AUTHOR	Selçuk Bedük, Anette Eva Fasang, Susan Harkness, Stefan Bastholm Andrade, Zafer Büyükkeçeci, Aleksi Karhula, Satu Helske
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Insurance against risk?

Economic cost and compensation of job loss in different welfare states

Selçuk Bedük, *University of Oxford, Oxford, UK*

Anette Eva Fasang, *Humboldt Univeristy, Berlin, Germany*

Susan Harkness, *University of Bristol, Bristol, UK*

Stefan B. Andrade, *The Danish Centre for Social Science Research, Copenhagen, Denmark*

Zafer Büyükkeçeci, *University of Cologne, Cologne, Germany*

Satu Helske, *University of Turku, Turku, Finland*

Aleksi Karhula, *University of Turku, Turku, Finland*

Corresponding author:
Dr. Selçuk Bedük
Departmental Lecturer
Department of Social Policy & Intervention, University of Oxford
32 Wellington Square, OX1 2ER, Oxford, UK
Tel: +44 (0) 1865 270325
Email: selcuk.beduk@spi.ox.ac.uk

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Abstract

In this paper, we examine the cost of job loss to household incomes, and the extent to which initial losses is compensated through the market, within the household and by the social security programmes. We use high quality survey and admin data from Denmark, Finland, Germany and the UK for the period of 1990-2018 and monitor incomes after job loss using an event study design. Our findings reveal significant, relatively persistent and long-term penalties on household incomes (around 9-13% of previous earnings) that are only higher in the UK in the short-term. Market appears to be the primary mechanism of compensation in all countries, while the relative importance of household and state compensations vary across countries. State compensation plays a crucial role in mitigating immediate income losses, while market compensation becomes more important over time. Household compensation mainly acts as a substitute for market and state compensation.

SER Keywords: social policy, unemployment, social security, risk, household, income

JEL classification: I38 – Welfare, Well-Being, and Poverty: Government Programs; Provision and Effects of Welfare Programs, J68 – Public Policy, J64 – Unemployment: Models, Duration, Incidence, and Job Search, J65 – Unemployment Insurance; Severance Pay; Plant Closings, D10 – Household Behavior and Family Economics,

1. Introduction

In an average year, around 2-6% of workers in the OECD countries lose their jobs involuntarily (Quintini and Venn, 2013). This roughly amounts to, for example, 1 million workers in Germany or 2 million workers in the UK. These numbers are significantly higher during recessions or other economic shocks. In the first six months of the Covid pandemic, around 6 million people in Europe (Eurostat, 2022) and 8 million people in the US (US Bureau of Labor Statistics, 2021) lost their jobs. Following a job loss, workers experience a 20-50% decline in their yearly individual earnings (Couch and Placzek, 2010; Bertheau et al., 2022), which might lead to large reductions in their household income as well as their expenditure and saving (Ganong and Noel, 2019; Andersen et al. 2021).

Despite its prevalence and significance for living standards, evidence is limited on the economic cost of job loss in different welfare states. Most of the literature looks at the speed of re-employment and average losses in yearly earnings following a job displacement or mass dismissals (Couch and Placzek, 2010; Farber, 2017; Upward and Wright, 2019; Bertheau et al., 2022) that does not account for the role of income pooling within households and income support provided by social security. The cost of job loss depends not only on the compensations made through the labour market, but also within the household and by the social security programmes. Others that have looked at cost of job loss for household income generally focuses on single-country or two-country comparisons (DiPrete and McManus, 2000; McManus and DiPrete, 2000; Ehlert, 2012; Rothstein and Valletta, 2017; Stepner, 2019, Seim, 2019; Di Nallo and Oesch, 2021), and does not provide a systematic account on how compensation mechanisms interact with each other and vary across different welfare states. Also, differences in their definitions and methodologies mean that they are often not immediately comparable to each other.

In this context, we provide a systematic and comparative examination of the economic cost and compensation of job loss in different welfare states. Building on and extending the existing evidence and framework provided by e.g. DiPrete and McManus (2000) and Ehlert (2012), we contribute to the

literature in three main aspects. First, we either update or provide new evidence on the cost of job loss for household disposable incomes both in the short-term and in the long-term for four countries with different welfare states, namely Denmark, Finland, Germany and UK. In general, the evidence on the cost and compensation of job loss for two Nordic countries were lacking, and comparing against these two countries is valuable as they provide significant institutional and outcome variation considering the generous, comprehensive, universal and individualized nature of the provided welfare support. There are also important distinctions between Denmark and Finland in suppressing job loss risks given different levels of labour market regulation which also enriches our country comparison. Furthermore, we update the evidence on the cost of job loss for household incomes in the long-run, and specifically examine whether earnings scarring reflect on household income scarring.

Secondly, we study all compensation mechanisms together (namely market, household and state), considering also the substitution effects between them. For example, when one type of compensation is available strongly e.g. through generous social security, it might reduce the need for other types of compensation e.g. through household. While DiPrete and McManus (2000) study all three mechanisms, they do not consider the interactions between them. Ehlert (2012) specifically consider the interplay between social and household compensation without explicitly considering the role of market compensation, which we argue to be main compensation mechanism that also effectively substitutes state compensation and drives household compensation.

Lastly, we discuss the extent to which the cost and compensation of job loss is driven by welfare state policies related to social security, labour market and family. Specifically, we consider possible policy interactions that can moderate or amplify different types of compensations. While all welfare states provide some form of insurance against risk, we do not know enough about how successfully they reach this function (Hacker and Rehm, 2022). This type of comparative analysis, we believe, would provide valuable evidence for testing the effectiveness of different policy interactions for insuring against job loss. While there is strong evidence base on the effectiveness of specific programmes such as unemployment

insurance, more system-based assessments that can account for policy interactions is limited. Also, as we argued previously, most of these analyses focus on individual earnings and not household income that is the main driver of living standards.

Our analysis uses long-term high-quality survey data from Germany and the UK, and administrative data from Denmark and Finland for the period of 1990-2018 (except a shorter period for the UK). These countries represent distinct welfare states with varying strategies for insuring against job loss. To assess the economic cost and compensation of job loss, we employ an event-study design and monitor incomes of job losers over the six years following a job loss event. We define job loss as a yearly transition from employment (i.e. at least 5 months in a year) to a significant period of unemployment (i.e. at least 3 months in a year) after job loss. To measure market compensation, we examine earnings replacement, to measure household compensation, we compare losses in individual earnings and household income before taxes and transfers, and to measure state compensation, we compare household incomes before and after taxes and transfers. Before presenting our theory and expectations, we summarise existing evidence in the next section.

2. Existing evidence

Existing studies on the economic cost and compensation of job loss reveal three important findings. First, following a job loss, individuals experience significant losses in their yearly household incomes, but by varying degrees across countries. In the year of job loss, compared to their household income in the year before, individuals lose around 15% in Canada (Stepner, 2019), 10-20% in Germany (Ehlert, 2012), 9% in Sweden (Seim, 2019), 5% in Switzerland, 20% in the UK (Di Nallo and Oesch, 2021) and 18-28% in the US (DiPrete and McManus, 2000; Ehlert, 2012; Rothstein and Valletta, 2017) even after taxes and transfers are taken into account.

Secondly, these losses in household income persist over time in most countries, but dissipate in others. For example, after 3-5 years, income losses reduce to, but stay significant at around 7-10% in Canada, Germany, Sweden, Switzerland and the UK (Stepner, 2019; Seim, 2019; Di Nallo and Oesch, 2021), while they mostly disappear in the US (DiPrete and McManus, 2000; Ehlert, 2012).

Finally, in compensating these losses market, household and the state all have important roles, although their importance possibly varies across countries. For example, DiPrete and McManus (2000) show that a significant part of the compensation for job loss happens through the labour market, e.g. after an employment exit, around 87% of US and 71% of German workers re-employed within five years. Ehlert (2012) argues that, in the case of job loss, the household is the primary source of buffer against earnings losses for couples, although much more so in the US than in Germany. Others emphasize that social security, specifically unemployment insurance in the first years and minimum income schemes in the following years, are the primary source of compensation in the case of job loss, where the level of replacement of household income ranges between 10-25% in the UK and the US, 35-50% in Canada and Switzerland, and 65-70% in Germany and Norway (Hardoy and Schone, 2014; Fackler and Weigt, 2020; Stepner, 2019; Di Nallo and Oesch, 2021).

While these studies provide important evidence across countries, they are not immediately comparable due to different definitions and methodologies. For example, while some focuses on job displacement (i.e. mass dismissals) (e.g. Seim, 2019), others consider transition from employment to non-employment or unemployment (DiPrete and McManus, 2000; Ehlert, 2012). In terms of methodology, while some use a control group (e.g. Fackler and Weigt, 2020), others consider changes over time with or without fixed effects (e.g. DiNallo and Oesch, 2021); or while some uses logarithmic transformation to present percentage changes (DiPrete and McManus, 2000), others use re-scaling (e.g. to average earnings) (e.g. Ehlert, 2012). Also, while some only focus on evidencing market compensation (Lachowska et al. 2020), others only consider state compensation (e.g. Stepner, 2019). We contribute to this literature by providing

systematic comparative evidence on the cost of job loss for household incomes, and its compensation mechanisms in different welfare states.

3. Theory, evidence and hypotheses

Following a job loss, how much of lost income are compensated through the markets, within the household and by the welfare state? What is then the cost of job loss for household incomes in the short-term and long-term?

Before presenting our theoretical expectations given the characteristics of different welfare institutions in four countries, three points are important to raise. First, our research design does not allow us to identify the effects of specific institutional characteristics (Parolin and Van Lancker, 2021), so we will descriptively use policy details to contextualize our findings. Secondly, welfare states change over time, but their main characteristics remain distinct from each other (Abrahamson, 2010). In Appendix (Figure A1-A3), we present how different indicators of policies related to market, family and state have changed during 1990-2018 for the four comparison countries, and discuss them below to form our expectations. Lastly, while we describe each types of compensation separately, there are important substitution effects between them. We consider these substitution effects in relation to each mechanism for constructing our hypotheses.

3.1. Economic cost and compensation of job loss

We define the economic cost of job loss as the average penalty in household disposable incomes i.e. the extent of household disposable income lost in the years following a job loss. The penalty depends on the extent to which job loss is compensated by three mechanisms. The first is social compensation, provided by social security programmes. Social compensation can be defined based on the generosity of social security, considering eligibility, duration and level of benefits. Unemployment Insurance (UI) protects against significant losses and provide income maintenance generally on an individual basis in the short-

term (the first six months to two years). On the other hand, minimum income schemes (MIS) such as means-tested social assistance, tax credits, and child and housing benefits are generally defined on a household basis and provide a certain level of income for those with precarious employment or weak labor attachment, or unemployed in the longer-term. Many have emphasized the crucial role of social security for compensating income losses following a job loss within the household, where the level of compensation ranges between 10-25% in the UK and the US, 35-50% in Canada and Switzerland, and 70-90 % in Germany and Norway (Hardoy and Schone, 2014; Fackler and Weigt, 2020; Stepner, 2019; Di Nallo and Oesch, 2021).

The second is market compensation, defined by the speed and conditions of re-employment of the job losers. The faster the re-employment and the better the conditions of new employment, the lower the losses in yearly earnings, hence the higher the compensation of losses through the market. For example, DiPrete and McManus (2000) show that after an employment exit, around 87% of US and 71% of German workers re-employed within five years. More recently, Bertheau et al. (2022) found that, among job losers, around 70% in Portugal, Spain and Italy, around 80% in Austria, and around 90-95% in France, Sweden and Denmark re-employs within a year. Still, job losers could only replace 50%-80% of their previous yearly earnings in the first year (Lachowska et al. 2020; Bertheau et al. 2022).

The third is the household compensation, defined here mainly related to income pooling within the household. The cost of job loss for household incomes is lower if there are other earners in the household, so earnings of other members in the household provides an instant buffer against losses. Ehlert (2012) argues that, in the case of job loss, the household is the primary source of compensation for couples. In the longer-term, households might also respond to the job loss by increasing labour supply mainly of partners (i.e. added worker effect (AWE)). This dynamic response, however, is generally found to be relatively limited either to certain groups or to recessionary periods in countries with weaker unemployment insurance (Hardoy and Schone, 2014; Bredtmann, 2018; Fackler and Weigt, 2020). Other compensation mechanisms within the household could be increasing capital income or home equity

extraction; however, while these could be important for certain households, existing evidence shows that these are relatively limited when we look on the compensation of an average household (Andersen et al. 2021).

Each compensation mechanism can separately replace income following a job loss, and substitute other compensation mechanisms. These substitutions can be mechanical or reflect dynamic behavioural responses. For example, increasing market compensation can mechanically reduce household and social compensation, as it decreases initial earnings losses and might lead to individuals moving out of social security benefits. Or, low state compensation might increase the need for market and household compensation, while high state compensation through generous UI benefits might replace the need for household and market compensation at least in the short-term.

Given these definitions, welfare states as a system of interacting and complementary social policies can determine the economic cost of job loss by shaping the level of these compensations (Di Prete, 2002; Western et al. 2012; Brady, 2022). The compensation strategies i.e. the order and importance of each compensation likely varies significantly across the welfare states in line with policies that affect the risk and consequences of job loss such as employment protection, activation and training, family and social security policies. Therefore, we expect the economic cost of job loss to vary across welfare states in line with these compensation strategies.

3.2. State compensation

We expect higher state compensation in countries with more generous social security benefits. Generosity includes eligibility, duration and level of benefits, and two social security programmes that are relevant for compensating income losses following a job loss are unemployment insurance (UI) mainly relevant in the short-term, and minimum income schemes (MIS) mainly relevant in the longer-term. We discuss main

parts related to generosity of these programmes below, and describe policy details in the Online Appendix.

Given this definition, countries can be distinguished based on their model of social security i.e. residual, insurance vs universal principles. In the residual model such as the UK, social risks are understood in a narrow perspective, where for example job loss is not considered to deserve public support unless it is followed by a condition of low income or poverty. As a result, unemployment insurance is relatively meagre in the UK, while minimum income benefits are relatively more generous, specifically for those with children. In the insurance model, the focus is on providing income maintenance in the case of income shocks. Income is protected on a status-basis mainly for those with a relatively stable labour market attachment, while those who cannot work or with relatively precarious employment trajectories, minimum income schemes provide only limited protection. As a result, unemployment insurance is relatively generous in Germany, while the minimum income benefits are relatively meagre. In the universal model, income is protected comprehensively independent of the reason for low income, and regardless of work and family lives and events. Following this logic, the system provides generous benefits both for those who experiences risk events such as job loss through unemployment insurance, and for others who are out of the labour market through minimum income benefits.

Despite a general convergence in the generosity of unemployment insurance (UI) in 1990s (Scruggs and Tafoya, 2022), countries are still distinguished in how much compensation they provide against job loss in line with their social security models. Considering UI, countries apply similar conditionality requirements (for e.g. certain behaviours and previous employment), but significantly differ in their generosity (see Figure A1 in Appendix). Among the four countries, Denmark provides the most generous benefits, with an earnings-related scheme replacing on average around 80% of previous earnings available for maximum of two years. On the other hand, the UK provides the least generous UI benefit, with a fixed amount (e.g. 9% of average wage) providing on average 20% replacement rate for a maximum of six months. UI schemes in Finland and Germany provide similar generosity with earnings-related schemes

that, on average, replace around 60% of previous earnings with a maximum duration for receipt of two years in Finland and one year in Germany.

In terms of minimum income schemes (MIS), Denmark has consistently provided more generous benefits around 60% of median household income than Germany and Finland, where MIS provide around 40-55% of median household income. The adequacy of benefits (as relative to the median household income) is generally higher in Finland than Germany (except for households of couples with children). In the UK, we see a clear trend towards lower generosity over time. In the beginning of the 2000s, MIS provided around 60-70% of median household income, which recently reduced to around 45-55%. Overall, MIS is relatively more generous in the UK than in Germany.

In that respect, we expect state compensation to be the highest in Denmark and Finland, both in the short and in the long-term due to generous and nearly universal UI and MIS benefits. On the other hand, we expect the lowest state compensation in the short-term in the UK due to inadequate UI, and the lowest state compensation in the long-term in Germany due to inadequate MIS.

3.3. Market compensation

We expect market compensation to be driven by three main factors. The first is the level of regulation in the labour market. In more regulated markets, where firing and hiring employees are more costly for employers, one would expect slower re-employment for those who lose their jobs. Theoretically, stricter regulations for protecting employment decrease the flow in the labour market; so, while stronger EPL can protect good jobs and prevent against possibly the long-term unemployment and significant earnings scarring especially for high-earners (Gangl, 2006; Gonalons-Pons and Gangl, 2022). Stronger EPL can also make re-employment harder, especially for precarious or temporary workers due to limited availability of jobs (Inanç and Kalleberg, 2022), and limit the conditions of re-employment by acting as a barrier to enter high-quality jobs as these jobs might be well protected for insiders (Rueda, 2014; Biegert,

2017; 2019). Therefore, while it is important to note the potentially dual effects of strict regulations protecting insiders and excluding outsiders, in overall, conditional on the risk of job loss, one would expect market compensation to be higher in contexts with lower EPL due to quicker and better re-employment.

While many have argued for a convergence towards less regulated labor markets, such arguments are true mainly for temporary employment. Strong protections were held for employees with regular permanent contracts across the OECD, creating strong dualization especially in countries such as Germany (Eichhorst and Marx, 2012). In Figure A2 in Appendix, we present the OECD index for employment protection legislation (EPL) for mass dismissals, regular jobs and temporary jobs. Germany is the country with the strictest employment protections for regular jobs and increasingly less protected temporary employment. On the contrary, Denmark consistently had relatively less strict EPL for both regular and temporary employment. Finland is the only country among the four to reduce protections for regular jobs during the observation period, and from early 2000s provides similar level of protections for regular workers to Denmark (and our data in Finland spans from 1997, so mainly captures this later period), while the UK consistently had the lowest EPL for both regular and temporary workers.

The second is the level of active labour market policies (ALMPs). These policies are designed to enhance individuals' employability and facilitate faster re-employment with better conditions for unemployed or underemployed. Typically, they include a combination of training programs, job search assistance, monitoring and behavioural requirements with a threat or application of sanctions, and subsidized employment (Crepon and Van den Berg, 2016). Their effectiveness is context dependent and heterogeneous across groups, but overall, they are shown to increase re-employment and subsequent earnings (Card et al., 2018), especially when combined with generous benefits and in flexible labor markets i.e. flexicurity (Madsen, 2004; Muffels and Luijkx, 2008). A recent analysis by Bertheau et al. (2022) show that ALMP accounts for a significant portion of heterogeneity across European countries in the cost of job loss for yearly earnings. Therefore, we expect higher ALMP to be associated with higher

market compensation. Figure A1 in Appendix presents overall spending on active labour market policies (ALMP) as a percentage of GDP for four countries during 1990 and 2018. Consistently across the period, Denmark had the highest spending (around 1.5-2% of GDP) and the UK had the lowest spending (around 0.2-0.5% of GDP), while Finland and Germany are in between (around 1% of GDP).

The third is the substitution effects of state and household compensation. If the loss of earnings is already replaced adequately by income pooling within the household and by the social security programmes, individuals might not be incentivized to quickly re-employ at least in the short-term. For example, if there are other earners in the household, the initial penalty is likely to be low and that might affect the job search behaviour, re-employment probabilities, hence the market compensation. Rao (2021) argues that this might specifically be relevant for women for whom job loss becomes a critical event that might lead to curtailing their labour market participation. This might be more likely in countries with more dual-earner households such as Denmark and Finland. Or, high social compensation, specifically through UI, can initially create disincentives for employment and moderate market compensation. This might be especially relevant in contexts with high EPL for regular workers such as Germany given the difficulty of obtaining well-paid jobs for relatively precarious workers (Biegert, 2017).[i] On the other hand, high state compensation can also amplify market compensation, by allowing the unemployed the time for job-search and improving job matching (Biegert, 2017). Denmark's flexicurity strategy of combining flexible labour markets with generous unemployment insurance and active labor market policies are long argued to increase the speed of transitions into employment, hence market compensation (Madsen, 2004; Muffels and Luijkx, 2008).

Considering all, we expect market compensation to be higher in countries with less regulated labour markets and more active labour market policies, especially if they are combined with generous social benefits such as Denmark. UK is another country with low EPL and high conditionality on MIS, so likely to show high market compensation. In Finland, despite high levels of EPL, high ALMPs might increase market compensation especially in the long-term, and high UI and MIS might lead to better job match. On

the opposite, we expect market compensation to be the lowest in Germany despite higher conditionality on MIS, as relatively highly regulated labour markets without high ALMPs might lengthen the duration of unemployment especially considering the moderating effect of relatively generous UI. On all these expectations, we assume that disincentivizing effect of income pooling within the household (i.e. substitution effect of household compensation) is not strong enough for average households in these countries.

3.4. Household compensation

We consider three important factors shaping the level of household compensation. First, the level of household compensation depends on household employment, which will be shaped by family policies (Ziefle and Gangl, 2014), specifically by the extent to which welfare or care responsibilities are de-familialized (or individualized as more appropriately put by Daly (2011)). In countries with more de-familalization policies such as Denmark and Finland, public provision of early childhood education and care and paid parental leave can reduce the cost of children and might relieve some of the structural constraints against employment. Such policies can also make individuals relatively more independent of the family relationships, which might then increase the existence or possibility of a second earner (Ziefle and Gangl, 2014; Zagel and Van Winkle, 2022), especially for low educated or low earner mothers in high inequality settings (Hook and Paek, 2020).

Over the past decades, spending on family policies has increased significantly, specifically on early childhood education and care, and parental leave (Daly and Ferragina, 2020). Beyond what type of households that these policies promote between male, one-and-a-half or dual breadwinner model (Daly, 2011), and despite nearly universal direction towards incentivizing women towards employment and moving care work outside of the household even in most familialistic regimes such as Germany, the level and composition of household employment among countries are still significantly distinguished from each other. As shown in Figure A1 in Appendix, two full-time earner households have been the norm in

Denmark and Finland (around 60-70% of household) across the observation period, while in Germany and the UK, one full-time and one part-time earner households are equally common as the two full-time earner households. In the last decade or so, the proportion of two full-time earner households have increased both in Germany and the UK, but still fall short of the levels in Nordic countries.

Second, the level of household compensation depends also on who experiences the job loss. If the job loser is the lower earner within the household, other earners can provide an instant buffer and high level of household compensation. This might be more likely in Denmark and Finland given the prevalence of dual earner households, or in Germany and the UK given lower protections for temporary than regular jobs i.e. dual labour markets (Rueda, 2005), which might particularly raise the risk of job loss for lower earners (see Figure A1 in Appendix).[ii]

Third, the level of household compensation depends on the substitution effects of market and state. If job loser already re-employs with good conditions or loss of earnings is satisfactorily replaced by social security, the need for additional earner and income pooling within the household dissipate. As we have mentioned above, market compensation mechanically reduces the level of household compensation by decreasing the level of initial losses in individual earnings, while high social compensation might reduce the need for additional earners. While these substitution effects can be considered as short-term dynamics, they can also reflect long-term strategies of income pooling especially in countries with typically low state compensation such as the UK.

Therefore, the level of household compensation depends on the relative importance of different factors. If the level of individualization (i.e. policies for de-familialization) and household employment are the main driver of household compensation, Denmark and Finland is likely to have the highest household compensation given the existence or potential of second earners in the household. This is our main expectation. However, this depends on the assumption that composition of risk is similar across countries, so job loss does not occur selectively in single earner or dual earner households, or for lower or higher

earners within households in certain countries. At the same time, in Nordic countries, if state compensation is generous enough to compensate most of the initial loses and market compensation is also relatively high, these would not leave much space for household compensation, while the lack of social or market compensation in Germany and the UK might require households to take on the responsibility on their regard and increase the household compensation. In that case, we might expect household compensation to be higher in Germany and the UK.

3.5. Penalty of job loss

Considering different compensation mechanisms, the penalty of job loss depends on the level of compensations provided by each mechanism as well as their substitution effects between them given distinct policy mixes applied in different welfare states. However, it is relatively difficult to form expectations as while there is evidence on the importance of each mechanisms separately, there is no clear evidence on their relative importance. Still, state compensation is a relatively independent mechanism that shapes the conditions that might affect individual's job-search behaviour and households' decisions on income pooling. In between market and household, market is likely to be the primary mechanism i.e. if job losers can re-employ, they do; if they cannot, households pool incomes to insure against shocks and compensate the losses both as a short-term and long-term strategy.

Given these assumptions, the penalty is likely to be the lowest in Denmark and the highest in the UK. We expect the losses to be highest in the UK despite higher market and possibly household compensation mainly due to low state compensation. Specifically, in the short-term, UI does not provide adequate compensation, but also in the long-term as MIS would replace incomes only for those in need. On the other hand, we expect the lowest penalty of job loss in Denmark in both the short and the long-term as it likely provides a high state compensation and the necessary conditions for high market and household compensation. Similarly, in Finland, high state compensation would replace most of the losses in earnings, but the penalty is still expected to be higher than in Denmark due to lower market compensation

(given higher EPL). In Germany, the penalty is expected to be higher than Denmark and Finland due to lower state and market compensation especially in the long-term; compared to the UK, the penalty is likely to be lower at least in the short-term due to relatively generous UI.

4. Research design

4.1. Data and target population

We use high-quality long-term panel survey data for Germany (German Socio-Economic Panel -GSOEP) and the UK (British Household Panel Survey - BHPS), and longitudinal administrative data from Denmark and Finland. The available data covers 1991-2018 for Germany and Denmark, 1997-2018 for Finland, and 1991-2008 for the UK.[iii] The admin data from Denmark and Finland combines multiple registers including population, tax and social security data.

Our target population is workers aged 25-55. We exclude younger workers given longer education and higher state support for young people in Denmark and Finland. We exclude older workers given the possibility of early retirement, and self-employed given the difficulty of measuring earnings of this group. These choices are standard in most of the literature (e.g. DiPrete and McManus, 2000; Couch and Placzek, 2010). We use an unbalanced sample, and our unit of analysis is individual, although some information, as described below, is at the household level.

4.2. Measures

Our main explanatory variable is the event of job loss, a binary variable showing a transition from employment (at least five months in the previous year) to unemployment. We define unemployment as being unemployed for at least three months in the current year to capture significant shocks rather than short-term fluctuations.[iv] Our aim is to observe the incomes of those individuals who have been exposed to a significant event of job loss.

We use multiple outcome measures to estimate economic cost and different compensation mechanisms. To show the cost of job loss, we use post-tax/post-transfer household income (i.e. post-government household income), which is a sum of household earnings, investment income and public transfers net of taxes, equivalized for household size and composition using modified-OECD scale.[v] This is the final income available to households for spending or consumption, hence ultimately defining their living standards. To show compensations for job loss, we use different measures of income. To examine market compensation, we use i) employment defined as being in paid-work for at least 5 months in a given year and ii) individual earnings showing gross annual earnings for all employment before taxes and social contributions. To examine household compensation, alongside individual earnings, we use pre-tax/pre-transfer household income (i.e. pre-government household income), which includes gross yearly earnings and capital income of all members in the household. The difference in losses between individual earnings and pre-government household income gives us the level of household compensation. To examine state compensation, we compare pre-and post-government household income which is the household disposable income before and after taxes and transfers, equivalized using the modified-OECD scale.

We use four variables as controls. Losing a partner is a binary variable showing a transition event from partnership or marriage to singlehood. We also use calendar year, age and gender for residualizing our outcome variables (see below). We present descriptive statistics for all variables and separately for each country at Table A1 in Appendix. We also discuss in detail comparability issues related to the measurement e.g. of unemployment, household and certain income components, and if there are any possible implications for our analysis in the Online Appendix.

4.3. Estimation of the effects of interest

Our main interest is observing how much income individuals lose following an event of job loss relative to their income prior to the event. In other words, from a policy perspective, we are interested in monitoring the incomes of only those who experiences a job loss to understand the cost and compensation

for these groups in different welfare states. Estimating these effects do not require a control group, and as the characteristics of this 'treatment' group can be different from the average population, these estimates would not represent causal effects of job loss.

We define the social compensation as the level of household income replaced by the social security programmes in the years following a job loss. We consider both taxes and transfers together. We define market compensation as the level of earnings replaced in the years following a job loss. The replacement can be due to re-employment or increasing earnings for those already re-employed, hence this measure shows the speed and the conditions of re-employment. We define household compensation as the level of earnings replaced within the household in the years following a job loss, which can show the contribution of other earners in the household, as well as the changes in the capital income. We will, however, interpret household compensation only related to household earnings because results with and without capital income give very similar results (see Online Appendix). Finally, we define the penalty of job loss as the amount of post-government household income lost in the years following a job loss, relative to the income in the year before the job loss.

To estimate these quantities, we use an event study design model using linear regression:

$$Y_{it} = \alpha_i + \delta_{it}\, I[z = t] + \beta_{it}\, X + \varepsilon_{it} \qquad \textit{(eq. 1)}$$

Y is outcome residualized for year, age and gender prior to the analysis. The first term is event time t dummies, including three lags and six lead years (i.e. t=-2, -1, 0, 1, 2, 3, 4, 5, 6) relative to the timing of job loss, and the remaining lags and leads are bunched together. X is the partnership dissolution as the only control variable. Our effects of interest can then be calculated from δ_{it}. To present coefficients equivalently and as percentages of a meaningful quantity, we need a base reference value to re-scale, and we use the average earnings in the three years prior to the job loss as our reference value (similar to Ehlert, 2012). This choice allows us to decompose the difference in total earnings loss (%100) and the

final cost of job loss (for post-government household income) into three compensation mechanisms. Then, for example, the difference in the value for δ_{it} in pre-government and post-government household income models shows the level state compensation as a percentage of average earnings within the reference years. Similarly, $1-\delta_{it}$ in earnings model shows market compensation, and the differences in the value for δ_{it} in earnings and pre-government household income models shows the level of household compensation (as a percentage of average earnings within the reference years). We run the analysis separately for each country.

5. Results

5.1. Compensation of job loss – household, social and market

Table 1 presents the average compensation levels across four countries. The numbers show how much of the initial loss of earnings is replaced through the market, within the household and by the state on average within the six years following a job loss, and they are presented as a percentage of average earnings in each country within reference years (i.e. three years prior to job loss).

The findings show market as the primary mechanism for compensation. On average across all countries, market compensation replaces around 60% of losses, while the compensation by the state and household are around 16% and 13% respectively. The prominence of market mechanism across all countries is mainly due to the fact that, even if generally with lower wages than previous employment, the majority re-employs within a year.[vi] This is also in line with relevant evidence from other countries (e.g. see Gangl, 2006; Lachowska et al. 2020; Bertheau et al. 2022). Still, market compensation is the highest in Denmark (66%) and the lowest in Germany (55%), while the UK and Finland shows similar levels of market compensation (60%). This aligns well with our expectation given the mix of policies related to the labour market. Denmark's flexicurity strategy combining flexible labour markets with activation policies and generous unemployment insurance specifically increases the speed of re-employment, while Germany's mix of stringent EPL for regular workers, low EPL for temporary workers and generous UI is a

configuration that potentially disincentivize work due to lack of attractive job opportunities relative to the benefit levels, as suggested by Biegert (2017). Similarly, market compensation is relatively higher in the UK (60%), where employment protections have been consistently low during the observation period, and in Finland (60%), which provides high activation and generous unemployment insurance. Aligning well with their employment strategies, compensation is primarily related to re-employment in the UK and earnings replacement in Finland (See Table A2 in Appendix).[vii]

[Insert Table 1 here]

While market compensation is the primary mechanism in all countries, the relative importance of household and state differs between countries. We argue that this can be explained by substitution effects between compensation mechanisms. For example, in Denmark, state compensation (22%) is more important than household compensation (2%). Similarly, in Finland, state compensation (17.4%) is higher than household compensation (11.8%). While generous and universal social security provision explains high level of state compensation in these countries, lower household compensation can be explained by the substitution effects of market and state compensation. While the high level dual-earner households provide an ideal context for high household compensation, and job loss tends to happen more to lower earners within the households (see Figure A4 in Appendix), household compensation is low possibly because state and market compensation already replaces most of the lost earnings i.e. 90% of losses in Denmark and 78% of losses in Finland. Conversely, in the UK, where the state compensation is the lowest among all countries (7%), household compensation is more prominent (around 20%). The level of dual earner households is relatively lower in the UK than Nordic countries, and job loss is experienced equally across high and low earners within the household ((see Figure A4 in Appendix). Despite these conditions, household compensation in the UK is high possibly as a result of a long-term income pooling strategy followed by these households for preparing against or compensating for a job loss.[viii] Similarly, in Germany, where the level of market compensation is the lowest among all four countries, the level of household and state compensation are very similar (around 18%). Therefore, household appears to be

acting as a last resort for compensation, when the state or market compensations are not adequate to replace a significant part of the earnings losses following a job loss.

These substitution effects are clearer when we observe how these market, household and state compensations have evolved over the six years following a job loss in Denmark, Finland, Germany and the UK (see Figure 1).

In general, across all countries, market compensation is rising, while household and state compensation is declining over time. These reverse trends between market and other compensations are possibly related and due to certain substitution effects. First, rising market compensation can mechanically reduce other types of compensations as it reduces the initial loss and allows people to move out of social benefits. This is consistent with how the rise in market compensation and the decline in household compensation are simultaneously stalling after three years both in Germany and the UK. Similarly, household compensation completely disappears after the 4^{th} year of job loss in Denmark and reduces to less than 10% in Finland, possibly due to strongly continuing market compensation between the second and fourth year in both of these countries. Second, rising market compensation is likely to be a response to substitute the losses from declining state compensation. With the exhaustion of generous UI benefits, individuals might be forced to re-employ regardless of conditions of the new employment. Indeed, in countries with generous UI schemes (i.e. all except the UK), where the maximum duration of UI benefits are around two years, we observe that market compensation disproportionately grows within the third year possibly due to the exhaustion of eligibility. Moreover, as we show in Figure A5 in Appendix, this increase in market compensation is partly due to rising employment. On the other hand, market compensation in the UK, which is as low as in Germany in the first year, significantly and equally grows in the second and third years.

[Insert Figure 1 here]

5.2. Penalty of job loss

Considering these compensations, what is then the penalty of job loss in the short-term and long-term in different welfare states? Table 2 shows average penalties over the six years following a job loss in four countries. The estimates show the level of post-government household income lost between the reference year and the average of the following six years, and presented as a percentage of the average earnings in the reference years.

[Insert Table 2 here]

The findings show that, despite high level of compensations through all three mechanisms, households in all countries experience significant losses in their household incomes, on average, at around 10-13%. Also, even with significant differences in the relative importance of compensation mechanisms, overall, the cost of job loss is similar across countries. Still, the UK has higher penalty around 13%, while other countries show a penalty around 10%.[ix] As we have shown above, household compensation is the highest in the UK, but does not seem to sufficiently reduce the cost at least to the levels in other countries with higher level of state compensation. Similar penalties across Denmark, Finland and Germany arise despite the differences in the source of compensation, reflecting different compensation strategies. In Denmark, household compensation is negligible and losses are mainly replaced by the market and state, while in Germany and Finland, the relatively lower market compensation is substituted mainly by the household.

This average picture, however, masks significant variation over time, especially in the UK. Figure 2 shows the amount of post-government household income lost in the six years following a job loss in four countries, presented as a percentage of the average earnings in the reference years. Three comparative findings are important to emphasize.

First, in the short-term, the findings partly align with our expectations showing the highest cost for the UK and the lowest cost in Germany, possibly driven mainly by the differences in state compensation. In

the first year of job loss, the economic cost is around 22% in the UK, 8.6% in Germany and 10% in Denmark and Finland. As we have shown above, in the first year of job loss, in between the UK and Germany, the levels of market and household compensation are very similar, while state compensation is particularly low in the UK and particularly high in Germany. The slightly lower cost in Germany than Denmark and Finland is due to the fact that Germany combines a high level of state and household compensation, and despite significantly lower level of market compensation, this strategy reduces the cost more than other countries at least in the first year (although the differences are not statistically significant).

[Insert Figure 2 here]

Secondly, the evolution of these losses over time vary across countries in line with the level and type of compensations, and substitutions between them. In the UK, starting from the second year, penalty significantly reduces over time due to a significant increase in market compensation (from 38.7% to 50%) and continuing household compensation. In other countries with generous UI benefits, we see the penalties grow in the second year as the rise in market compensation is lower than the declines in state and family compensation. In the case of Finland, market compensation drops in the second year possibly a result of subsequent and repeated job loss experiences. In the third year, market compensation significantly increases again in countries with generous UI benefits and that is probably to substitute the declining state compensation from the exhaustion of eligibility. Still, despite this increase in market compensation, penalties relatively stall and reduce only slightly, which means that the increase in market compensation almost perfectly substitutes the declines in state and household compensations. What is partly distinguished in the UK, as we argued above, is the continuing household compensation that specifically picks up from the fourth year reflecting a dynamic long-term household response, and that helps to reduce the penalty in the long-term.

The third and last comparative finding is the variation in the cost of job loss across countries in the long-term. At the sixth year of job loss, the average penalty is still significant around 8.5-8.8% in Denmark, Finland and Germany, while it is substantially lower at 4.5% in the UK (although not statistically different from other countries). As we argued above, the lower penalty in the UK can be explained by the continuing market compensation combined with the long-term household strategy of income pooling. On the other hand, we observe relatively persistent losses in other countries as rising market compensation only slightly surpasses the declines in household and state compensations.

Beyond this variation, we see relatively persistent penalties in all countries. Therefore, job loss leads to significant and long-term costs not only for individual earnings, but also for household incomes. Even in countries with the most generous social security and ideal context for both market and household compensation, some households continue to be economically scarred by an experience of job loss even after six years.

6. Discussion

In the last few decades, insecurity of jobs and income have become a greater concern in high income countries. Kalleberg (2011; 2018), for example, argued that deindustrialization, relaxed firing and hiring regulations, proliferation of temporary or short-term contracts, and weakened collective power of workers have shifted the risks from employers to employees, and increased the quantity, but decreased the security and quality of jobs. Others have contended that, income insecurity has risen substantially due to a significant shift in responsibilities of social risks from the state and market towards families and individuals (Hacker, 2006; Western et al. 2012; Latner, 2019; Hacker and Rehm, 2022). As a result of these declining income and employment protections provided by labour markets and welfare states, individuals are increasingly left to address risks such as job loss on their own (Andersen et al. 2021), which possibly pushes many of those without inadequate resources to borrowing and debt through credit markets (Wiedemann, 2021).

In this article, we examined the economic cost of job loss for household incomes, and the extent and sources of compensations provided against job loss in different welfare states. We defined job loss as a yearly transition from employment (at least for five months) to unemployment (at least for three months). Our findings confirm that household incomes significantly reduce in the years following a job loss even in countries with the most flexible labour markets and most generous welfare states. Within the six years following a job loss, on average, individuals lose around 10-13% of previous earnings, even after accounting state, market and household compensations. These penalties are higher in the short-term, especially in the UK, where it reaches at 22%, while relatively lower in the long-term, again especially in the UK, where it drops at around 5%. Therefore, in general, the cost of job loss for household incomes is significant, relatively persistent and long-term. While the cost is lower in the UK than other countries in the long-term, the total cost of job loss is significantly higher for individuals and households in the UK due to significantly higher penalties in the first three years of job loss.

These differences across countries and variation over time are a result of the specific compensation strategies that countries with different welfare states follow. While market compensation is the primary mechanism in all countries, the relative importance of state and household compensation differs across countries. For example, in Denmark, high state and market compensation already replaces around 90% of previous earnings, so does not leave much responsibility for the household, while in the UK, the lack of state compensation is mainly substituted by household compensation both in the short-term and long-term. Finland has a similar compensation strategy to Denmark that depends mainly on state and market compensation, yet still differ from Denmark showing lower state and market compensations, which are substituted by higher family compensation. In Germany, where the market compensation is generally lowest among all, state and household have similar roles in compensating incomes after a job loss.

In the short-term i.e. the first two years of job loss, state compensation seems to be driving the differences across countries. State compensation is significantly higher in the first two years for countries with generous unemployment insurance (UI) benefits, and that mainly determines the level of job loss penalty

in the short-term. For example, in countries with generous UI benefits such as Denmark, Finland and Germany, the average penalties are around 9-10% in the first year; in the UK, despite higher-levels of household compensation than other countries, the penalty is around 22% mainly due to meagre UI benefits.[x] In the longer-term, however, higher social compensation does not necessarily translate to lower penalty possibly because MIS benefits generally function as a safety net rather than income replacement, and behavioural requirements possibly push people into labour market substituting social with market compensation. For example, from the third year of job loss, Denmark, Finland and Germany provide significantly higher social compensation than the UK, while penalties decline much faster in the UK than in other countries.

In the longer-term, market compensation is what seems to partly drive the variation in penalties. In all countries, market compensation is the only mechanism that improves over time, while household and state compensation generally reduce over time. Therefore, the main mechanism for compensating losses in the long-term seems to be individual's own effort for re-employing with good conditions. However, especially after the third year of job loss, these efforts manage to reduce the penalties only slightly in most countries. This probably shows that continuing market compensation can only substitute for declining state and household compensations. One exception is the UK, where the cost of job loss significantly declines over time, especially within the sixth year. What is different in the UK is the rising compensation from the household, which alongside the increase in market compensation significantly helps to reduce the cost of job loss in the longer-term.

In general, household compensation appears to be a mechanism that acts as a last resort substituting for market and social compensations. While we expected household compensation to be higher in Nordic countries with higher level of de-familialization and dual earner households, and where job loss is more likely to be experienced by lower earners within the household, we found the otherwise: the average household compensation is lower in Denmark and Finland than in Germany and the UK. We consider that this can mainly be explained by high social and market compensation in the Nordic countries, which

reduce the need and space for household compensation. Higher market compensation can reduce the initial loss and hence mechanically reduce household compensation, while existence of generous social compensation can discourage additional workers within the household. Conversely, the lack of strong state compensations leaves more responsibility on the individuals and households in the UK, whom respond partly by long-term income pooling strategies to compensate against job loss and unemployment, similar to the findings of Ehlert (2012) for the US. These results show the strong elasticity of household compensation to the availability of market and state compensation; it can become a primary mechanism when there is need e.g. in the UK, or it can almost disappear when there is enough compensation from other mechanisms e.g. in Denmark.

These findings provide key implications for policy. State compensation, specifically UI benefits, is crucial for insuring against job loss and ensuring adequate income replacement especially in the first years of a job loss. Despite strong state compensation, however, significant losses in post-tax/post transfer household incomes can still be observed even after six years. This can partly be explained by the scarring effect of job loss and unemployment (Gangl, 2006). Even in the most open labour markets such as Denmark and the UK, 15-20% of those who lose their jobs stay unemployed after six years; this number goes up to 30-40% for Finland and Germany. Even for those employed, the conditions of new employment are usually worse than their previous employment (similar to the findings of Lachowska et al. 2020). What our findings also show is that these scarring effects for earnings and employment are not fully compensated within the household or by the state and causes persistent losses in household incomes.

Market compensation is a crucial mechanism especially driving the evolution and persistence of job loss penalties over time. Market compensation is high not only in countries with low EPL and high ALMP such as Denmark, but also in Finland where relatively high EPL is mixed with relatively high ALMP and generous UI. Another policy mix of low EPL and low UI, despite the low ALMP, seems to still provide high compensation at least in the long-term in the UK. On the other hand, market compensation is significantly lower in Germany, which has a particularly dual labour market structure and with a policy

mix of generous UI and low ALMP that does not provide opportunities and activation for re-employment (Biegert et al. 2017). These findings support recent cross-national evidence showing the earnings scarring is lower in countries with high ALMP (Bertheau et al. 2022), but especially when it is combined with generous UI benefits (Biegert et al. 2017).

Our analysis is limited in several respects. First, comparability of measurement between administrative and survey data could be a potential problem for comparing estimates across countries. In Online Appendix, we discussed in detail possible issues related to different measures. We believe, there could be one major issue related to the underreporting of public transfers in survey data that might lead to underestimation of state compensation and overestimation of cost of job loss in Germany and the UK compared to the other two countries with administrative data. Secondly, we look at average effects, but the losses might vary across different groups. For example, Ehlert (2012) shows that, in Germany, while cost of job loss disappears after three years for men in couples, it is persistent for women in couples. Such heterogeneities are important to explore as possible sources of inequality. Thirdly, we do not use a control group and our estimates do not represent causal estimates. However, based on the UK data, we reached similar findings based on difference-in-differences model and using fixed effects (see Online Appendix). Fourthly, we evaluate household compensation mainly based on earnings of other members, but does not consider the effect of familial ties and support such as transfers or in-kind support from other households (i.e. parents). Ehlert's (2012) finding for singles, however, shows that such transfers provide limited compensation. As our interest is only on household incomes, we also do not consider other household responses for consumption smoothing such as dissaving, borrowing or other financial strategies e.g. related to loan or mortgage. Lastly, while comparing four countries gives us important comparative evidence, a more systematic assessment of institutional characteristics could be made with a more comprehensive design. Certainly, such a design would limit the time frame and require significant efforts for harmonizing a large number of longitudinal datasets.

Many scholars recently argued that the demand from states to protect individuals against the financial consequences of uncertain events are comprehensive across different groups and exposure against risks (given insurance possibilities) is an important driver of social and political preferences (Rehm, 2016; Rueda and Stegmueller, 2019). These income protections are important for all income groups, particularly for those lacking sufficient private resources. Modern welfare states, specifically a social insurance and a minimum income scheme adapted to the labor market and household of the 21st century, can effectively compensate risks and provide security for all (Atkinson, 2015). Recent empirical evidence from a substantial body of economic literature indicates that well-designed unemployment insurance has minimal negative impacts on the duration of non-employment, while yielding significant positive effects on the speed and conditions of re-employment (Schmieder and Von Wachter, 2016). However, unemployment insurance primarily serves as a short-term policy and often falls short in covering marginalized groups, such as those engaged in non-standard employment (Immervol et al. 2022). Therefore, it is imperative not only to reform existing insurance schemes to cater to the needs of the future workforce but also to supplement them with generous minimum income schemes to establish a safety net. Additionally, these efforts should encompass initiatives aimed at enhancing job matching, improving job quality, and facilitating re-training and skill development. These measures acknowledge the crucial role of market-based compensation in insuring against job loss (Von Wachter, 2019).

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Endnotes

[i] Such disincentive effects are likely to be low for those receiving MIS benefits especially in Germany and the UK, due to strong behavioural requirements such as work-search and job-availability, which are followed by sanctions in case of non-compliance.

[ii] This is also similar for Finland until early 2000s, but our main analysis for Finland does not consider this period as the Finish data starts from 1997.

[iii] We did not use Understanding Society (UKHLS), which is the counterpart of the BHPS, for the most recent period in the UK because UKHLS does not include information on yearly incomes, which is crucial to estimate the economic cost of job loss

[iv] We have tested the sensitivity of our UK results to these conditions, for example, by conditioning on longer employment (i.e. 7 months) and shorter unemployment (i.e. more than 2 months) similar to the definition used by Ehlert (2012) and the results are substantively very similar. We have explored how the results change when we define job loss as any transition into unemployment (i.e. unemployment spell) and expectedly, the penalty estimates were significantly lower. See Online Appendix for results.

[v] The scale weights first adult as 1, other adults as 0.5 and each child below age of 14 as 0.3.

[vi] This can be observed at Table A2 and Figure A5 in Appendix, which show that the average re-employment rate within six across countries is 66%; most of this re-employment happens in the first year, and re-employment rates are generally higher than percentage of earnings replaced, so at least for some of those re-employed, the earnings of the new employment is lower than their pre-job loss earnings.

[vii] The primacy of earnings replacement might be related to two factors in Finland: high ALMP raising skills and high UI benefits raising reservation wages.

[viii] We argue this is a long-term strategy because other earnings (than the earnings of job loser) within the household in the UK does not change much over the six years and even drops slightly in the first years (results not shown, but available from authors). This possibly shows that short-term dynamic added worker effect is relatively limited.

[ix] One could consider explaining differences across countries with the variation in the duration of job loss, but as we show in Online Appendix that the average duration is very similar, around six months, across countries.

[x] For example, in between Germany and the UK, family and market compensation are very similar around 23-25% and 38% respectively, while the penalty is significantly lower in Germany than the UK mainly due to higher state compensation. State compensation in the first year is 30% in Germany and 14% in the UK.

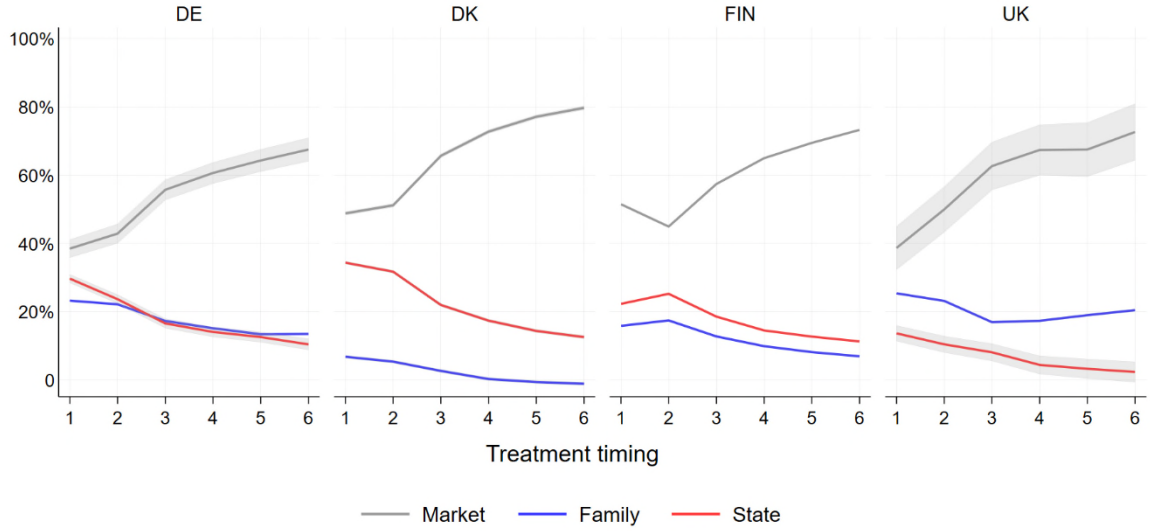
TABLES AND FIGURES

Table 1. Average market, family and state compensation in Germany, Denmark, Finland and the UK

Country	Market compensation	Family compensation	State compensation	Total compensation
DE	54.9%	17.5%	17.8%	90.2%
DK	65.9%	2.2%	22.1%	90.2%
FIN	60.3%	11.8%	17.4%	89.5%
UK	59.8%	20.4%	7.0%	87.2%
All countries	60.2%	13.4%	15.7%	90.2%

Notes: The table shows average income compensation through the market, family and state within the six years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Market compensation shows earnings replacement, family compensation shows reduction in losses through other earnings, while state compensation shows replacement of incomes through taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Figure 1. Market, family and state compensation over the six years following a job loss in Germany, Denmark, Finland and the UK



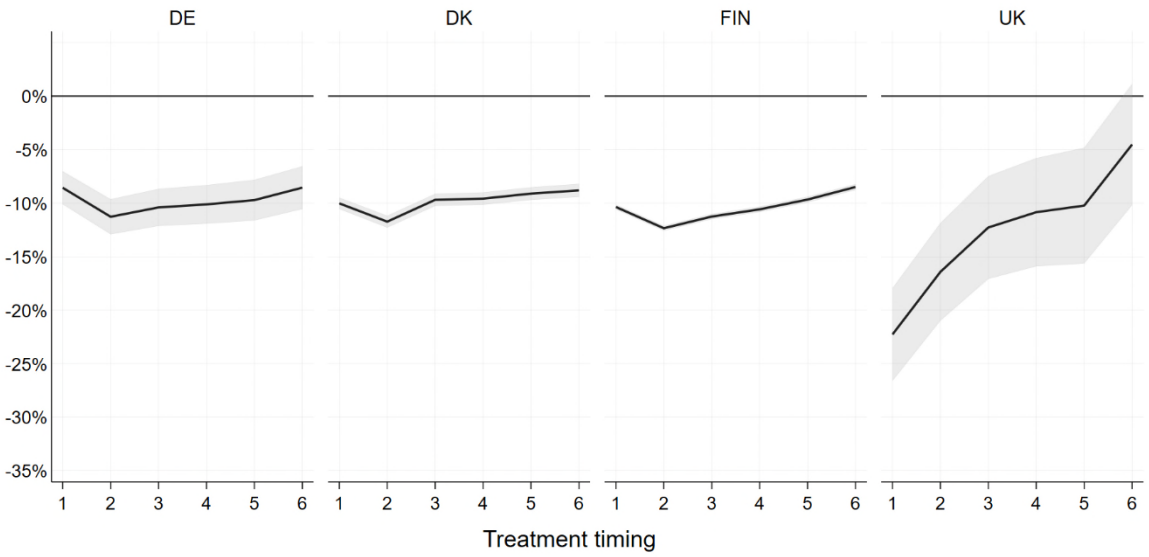
Notes: The figure shows income compensation through the market, family and state in the years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Market compensation shows earnings replacement, family compensation shows reduction in losses through other earnings, while state compensation shows replacement of incomes through taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Table 2. Average cost of job loss for household incomes in Germany, Denmark, Finland and the UK

Country	Estimate	Lower bound	Upper bound
DE	-9.8%	-8.0%	-11.5%
DK	-9.8%	-9.3%	-10.4%
FIN	-10.5%	-10.2%	-10.7%
UK	-12.8%	-7.8%	-17.7%
Total	-10.7%	-8.8%	-12.6%

Notes: The table shows estimates of the average loss in post-government household income in the six years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. The estimates are the average over six years. Post-government household income is defined as the sum of household earnings and investment income net of taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Figure 2. Average cost of job loss over the six years in Germany, Denmark, Finland and the UK



Notes: The figure shows loss in post-government household income in the years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Post-government household income is defined as the sum of household earnings and investment income net of taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

APPENDIX

Table A1. Descriptive statistics

Germany (DE)

	Mean	p50	SD	Min	Max
Job loss	0.12	0.00	0.32	0	1
Employed	0.67	1.00	0.47	0	1
Earnings (€)	17807	15952	16599	0	480000
Pre-government HH income (eq.) (€)	19727	16744	16950	46	491000
Post-government HH income (eq.) (€)	16056	14269	9429	1147	277000
Partnership dissolution	0.02	0.00	0.14	0	1
Female	0.42	0.00	0.49	0	1
Age	40	41	8	25	55
Year	2004	2004	8	1991	2019

Denmark (DK)

	Mean	p50	SD	Min	Max
Job loss	0.08	0.00	0.27	0	1
Employed	0.85	1.00	0.36	0	1
Earnings (KRR)	190000	191000	156000	0	12900000
Pre-government HH income (eq.) (KRR)	271000	244000	271000	3	75900000
Post-government HH income (eq.) (KRR)	216000	192000	150000	6	43400000
Partnership dissolution	0.03	0.00	0.17	0	1
Female	1.53	2.00	0.50	1	2
Age	43	44	8	25	55
Year	2002	2001	7	1991	2018

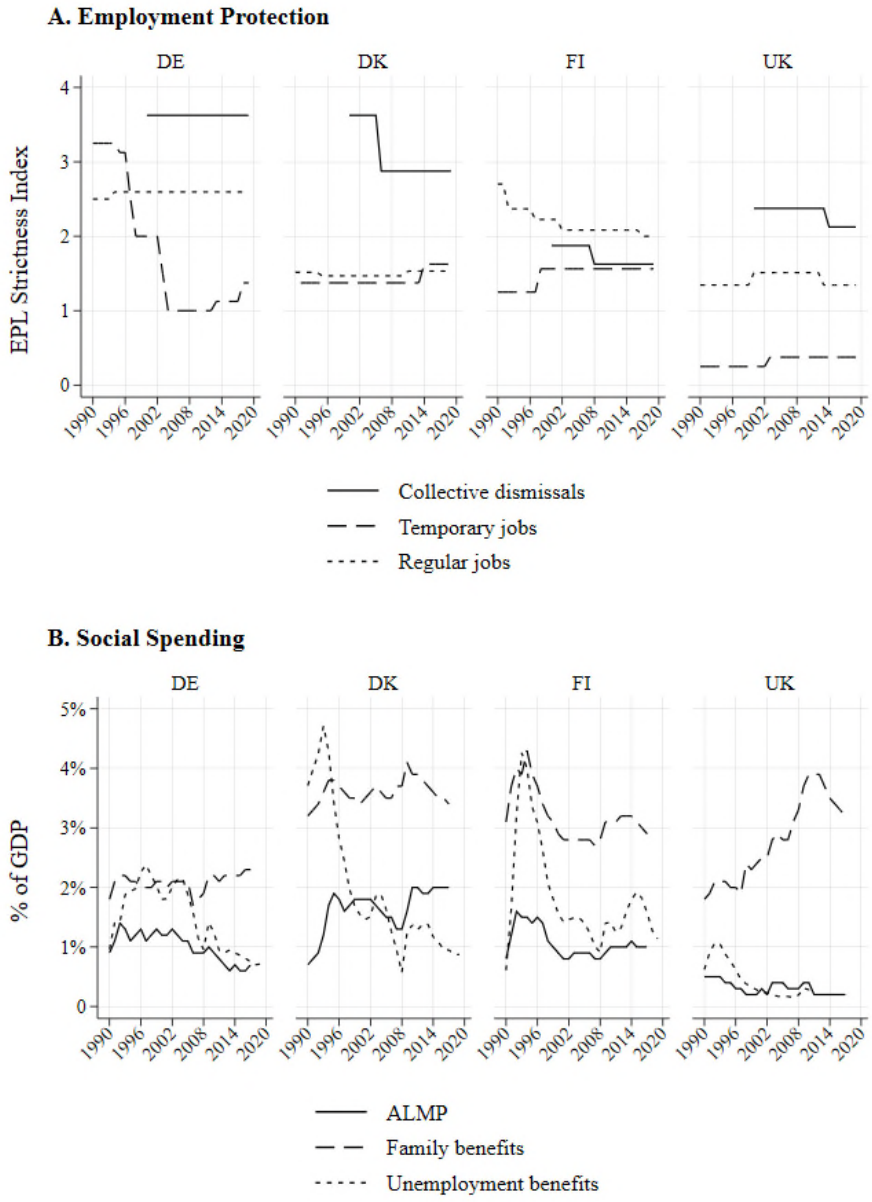
Finland (FIN)

	Mean	p50	SD	Min	Max
Job loss	0.11	0.00	0.31	0	1
Employed	0.71	1.00	0.45	0	1
Earnings (€)	20382	18911	19557	0	213613
Pre-government HH income (eq.) (€)	24080	21855	35214	4	292482
Post-government HH income (eq.) (€)	21812	20068	23091	5480	198661
Partnership dissolution	0.04	0.00	0.19	0	1
Female	0.50	0.00	0.50	0	1
Age	40	40	8	25	55
Year	2008	2008	6	1997	2018

United Kingdom (UK)

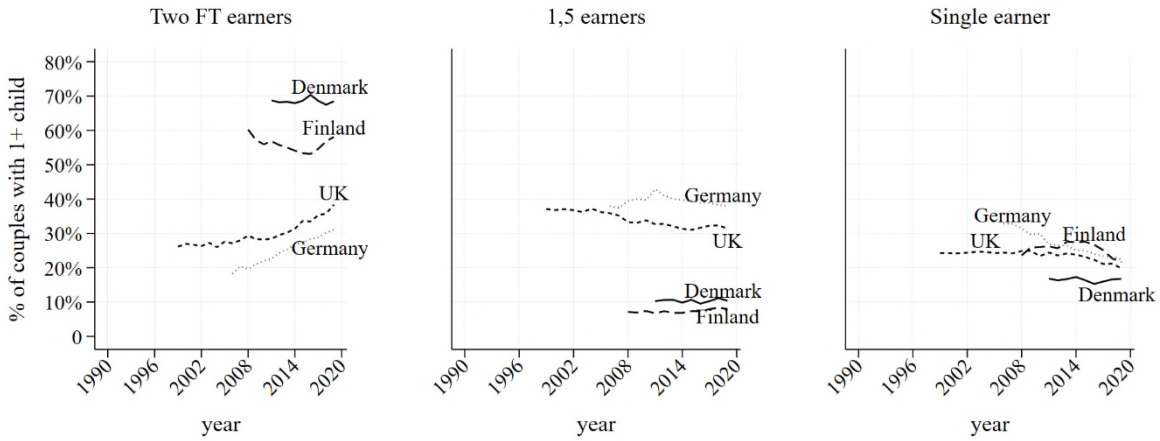
	Mean	p50	SD	Min	Max
Job loss	0.13	0.00	0.33	0	1
Employed	0.78	1.00	0.41	0	1
Earnings (£)	11068	8966	11539	0	240000
Pre-government HH income (eq.) (£)	13127	10886	11461	50	181000
Post-government HH income (eq.) (£)	11647	10166	7590	1208	219000
Partnership dissolution	0.03	0.00	0.16	0	1
Age	0.49	0.00	0.50	0	1
Female	40	40	8	25	55
Year	2000	2000	5	1991	2008

Figure A1. Market regulation and activation during 1990-2018 – EPL and ALMP



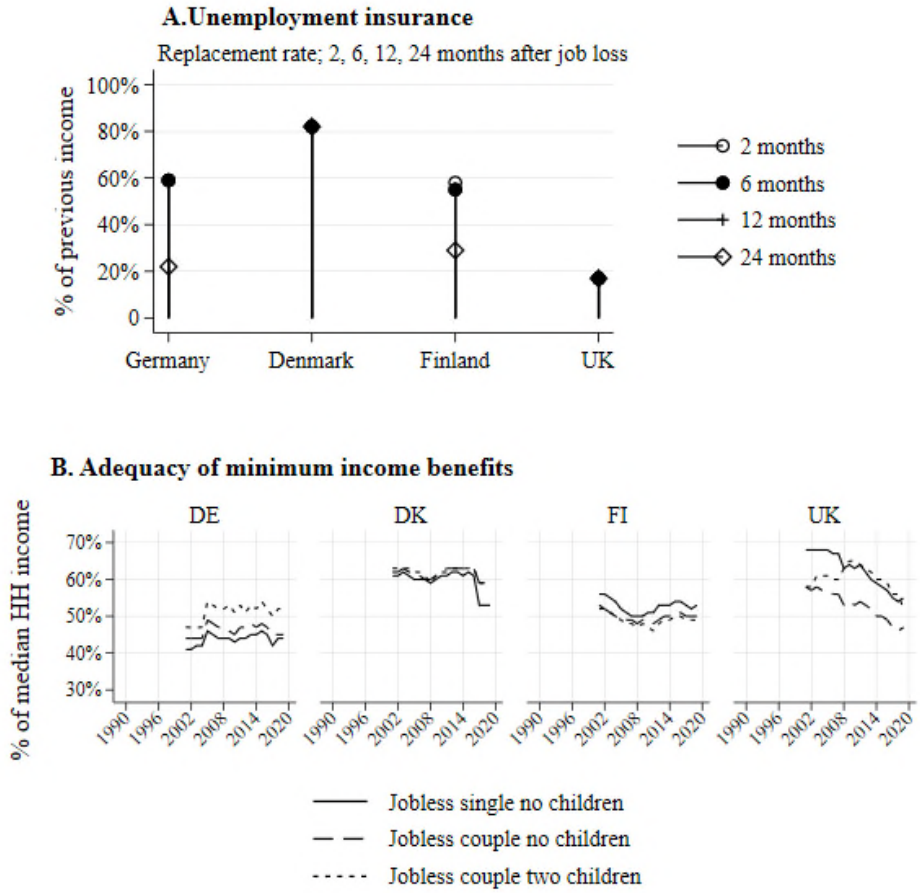
Notes: The figure shows an OECD indicator on the strictness of Employment Protection Legislation (EPL) and level of social spending (as % of GDP) for different programmes including active labor market policies (ALMP) in four countries, Denmark, Finland, Germany and the UK during 1991-2018. The data is from OECD.Stat Labor Force Statistics and is publicly available from https://stats.oecd.org/.

Figure A2. Family characteristics during 1990-2018 – income pooling within family



Notes: The figure shows the level of household employment among couples in working age (15-64), separating dual, one-and-a-half earner (one full-time and one part-time worker) and single earners. Part-time work is defined as working less than 30 hours per week. The data is from OECD.Stat Family Database and is publicly available from https://www.oecd.org/els/family/database.htm.

Figure A3. Social security during 1990-2018 – unemployment insurance (UI) and minimum income schemes (MIS)



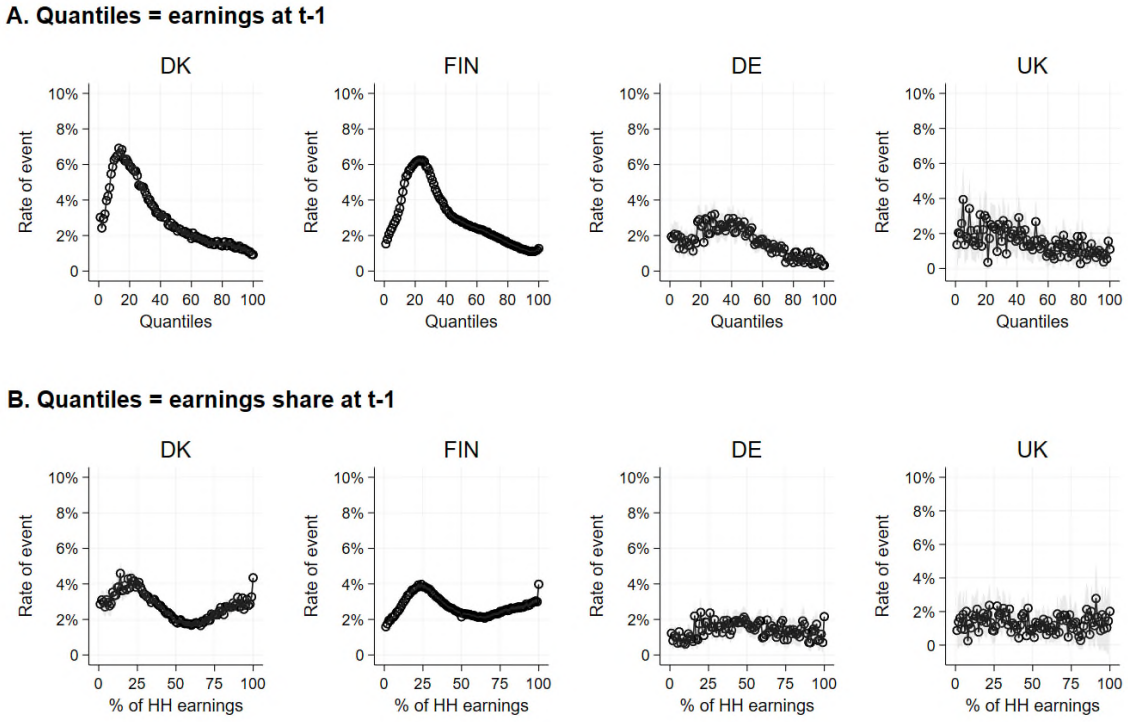
Notes: The figure shows the generosity of social security schemes in four countries, Denmark, Finland, Germany and the UK during 2000s. Graph A shows replacement rates for different durations of unemployment, where replacement rate is defined as the percentage of pre-event earnings replaced by the UI schemes. Graph B shows an indicator about the adequacy of minimum income benefits. The indicator is a sum of different MISs and show what percentage of medina income these benefits could replace for different family types. level of household employment among couples in working age (15-64), separating dual, one-and-a-half earner (one full-time and one part-time worker) and single earners. Part-time work is defined as working less than 30 hours per week. The data is from OECD.Stat Benefits and Wages, and is publicly available from https://www.oecd.org/social/benefits-and-wages/.

Table A2. Re-employment and earnings replacement in Denmark, Finland, Germany and UK

Country	Re-employment rate	Earnings replacement (among re-employed)	Earnings replacement
DE	57.0%	63.3%	54.9%
DK	78.0%	68.0%	65.9%
FIN	62.1%	74.5%	60.3%
UK	67.8%	62.7%	59.8%
Total	66.2%	67.2%	60.2%

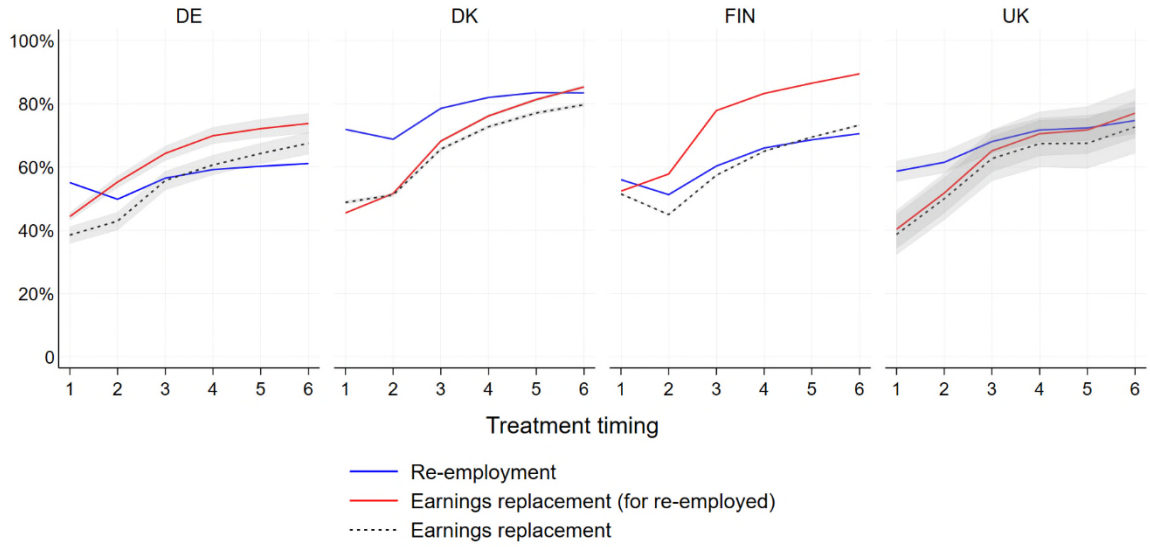
Notes: The table shows average re-employment rate, earnings replacement among re-employed and among all within the six years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. The estimates for earnings are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Figure A4. Profiles of job loss across earnings and within household earnings share distributions in Denmark, Finland, Germany and the UK



Notes: The figure shows the risk of job loss across the distribution of i) earnings prior to job loss and ii) earnings share (i.e. the share of earnings of the job loser within the overall household earnings) prior to job loss in Denmark, Finland, Germany and the UK. The estimates show the average estimates across all observation years.

Figure A5. Components of market compensation over time – re-employment and earnings replacement in Denmark, Finland, Germany and UK



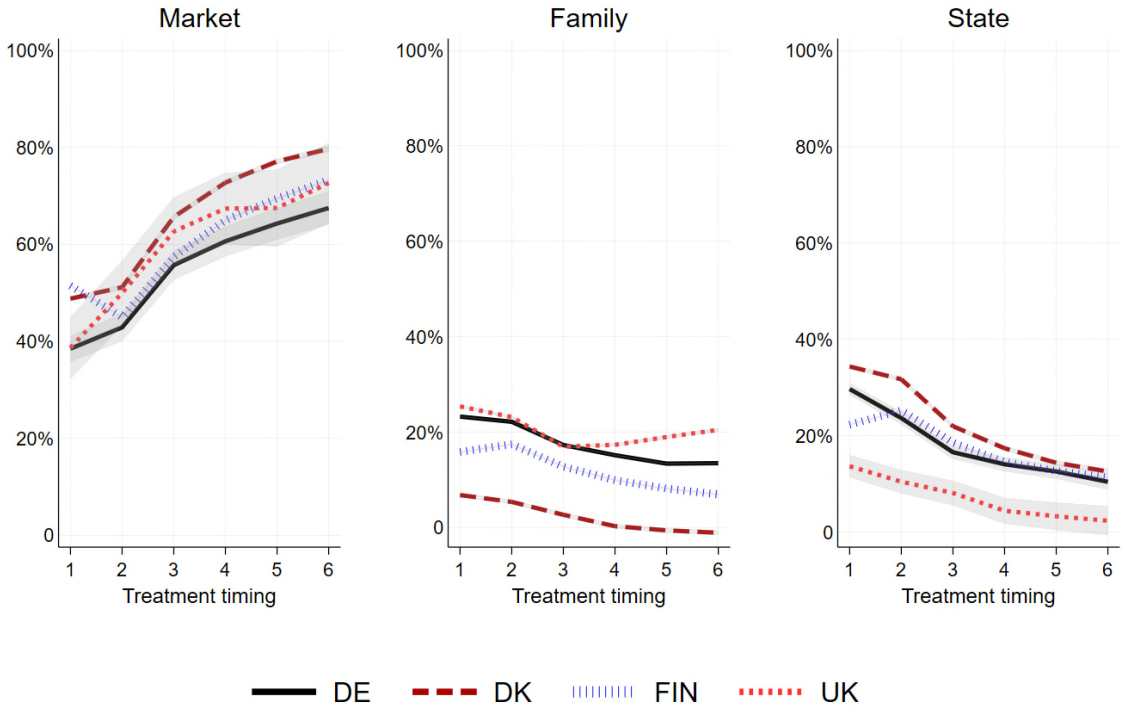
Notes: The figure shows re-employment rate, earnings replacement among re-employed and among all in the six years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. The estimates for earnings are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Table A3. Cost and compensation of job loss over time in Denmark, Finland, Germany and UK

		Penalty of job loss				**Market compensation**				**Family compensation**				**State compensation**			
		DE	DK	FIN	UK	DE	DK	FIN	UK	DE	DK	FIN	UK	DE	DK	FIN	UK
Treatment timing	1	-8.6%	-10.0%	-10.4%	-22.3%	38.5%	48.8%	51.5%	38.7%	23.3%	6.8%	15.9%	25.4%	29.7%	34.4%	22.3%	13.7%
	2	-11.3%	-11.7%	-12.3%	-16.4%	42.9%	51.2%	44.9%	50.0%	22.2%	5.4%	17.5%	23.2%	23.7%	31.7%	25.2%	10.5%
	3	-10.4%	-9.7%	-11.3%	-12.3%	55.7%	65.7%	57.4%	62.7%	17.3%	2.7%	12.8%	16.9%	16.6%	22.0%	18.6%	8.1%
	4	-10.1%	-9.6%	-10.6%	-10.8%	60.6%	72.8%	65.0%	67.4%	15.2%	0.3%	9.9%	17.3%	14.1%	17.4%	14.5%	4.4%
	5	-9.7%	-9.1%	-9.7%	-10.2%	64.3%	77.1%	69.5%	67.5%	13.4%	-0.6%	8.2%	19.0%	12.6%	14.4%	12.7%	3.3%
	6	-8.6%	-8.8%	-8.5%	-4.5%	67.5%	79.7%	73.3%	72.7%	13.5%	-1.1%	6.9%	20.5%	10.4%	12.6%	11.3%	2.4%
	Total	-9.8%	-9.8%	-10.5%	-12.8%	54.9%	65.9%	60.3%	59.8%	17.5%	2.2%	11.8%	20.4%	17.8%	22.1%	17.4%	7.0%

Notes: The figure shows income compensation through the market, family and state in the years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Market compensation shows earnings replacement, family compensation shows reduction in losses through other earnings, while state compensation shows replacement of incomes through taxes and transfers. The penalty shows loss in post-government household income in the years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Post-government household income is defined as the sum of household earnings and investment income net of taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Figure A6. Comparing market, state and family compensation across four countries



Notes: The figure shows income compensation through the market, family and state in the years following a job loss relative to the year prior to the job loss event in Denmark, Finland, Germany and the UK. Market compensation shows earnings replacement, family compensation shows reduction in losses through other earnings, while state compensation shows replacement of incomes through taxes and transfers. The coefficients are re-scaled and so the values are presented as percentage of average earnings during the reference period (three years prior to job loss). The estimates are derived from the event study model described in eq. 1 in the methods section.

Online Appendix to:

Insurance against risk?

Economic cost and compensation of job loss in different welfare states

1. Policy descriptions – unemployment insurance schemes in four countries
2. Comparability of measurement between administrative and survey data
3. Effect of capital income
4. Descriptive analysis – risk of job loss
5. Robustness analysis (for the UK)
    a. Weighting – no weight unbalanced; no weight balanced; longitudinal weights
    b. Job loss definition – Ehlert; spells
    c. Model – diff-in-diff with and without FE

1. Policy descriptions – unemployment insurance schemes in four countries

(see OECD, 2020 for country policy descriptions available from 2001).

In Germany, unemployment insurance is compulsory. Eligibility is conditional on previous employment (i.e. must be minimum 12 months), contributions (i.e. must be paid minimum 12 months in last 2 years except for those with very low earnings i.e. those earning below 10% of average wage), registering as unemployed, and looking and being available for work. The benefit is paid to individuals based on their previous earnings, and the replacement rate is 60% with a maximum ceiling at 95% of average wage (around 7000 Euro in 2020).[1] The duration is max 12 months (for those with 24 months contributions; lower max duration for those with lower contribution periods). People receiving unemployment insurance can work up to 15 hours beyond which benefits are totally withdrawn. This design has generally been consistent over the observation period, except that it was more generous and longer duration was possible for older workers – for example, in 2001, those aged above 45 and over could receive up to 18 months, and those at and above 57 could receive up to 32 months of payment from unemployment insurance.

In Denmark, unemployment insurance is voluntary, received through membership of an insurance fund. Eligibility is conditional on payment of membership fee (for at least a year), past employment (at least 12 months within past 36 months), earnings as well as other behavioural requirements such as registration as unemployment, having an updated CV and being available for interviews on request. Part-time insurance is also available with lower thresholds on employment and earnings. The benefit is paid to individual based on their previous gross earnings (highest yearly average of last 24 months), and in general the replacement rate is 90% with a maximum ceiling at 52% of average wage (around 220,448 DKK). The maximum benefit period is two years with an option to prolong by up to 1 year by working up to half a year. The design has generally been consistent over the observation period except that the maximum benefit duration was initially four years and reduced to two years in 2010.

[1] For those with a dependent children, replacement rate is 67%.

In Finland, unemployment insurance is a two-tiered system with a compulsory basic benefit and a voluntary earnings-related benefit. Eligibility is conditional on previous employment (i.e. 34 weeks in the last 28 months, which is reduced to 26 weeks in 2014), registering unemployed, being available for and actively seeking full-time work, and paying membership fee for a year. The basic benefit paid to individuals earning below the earning threshold is 19% of average wage (i.e. 34 Euros in 2020) per day paid for five days per week. The earnings-related benefit is the sum of basic benefit, 45% of earnings until the threshold (i.e. 84% of average wage), and 20% of earnings in excess of the threshold with a maximum ceiling at 90% of wage. Additional supplement is also paid per children up to three children. The maximum benefit period is 100 weeks (5 days per week), which is reduced to 80 weeks only in 2017. The maximum benefit period can be prolonged with part-time work (up to 80% of full-time from 2016). The design has generally been consistent over the observation period except that the condition on previous employment was 34 weeks maximum benefit duration was initially four years and reduced to two years in 2010.

In the UK, unemployment insurance is compulsory. Eligibility is conditional on previous employment (at least 26 weeks within two years), minimum paid contributions (50 times of the minimum contribution), registering unemployed, being available for and actively seeking work. The benefit level is fixed at 9% of average wage (73£ in 2020). The maximum benefit period is 182 days, and benefit is withdrawn after 16 hours of work (below which is there is one-to-one reduction in benefit entitlement. The design has been consistent over the observation period without an exception.

2. Comparability of measurement between administrative and survey data

Administrative and survey data are two distinct sources of information with their own advantages and disadvantages depending on the question (Kapteyn and Ypma, 2007; Connelly et al., 2016). Neither is flawless, nor can they be directly comparable. While each can be used to answer similar questions, their use in a comparative research deserves further attention. In this section, we will describe possible issues of comparability specifically related to specific measures of interest, and discuss possible implications for our findings.

Unemployment

Unemployment is self-reported in both survey and administrative data, but in the latter, individuals have to formally report themselves at the job centre as unemployed. A possible implication is the underestimation of unemployment for these who do not formally report their employment status. Also, administrative data excludes those who are unemployed, but not eligible for UI benefits e.g. due to not accumulating adequate contributions. Moreover, such cases not included in admin data is likely to be selective, meaning groups that are particularly disadvantage with precarious labour market conditions. On the other hand, survey data can also miss certain unemployment spells due to non-response, which might lead to missing certain job loss events. Despite all of these issues, overall, we believe that our analysis is comparable across countries. For example, evidence from Spain shows that undercounting in administrative data is relatively small, and more importantly, labour market flows and unemployment rate are comparable across survey and administrative datasets (Lafuente, 2020). Evidence from the US also supports these conclusions showing similar earnings volatility for men and women between administrative and survey data (Ziliak et al. 2023).

Earnings

It is consistently reported across countries that earnings data from survey and administrative records match well overall, with a reliability ratio around 0.8 (Kapteyn and Ypma, 2007). In between survey and administrative data, while significant differences in the value of some individuals and outlier

cases are generally observed, the mean and variance of the distributions are generally found to be very similar. However, recent evidence show that earnings nonresponse is not random and generally more widespread at the tails, which then affects inequality measures; still average estimates are shown to be similar between survey and administrative data (Bollinger et al. 2019; Stüber et al. 2023). Given our analysis is focused on average effects, we consider that comparability issues are not likely to affect our conclusions in terms of earnings.

Tax and transfer

A key advantage of administrative data is its accuracy about public taxes and transfers. We expect public transfers, specifically related to social security programmes, to be underestimated in survey data due to underreporting. Evidence from the US has shown that underreporting of MIS benefits is widespread, but specifically focused at the bottom of the distribution, and the level of underreporting is very high at a level that significantly affects rates of poverty e.g. by around 10% for certain groups (Meyer and Mittag, 2019). Similarly, evidence from the US shows that at least half of the total amount of UI benefits distributed is not reported in survey data (Larrimore et al. 2023). We expect similar patterns in the UK and Germany, so that MIS benefits are likely to be underreported, which might lead to underestimation of state compensation and overestimation of the penalty and cost of job loss in these countries compared to their Nordic peers with administrative data.

Investment income

Investment or capital income is measured based on self-reported yearly income in surveys, while they are calculated from the tax records in Denmark and Finland. Also, investment income includes calculated rental value of primary residency for home owners as the formal measure used by governments. So, we might expect higher levels and more accurate measurement of investment income in Denmark and Finland than in Germany and the UK. However, this does not affect the estimation of our effects of interests (i.e. cost and compensations) as investment income is used for both pre- and post-government income. Only issue that might arise is if investment income is used as

a compensation strategy by some households, which would reduce the overall cost of job loss on post-government income more in countries with administrative data. Yet, as we show in Online Appendix that capital income has only a negligible effect on average penalty of job loss and household compensation in all countries.

Private transfers

Private transfers (e.g. from parents or relatives) could be an important source of compensation, but we are not able to capture them in our comparative design. Such private transfers are not captured within administrative data unless they are taxed, and the majority of such transfers could be not registered. In survey data, we have self-reported transfers from other households, which are also shown to be underestimated in general (Karagiannaki, 2011). Given the lack of complete data on such transfers, we decided to not include these sources of income in our household income definitions. However, transfers that are taxed are still included in incomes within Nordic, which we expect to be relatively minor. As we mention in our discussion, this could be an important limitation of our study as such transfers are usually common especially from parents to children who are in need e.g. who experienced a job loss. However, in the context of job loss, Ehlert (2012) shows that household compensation (including private transfers) is almost negligible at least for Germany and the US. Similarly, evidence from Denmark shows that such transfers have a limited effect in compensating income losses after a job loss event (Andersen et al. 2021).

Cohabitation

Cohabitation is self-reported in survey data through partnership questions, while in administrative data, if it is not a registered partnership, we estimate cohabitation based on some assumptions. For Finland and Denmark, a cohabiting couple is defined as two spouseless adults of different sex aged 18 and over and occupying the same dwelling on a permanent basis, provided their age difference is less than 16 years and they are not siblings. In case the couple has a common child, these specifications do not apply. Persons of the same sex living together are not regarded as cohabiting couples unless the

household-dwelling unit consists of two women who are the biological mother of the child living in the same dwelling and the second mother confirmed for the child. This is the formal definition used by statistics offices and the standard definition used in demographic research in related countries (see e.g. the discussion by Jalovaara and Andersson, 2018), so we do not expect to have any issues of comparability in terms of the prevalence of partnership dissolution.

Single

Similar to cohabitation, we have self-reported information in survey data, but estimated status of being single in administrative data based on the following assumptions. Single individuals are individuals who did not live with a marital or cohabitational partner at the end of each calendar year as per official registers. An individual was classified as being single if they did not have a family type or if their family type was either "[single] mother with children" or "[single] father with children". This is a standard definition used in similar studies, so we do not expect to have any issues of comparability in terms of the prevalence of living as single.

Household

Household as the unit of household income is defined differently in administrative and survey data. In administrative data, household is mainly defined based on the place of residence, more specifically the dwelling unit in Finland and address in Denmark. For Finland, "A dwelling refers to a room or a suite of rooms which is intended for year-round habitation; is furnished with a kitchen, kitchenette or cooking area; and has a floor area of at least 7 square metres. Every dwelling must have its own entrance. A single-family house may be entered through an enclosed porch or veranda. If a dwelling is entered through the premises of another dwelling, it is not regarded as a separate dwelling but instead those two constitute one dwelling (Statistics Finland, 2023)." In Denmark, a household comprises all persons living at the same address, regardless of their mutual relations. In both cases, adults who are not family or relatives (e.g. friends) who are living together are considered as a household.

On the other hand, in survey data for Germany and the UK, a household is ‘one person living alone or a group of people who either share living accommodation or share one meal a day and who have the address as their only or main residence’. Therefore, this definition would possibly exclude e.g. friends living together (unless they share food). This difference across administrative and survey data is a limitation of our study, yet we believe that it would not have major consequences as co-living among non-related adults are not very common in Denmark and Finland. In any of the countries, the definition of household does not include those living in institutional or residential homes or those who are homeless.

Non-response

Non-response and attrition are important problems in survey data, especially that are long-term and longitudinal. While both our survey data from the UK and Germany are very high quality and shown to be representative of population throughout the observation period (e.g. Lynn and Borkowska, 2018), the level of non-response and attrition is still high and can cause biased estimates. To examine the robustness of our results, we have run the analysis comparing different samples and using longitudinal weights that can account for attrition. These analyses are presented below at the end of this document, and generally our findings are very close based on balanced sample and using longitudinal weights.

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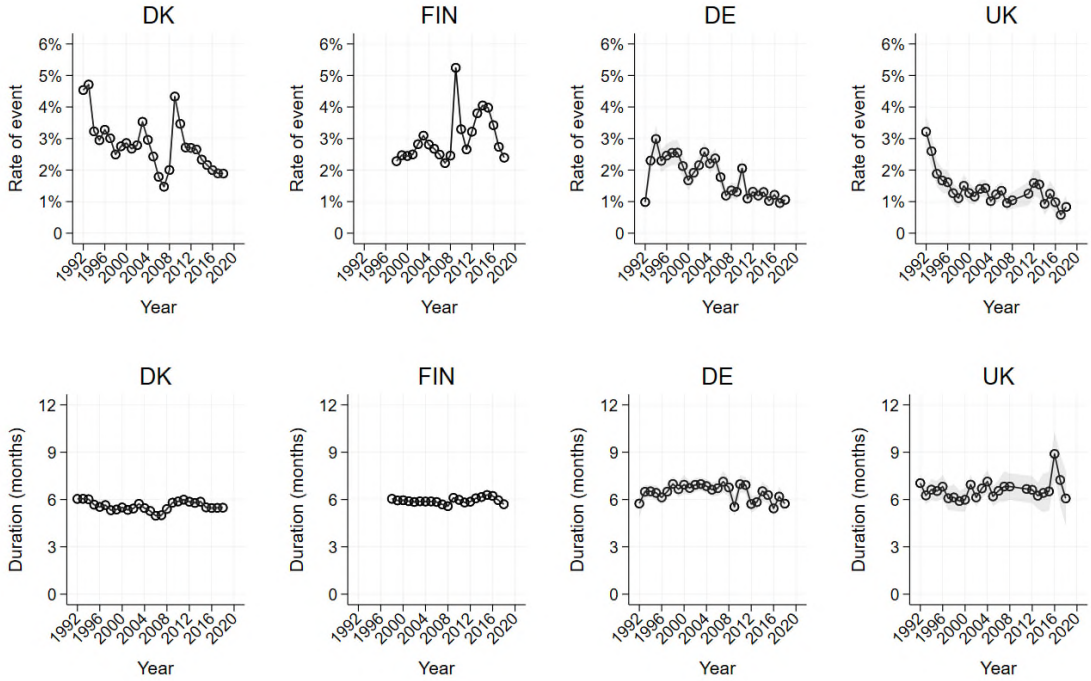
3. Effect of capital income

Table OA1. Comparing estimates from household earnings with pre-tax/pre-transfer i.e. pre-gov household income to investigate the effect of capital income

	DE		**DK**		**FIN**		**UK**	
Treatment timing	HH earnings (eq.)	Pre-gov HH income (eq.)	HH earnings (eq.)	Pre-gov HH income (eq.)	HH earnings (eq.)	Pre-gov HH income (eq.)	HH earnings (eq.)	Pre-gov HH income (eq.)
1	-38.1%	-38.3%	-44.1%	-44.4%	-32.0%	-32.7%	-35.6%	-35.9%
2	-35.0%	-34.9%	-43.1%	-43.5%	-36.7%	-37.6%	-25.6%	-26.9%
3	-26.8%	-27.0%	-31.1%	-31.7%	-29.0%	-29.8%	-19.4%	-20.4%
4	-24.0%	-24.2%	-26.2%	-27.0%	-24.5%	-25.1%	-14.9%	-15.3%
5	-22.4%	-22.3%	-23.0%	-23.5%	-21.9%	-22.4%	-13.0%	-13.5%
6	-19.2%	-19.0%	-21.1%	-21.4%	-19.4%	-19.8%	-6.9%	-6.9%
Total	-27.6%	-27.6%	-31.4%	-31.9%	-27.3%	-27.9%	-19.2%	-19.8%

4. Descriptive analysis – risk of job loss

Figure A1. Average risk and duration of job loss in four countries, 1991-2018



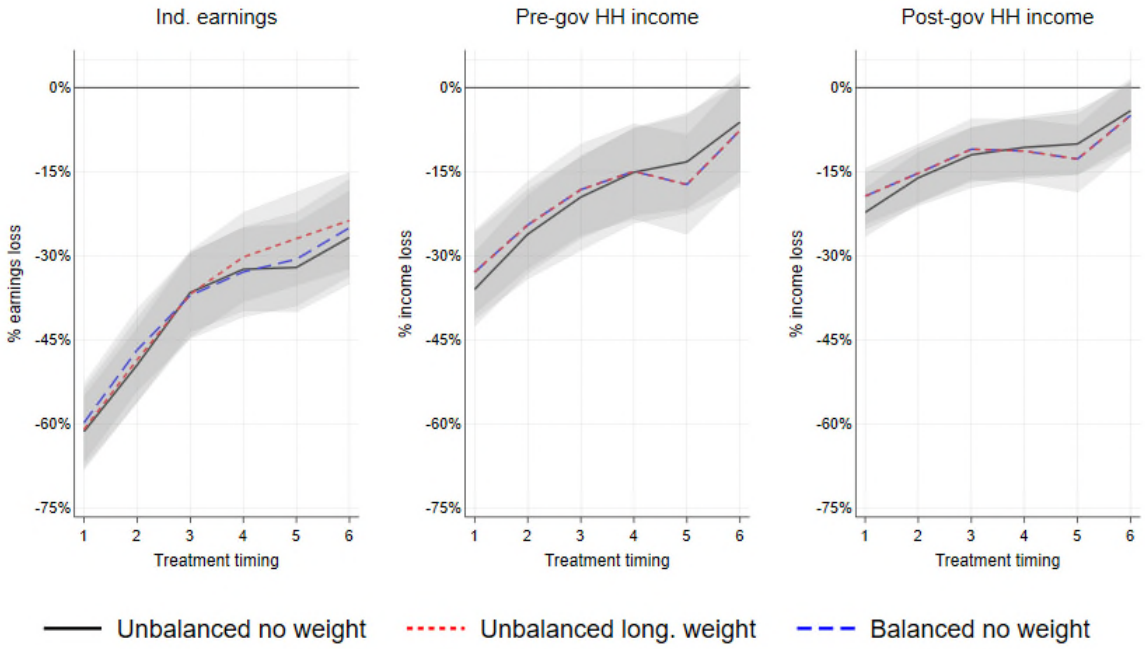
Notes: The figures show the rate of job loss in the population and the duration of unemployment in the year of job loss for job losers. We show the estimates for the period of 1991-2018 and for Denmark, Finland, Germany and the UK. The estimates for Germany and the UK are weighted. Job loss is defined as a transition from employment (i.e. being employed for 5 months) in the previous year and to unemployment (i.e. at least three months of unemployment) in the current year.

In Figure A1, we present the average risk and duration of job loss in four countries over the last three decades. The rate of job loss varies between 1% and 5%, and is generally higher in Denmark and Finland than in Germany and the UK. Overall, there is a downward trend in recent years in all countries except Finland, and rates peak after the 2008 recession, specifically in Denmark and Finland. In the UK, the rate of job loss falls significantly in the early 1990s and stays around 1% in the whole remaining period (we do not observe any changes in 2009 due to missing data from that year). Germany also follows a similar trend although at a lower level, with a jump of 1% around the 2008 recession. These differences, however, would not necessarily be important in our analysis as we are interested in the average penalty of job loss. What is more important is the duration of unemployment following the job loss because if it differs between countries, some of the differences in the penalty might be due to differences in the nature of job loss. However, what we find is that the

job loss experience, in terms of its duration, is very similar across countries. The average duration of unemployment following the job loss is around 6 months across all countries.

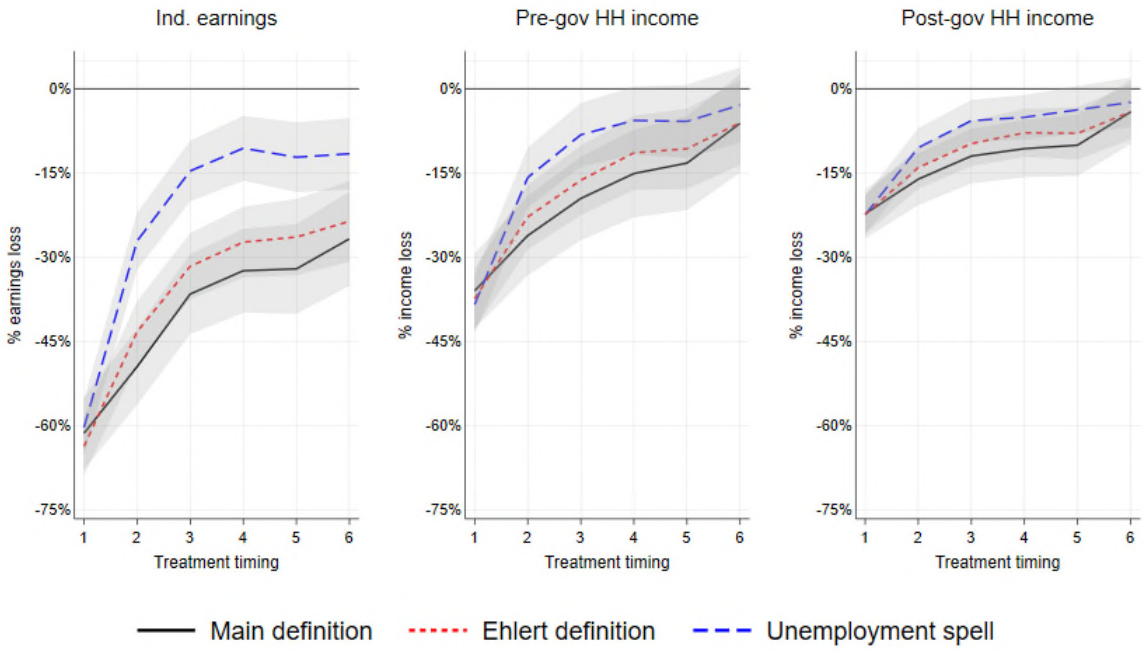
5. Robustness analysis

Figure A2. Weighting – no weight unbalanced; no weight balanced; longitudinal weights



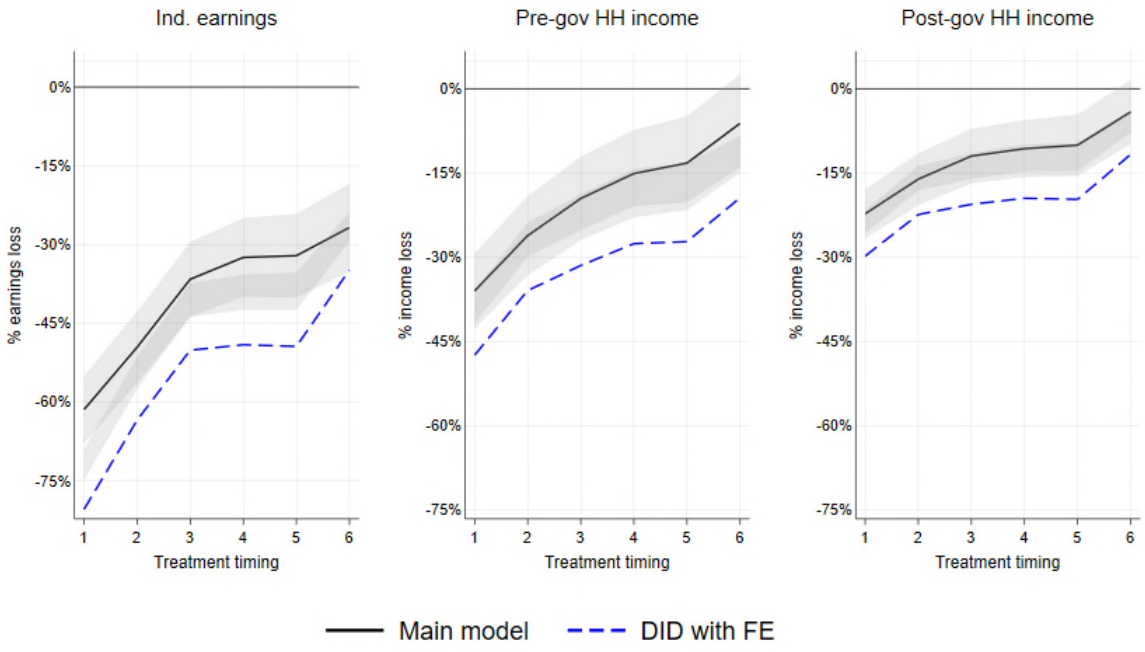
In Figure A2, we present robustness analysis for the UK regarding weighting. We compare the results of the main analysis which is based on an unbalanced and unweighted sample, to an analysis based on i) an unbalanced sample, but weighted using longitudinal weights to account for attrition and survey design, and ii) a balanced sample without weights. The results are very similar to our main results.

Figure A3. Job loss definition – Ehlert; spells



In Figure A3, we present robustness analysis for the UK regarding the definition of job loss. We compare the results of the main analysis which is based on a definition of job loss as a yearly transition from an employment of at least five months to an unemployment of at least three months, to two other options: i) a yearly transition from an employment of at least six months to an unemployment of at least three months, which is the same as Ehlert's (2012) definition, and ii) a spell of unemployment, which can be at least one monthly transition into unemployment. Expectedly, spell definition shows lower penalties for earnings and incomes as it probably represents a smaller shock than a job loss defined in our terms, while Ehlert's definition give very similar results (only that they are slightly smaller than our main findings, but still estimates overlap within confidence intervals).

Figure A4. Model – diff-in-diff with FE



In Figure A4, we present robustness analysis for the UK regarding our estimator. We compare the results of the main analysis which is based on a difference estimator to one that includes a control group (those without any job loss event) within a difference-in-difference estimator framework and including also fixed effects. The figures show the estimates are very similar and trends we observe are also clear with DID estimates, only that the latter is significantly higher than the prior.