover ratio 2009–2019	37%	48%
Quick ratio 2009–2019	1.70	1.21

Figure 95: Unemployment events, atypical furloughers in 2009 vs. non-furloughers

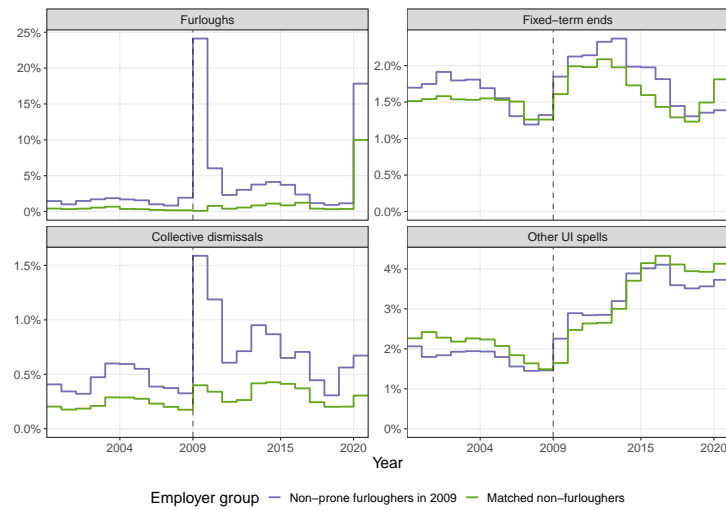


Figure 96: Wages, turnover and profits, atypical furloughers in 2009 vs. non-furloughers

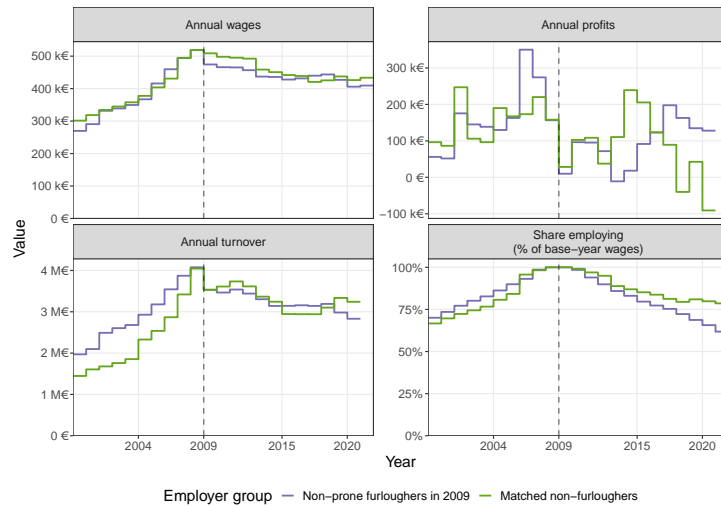


Figure 97: Debt and liquid funds, atypical furloughers in 2009 vs. non-furloughers

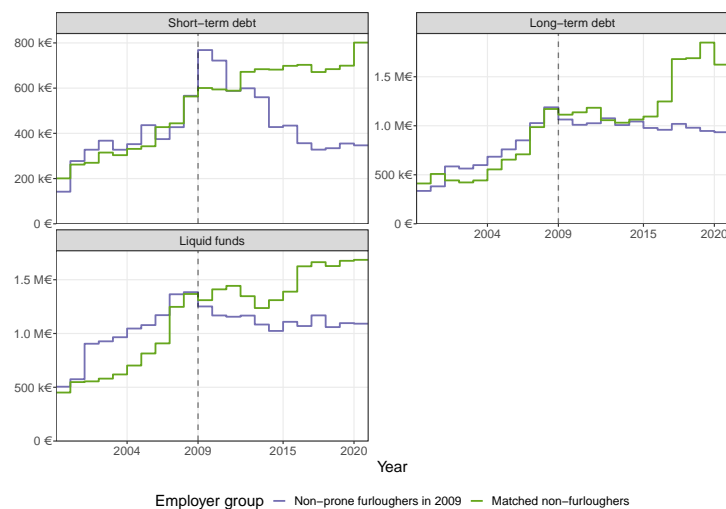


Figure 98: Unemployment events, prone furloughers in 2009 vs. non-furloughers

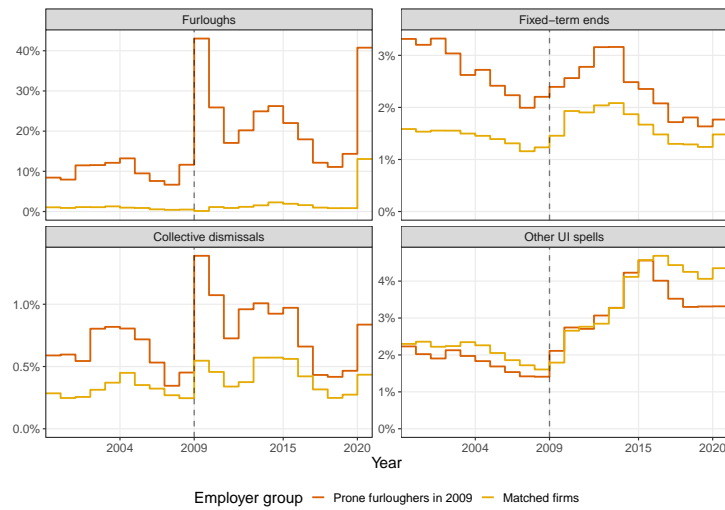


Figure 99: Wages, turnover and profits, prone furloughers in 2009 vs. non-furloughers

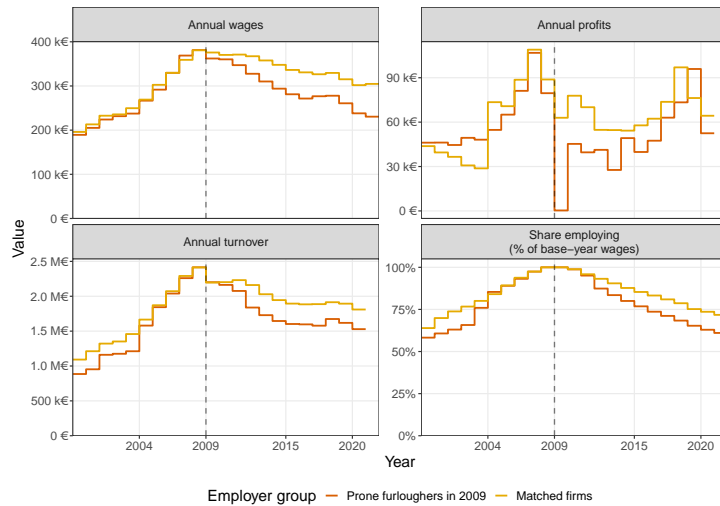
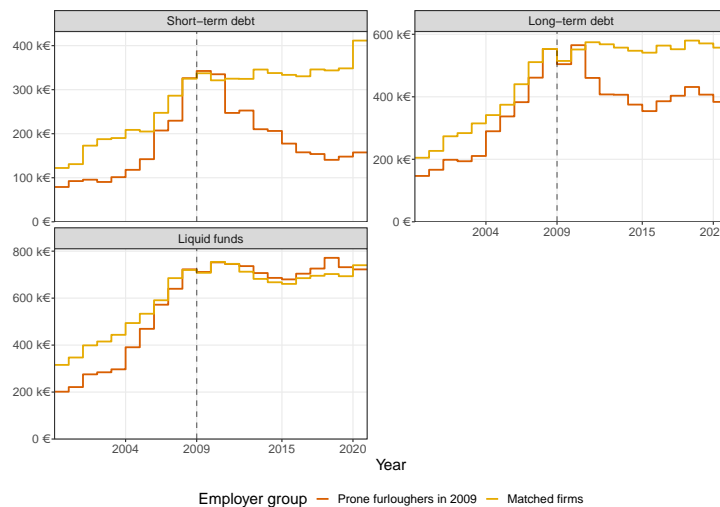


Figure 100: Debt and liquid funds, prone furloughers in 2009 vs. non-furloughers



## Appendix S Evolution of UI financing

The current broad framework for UI financing was established in 1999. Employers submit legally mandated UI premiums to the Employment Fund, a body regulated by law and governed by employer and employee representatives. These premiums are split by nominal incidence on employees and employers; the true economic incidence is beyond the scope of this paper.

Most employers pay the premium, at an average rate of 1.54% of wages in 2023. The central government does not pay this tax as an employer, but instead makes a lump-sum transfer to the fund that covers the flat-rate part of UI (excluding furloughs). Employers with a total wage bill below 130 000 euros are exempt. Academic universities and corporations organized as state enterprises<sup>12</sup> pay smaller rates. There is some very limited experience rating in the system (0.7% of UI taxes in 2022), discussed in the main text.

A employee tax, at a flat rate of 1.54% in 2023, is levied on most employees and their wages, even if the employer has an exemption. The major exception are wage earners who would not be covered by UI due to their age (below 18 or above 65).

The Employment fund acts as an intermediary after pooling the collected premiums. The unemployed claim UI from their individual unemployment funds. The funds collect payments corresponding to these claims from the Employment fund; they are required by law to cover only 5.5% of the UI costs through their own membership fees.

In 2024, there were 14 unemployment funds. Some funds have membership restrictions, and 12 have links to trade unions. However, as a number of funds are open to everyone, all employees can choose between a range of funds at their discretion. Roughly 85% of all employees are members in a fund. The average annual membership fee for a median-waged worker is 80 euros, with limited variation between the major funds.

Time in insured unemployment also contributes towards pensions (time in uninsured unemployment does not). Annual UI tax transfers to the pension funds are roughly the size of a third of the direct UI payments.

The employment fund also makes a payment to the Social Security Institution. This payment is made for the uninsured share of wage earners, and it roughly covers the costs for the basic unemployment allowance (BUA). The BUA is a flat-rate analogue to UI. It is paid to employees who satisfy the UI's recent employment condition but not the fund membership condition. However, the vastly more common form of unemployment assistance, the labour market subsidy (LMS) is fully funded by central and local government revenues. The LMS covers those who do not satisfy the employment condition or have exhausted the limited-duration benefits.

UI taxes have also been used to finance an adult education subsidy between 2001 and

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<sup>12</sup>This is a distinct, rare legal form. Most businesses with public ownership (whether majority- or minority-owned) are organized as limited companies.

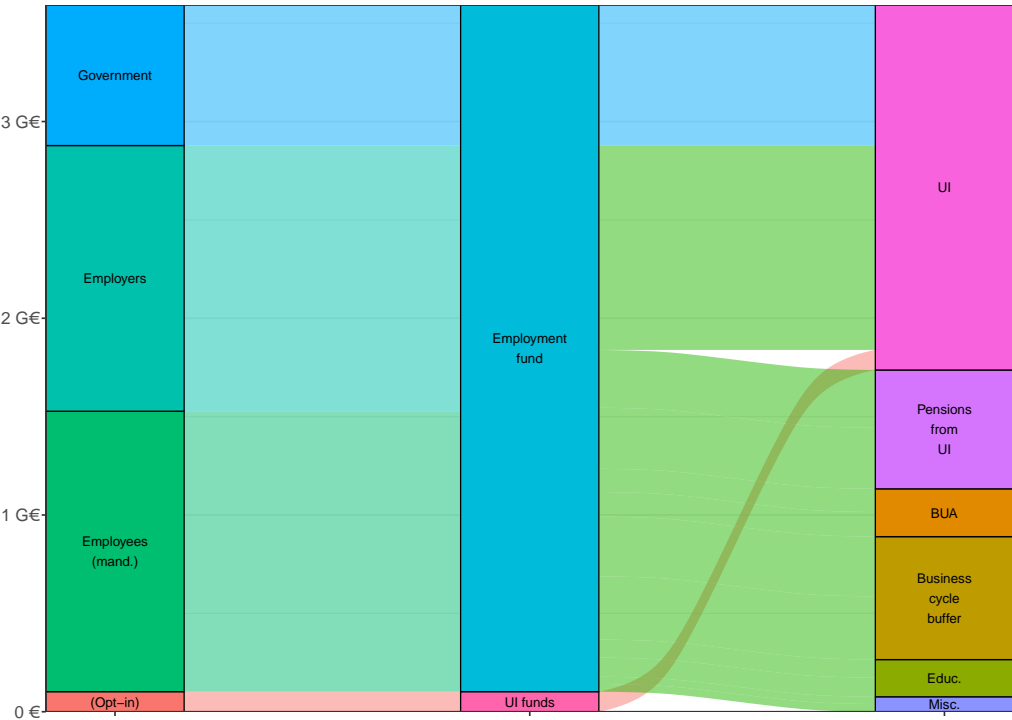
2024, a limited-duration earnings-related transfer available to workers with long tenures who go on study leave. Additionally, the Employment fund is required to maintain a business cycle buffer, which acts as an automatic stabilizer. Figure 101 collects these various funding flows for UI and UI taxes in 2022.

While the Employment fund proposes, and the ministry confirms, the annual premiums, the process is strongly regulated by law. The law determines how the premiums are to be split between employers and employees, who are mandated to pay, which costs are to be covered, and the size of the business cycle buffer.

Figure 103 shows how the employer and employee nominal rates have evolved over time. For most of the period, employers have paid the majority of the taxes; a reform in 2017 equalized the average rates. Meanwhile, the central government’s proportional share has remained fixed, demonstrated in figure 102.

The employer tax rate has been piecewise linear since 1994. A lower rate applies to wages up to 2.2 million, and a higher rate for any part of wages above that. The threshold was roughly doubled in 2008. Figure 104 shows the different schedules between 1989 and 2023, demonstrating substantial variation over time on all parameters of the schedule.

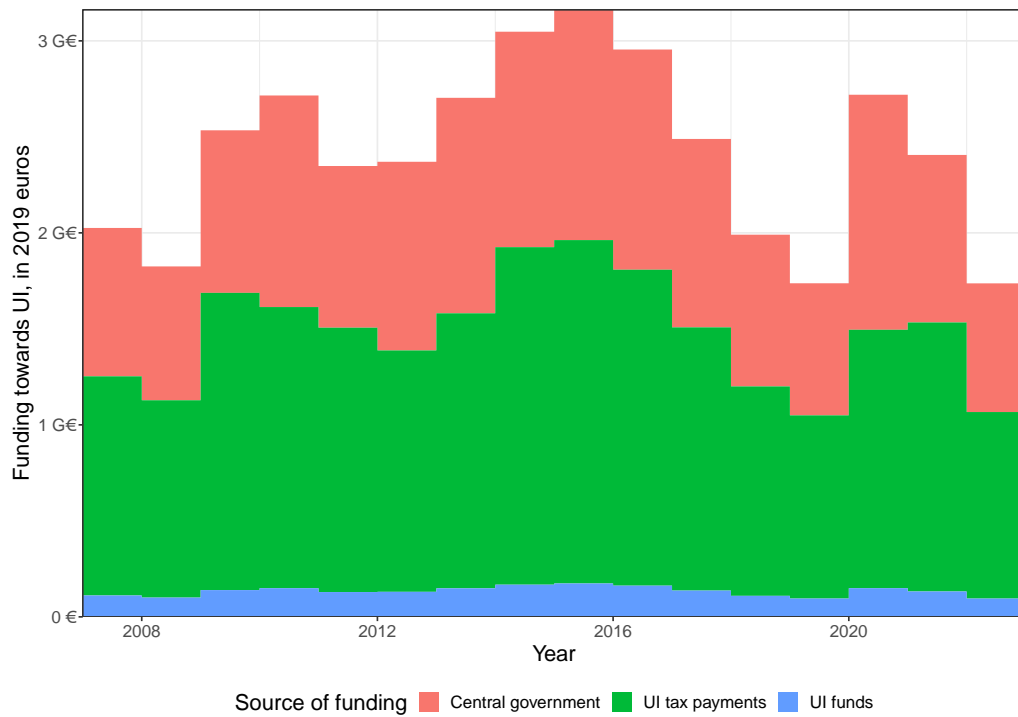
Figure 101: Unemployment benefit funding flows in 2022



Source: collected from the Employment fund’s annual report.

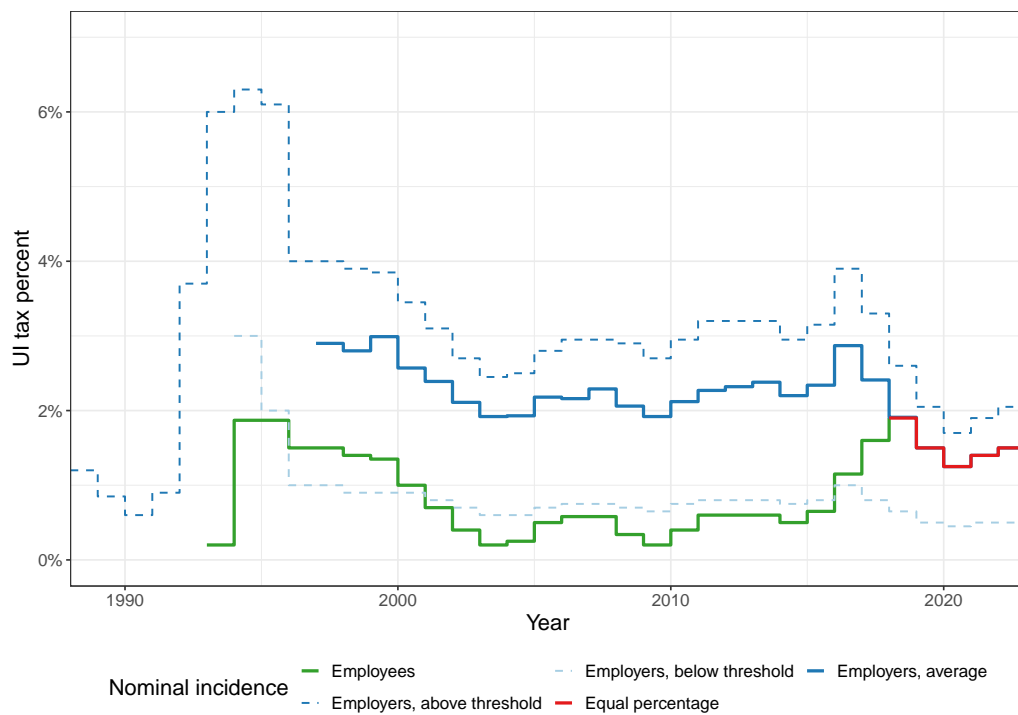


Figure 102: UI funding by source



Collected from the Employment fund's annual reports.

Figure 103: UI tax rates by nominal incidence



Collected from legislation and the Employment fund's annual reports. Employees had no rate before 1993. Data for employer average rates starts from 1997.

Figure 104: Marginal employer UI tax rate by wage and year

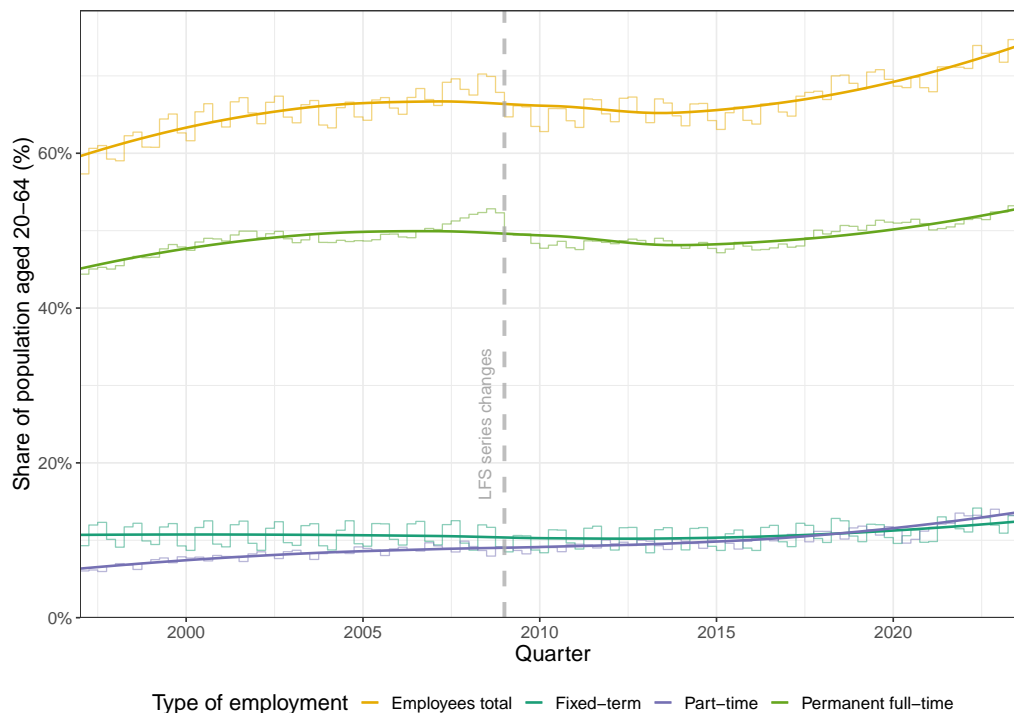


Collected from legislation. Covers most employers that do not have exemptions or exceptions in the law.

## Appendix T Part-time, fixed-term and open-ended employment

Figure 105 illustrates the broad patterns of types of job contracts between 1999 and 2021 from the labour force survey. The share of working-age population has remained quite stable for fixed-term contracts. The fraction in open-ended full-time contracts has increased slightly and the share in part-time jobs more significantly.

Figure 105: Part-time, fixed-term and open-ended full-time employment. Percent of working-age population.



Quarterly data from the Labour Force Survey. Trend lines are smoothed by LOESS. The fixed-term share includes both full-time and part-time fixed-term jobs, and the part-time share includes both fixed-term and permanent contracts.

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