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UNEMPLOYMENT SCARRING EFFECTS: A SYMPOSIUM ON EMPIRICAL LITERATURE

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Abstract

This article reviews the empirical literature on unemployment scarring effects. Our goal is twofold: on the one hand, to present an overview of empirical evidence relating to the impact of unemployment spells on subsequent labour market career; on the other hand, to provide a review of the econometric strategies mainly adopted to estimate the causal impact of such unemployment episodes. Focusing on a final sample of 63 papers, the empirical evidence appears homogeneous in highlighting significant and persistent wage losses and strong state dependence.

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Unemployment scarring effects: a symposium on empirical literature[†]

Mattia Filomena

1 Introduction

Since 1980s, many labour economists have focused their research activity on studying the impact of early unemployment on subsequent labour market outcomes in several countries and whether these effects are temporary or permanent. Although there are lots of papers relating to the study of the so-called "unemployment scarring effects" or "state dependence", to our knowledge there are no recent and particularly consistent surveys in the literature, which also focus on the causal inference approaches used. With the exception of Baumann (2016), who discusses on the consequences of job displacement on displaced workers' occupational situation, sociability and well-being, the only literature reviews date back to the 1990s (Fallick, 1996; Kletzer, 1998), or even earlier (Hamermesh, 1989), as regards US labour market. The article of Hamermesh (1989) represents the first survey of studies of displacement so it collects only 12 studies on US workers; while Fallick (1996) reports the effects of worker displacement, distinguishing in employment, earnings and human capital outcomes. Finally, Kletzer (1998) extensively discussed the state of knowledge on the issues of job displacement.

The aim of this survey is to offer scholars and policymakers a consistent collection of empirical evidence relating to the scarring effects of previous unemployment on later working career. The present article collects a large number of papers studying these phenomena as regard a single country or making a comparative analysis at international level and contributes to the literature filling the absence of recent and consistent surveys. In particular, the main purpose is not only to capture as many studies as possible published in the recent decades, but to highlight the main methodological innovations and econometric tools used by labour economists to capture the causal effects of unemployment. In this way, policymakers could have a solid body of proofs on the magnitude of unemployment scarring effects on subsequent labour market status, wage penalties, job stability and well-being and use these results as a support to the economic policy choices to avoid such consequences on living and working conditions.

A substantial part of the literature on scarring effects concerns the United States, where the size of these effects appears larger than in other countries probably due to significant differences in labour market institutions. Despite this, the causal effect of early unemployment on subsequent career and wage losses appears to be confirmed in almost all the studies examined: past history of unemployment tends to increase the likelihood of experiencing future unemployment and to generate earning losses after re-employment, inflicting a long-term "scar" (Arulampalam et al., 2001). The duration of unemployment can affect labour market outcomes directly and indirectly. The direct effect is through negative duration dependence in the transition from unemployment to employment or through its lagged effect on the starting wage and on the subsequent employment stability. The indirect effect is through the employment experience that is foregone, influencing thereby both the duration of subsequent (un)employment spells and the wage in subsequent employment periods (Cockx and Picchio, 2013). Moreover, Heckman and Borjas (1980) isolate four main types of structural state dependence:

1. *Markovian dependence*, when the probability that an employed worker will become unemployed differs from the probability that an unemployed worker will remain unemployed;

2. *Occurrence dependence* is the effect of previous occupancy of labour force states on the probability of transition from a given state. The number of previous spells of unemployment affects the probability that a worker will become unemployed and may arise if employers use unemployment records in their hiring or firing decisions;

3. *Duration dependence* is the effect of current duration in a state on the probability of exit from that state, so the probability of remaining unemployed depends on the length of time the worker has been unemployed in his current unemployment spell;

4. *Lagged duration dependence* is the effect of the duration in previous states on the probability of transition from a current state, so that probability depend on the lengths of previous unemployment spells. It can arise if unemployment results in a loss of productivity-enhancing work experience.

From a methodological point of view, researchers have to distinguish between true and spurious lagged unemployment duration dependence induced by the correlation with unobserved individual propensities to remain (un)employed. This is further complicated by the fact that the effect of lagged duration can only be identified for individuals for whom one observes a transition to the subsequent labour market state of interest. This leads to the so-called "sample selectivity problem". Moreover, a potential problem with the standard wage equation is that we can only study the effects of unemployment and labour market programs for individuals who were employed on the survey dates. Hence, we consider the possible sources of endogeneity of unemployment. These might cause sample selection bias, so many studies adopt the well-know procedure proposed by Heckman (1979). In Section 3 the main methodologies used in the empirical literature to allow econometric problems will be discussed.

The remainder of the article is organized as follows: Section 2 defines the theoretical background relative to the unemployment scarring effects. Section 3 presents the databases used and briefly describes the methodologies and the econometric approaches mainly adopted in the empirical literature on labour market entries. Section 4 summarizes the results of the systematic literature review conducted, distinguishing them by labour market outcome. Section 5 draws some conclusions.

2 Theoretical background

Following Gregg (2001) we can summarize at least three reasons that explain the possible association between early unemployment and future labour market persistence and scarring. About the first, some people may be more inclined than others to worse job careers due to persistent differences in unobservable characteristics (e.g. ability and motivation; differences in the search intensity or in the methods of search; different liquidity constraints and, as consequences, different reservation wages). The second says that a young worker may become unemployed due to persistent labour market conditions and the third indicates that unemployment in itself can generate unemployment in the future, i.e. the "true state dependence".

But what are the causes of these scarring effects? Theoretical explanations for the presence of the labour market scars are laid down in two main theories: the human capital theory and the signalling theory. According to the first, as long as workers accumulate firm-specific skills, their productivity increase and so earn more (Becker, 1975; Mincer, 1974). In human capital theory, employment and wage scars are related to the depreciation of general skills and knowledge workers possess, following an unemployment spell; or the lack of accumulation of human capital that would have occurred if an individual who have just left school had a job instead of facing early unemployment spells. In particular, when the contract between workers and the firm is terminated, workers are likely to loss their specific human capital and to be less productive in their subsequent jobs and to obtain lower subsequent wages than if they did not experience unemployment.

The other explanation derives from the signalling theory or imperfect information theory, which suggests that, since productivity is not easily observable at the time of hiring, the employer uses past history of unemployment of a worker, such as number of unemployment spells, their duration or frequency, as signal of low productivity and he is therefore penalized by lower employment probability and subsequent wage, at least initially (Spence, 1973; Vishwanath, 1989; Lockwood, 1991; Pissarides, 1992). However, this penalty at the time of re-employment should vanish over time if the worker shows greater productivity than expected from employer, once hired. In presence of asymmetric information, employers observe also the type of separation from previous job: e.g. plant closures give a less negative signal about productivity compared

to layoffs, so the "stigma" effect and the consequent wage loss should be lower. Infact, the estimated wage loss from displacement is 5.5 percentage points greater and the postdisplacement unemployment spells of laid off workers are about 25% longer than those of workers displaced by plant closing (Gibbons and Katz, 1991).

However, another important role is played by the job-match, according to the job search (or matching) theory. When a bad match is terminated, future earnings will be higher if the subsequent unemployment spell allows the worker to get a better match with future employer. The job-search model predicts a positive effect of job mobility on subsequent earnings, because workers are assumed to continue searching for more efficient job matches (Burdett, 1978; Jovanovic, 1979a; Mortensen, 1987, 1988). Moreover, workers could leave jobs if they do not experience improvements in productivity with seniority. If it is true, a stable matching over the time will be considered as a signal of high productivity and, finally, highly profitable job (Jovanovic, 1979b). Another approach comes from Lazear (1986) and suggests that job movers are high-skilled workers and the firms, competing for this type of dependents, offer higher wages.

3   Data and empirical framework

In this section we describe the main methodologies used by researchers in order to identify the causal effect as regard the studies concerning the unemployment scarring effects. In addition, we summarize the type of survey and database that has mainly been referred to in recent decades. We carried out our literature search from May to September 2020, through a comprehensive search in Ideas, EconPapers, Scopus and Google Scholar databases. Our search strategy was performed using combination of the following keywords: "unemployment scarring", "scarring effects", "wage losses", "duration dependence", "youth unemployment", "employment probability". Moreover, we applied filters in order to consider only articles published in refereed labour, economics, political sciences and sociology journals; working papers; technical report and contribution to books. Among these, studies that did not use rigorous methodological approach to identify the causal effect of previous unemployment spells on subsequent wage and employment opportunities are discusses in section 4 but not included in the Appendix. In fact, the main focus of our review concern the estimation of causal implications in the last three decades, so the final sample includes 63 papers, reported in the final Appendix.

The issue of re-employment earnings of unemployed workers has been most extensively analysed in the United States. Most of these studies use databases such as Displaced Worker Survey (DWS), which is relative to the Current Population Survey (see e.g. Addison and Portugal, 1989; Addison and Blackburn, 2000; Carrington, 1993; Gibbons and Katz, 1991; Kletzer, 1989, 1998; Podgursky and Swaim, 1987), followed by the Panel Study of Income Dynamics (Chowdhury and Nickell, 1985; Ruhm, 1991; Stevens, 1997) and the National Longitudinal Sur-

vey (Corcoran, 1982; Ehrenberg and Oaxaca, 1976; Ellwood, 1982; Heckman and Borjas, 1980; Kahn, 2010; McCall and Chi, 2008; Mroz and Savage, 2006; Omori, 1997). As regard Europe, studies about the British labour market mainly use the British Household Panel Survey (Arulampalam, 2001; Böheim and Taylor, 2002; Stewart, 2007; Tumino, 2015), the National Child Development Survey (Gregg, 2001; Gregg and Tominey, 2005) or the Joint Unemployment and Vacancies Operating System (Gregory and Jukes, 2001; Nickell et al., 2002). Papers concerned Germany use the German Socio-Economic Panel (see e.g. Biewen and Steffes, 2010; Burda and Mertens, 2001; Clark et al., 2001; Couch, 2001; Knabe and Rätzel, 2011; Manzoni and Mooi-Reci, 2011), while about empirical evidence concerned Sweden, the choice of data is more disparate (see e.g. Ackum, 1991; Hällsten, 2017; Nordström Skans, 2011). Adding four studies relating to Norway (Bratberg and Nilsen, 2000; Nilsen and Reiso, 2011; Raaum and Røed, 2006; Gartell, 2009), three to Finland (Hämäläinen, 2003; Karhula et al., 2017; Verho, 2008) and one about Denmark (Ahmad, 2014), we calculate 17 studies about Scandinavian countries, which mainly use administrative register dataset. Several databases are used in studies concerning Belgium: Panel Study on Belgian Households (Gangji and Plasman, 2007, 2008; D'Addio et al., 2002), Crossroads Bank for Social Security (Cockx and Picchio, 2013), VDAB (Heylen, 2011) and SONAR Survey Database (Ghirelli, 2015). Canadian database are mainly the Survey of Displaced Workers (Houle and Van Audenrode, 1995; Kuhn and Sweetman, 1998) and the UI administrative data (e.g. Belzil, 1995, 2001). There are no more than few papers to our knowledge as regard the Netherlands (Mooi-Reci and Ganzeboom, 2015), Spain (e.g. Arranz et al., 2003; Ayllón, 2013), Italy (e.g. Lupi et al., 2002; Naticchioni et al., 2016), France (Van Den Berg and Van Ours, 1999), Austria (Pichelmann and Riedel, 1993), Australia (Doiron and Gørgens, 2008; Knights et al., 2002; Mavromaras et al., 2015), Macedonia (Petreski et al., 2017), Bosnia (Tiongson and Fares, 2007), Switzerland (Arni et al., 2013; Helbling and Sacchi, 2014), Latin America (Cruces et al., 2012), New Zealand (Maloney and Parau, 2004).

This empirical literature only concerns studies conducted on single countries, but a significant number of studies also concern comparative analysis between two or more countries, in particular within the European Union and using the EU-SILC database (Roth and Moffat, 2014) or the European Community Household Panel - ECHP (e.g Arranz et al., 2005; Dieckhoff, 2011; Plum and Ayllón, 2015). As regard the studies about unemployment scarring effects, there are at least 11 studies that compare several countries and of which 5 include the US in the analysis: e.g. Abbring et al. (2002) compare USA and the Netherlands; Gangl (2004) uses GSOEP and SIPP data for Germany and USA; SIPP and ECHP for USA and 12 European countries (Gangl, 2006). Figure 1 illustrates the number of studies by country.

Regardless of the methodology and the models used by researchers, each of the analysis conducted in relation to unemployment scarring effects has a large number of control variables. The mainly used variables are distinguished in individual and demographic characteristics (e.g. age, gender, nationality, marital status), human capital indicators (education, experience, tenure), unemployment indicators (e.g. duration or number of unemployment spells), job characteristics
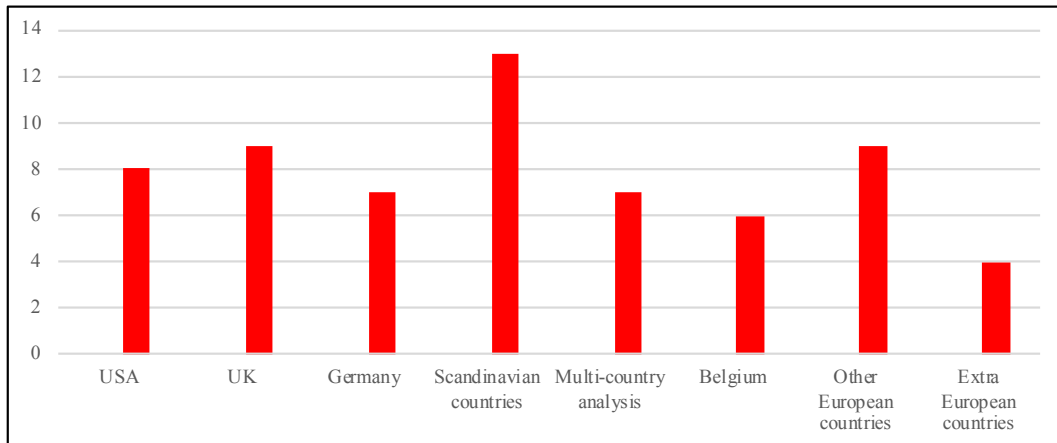
Figure 1: Number of studies by country.

(type of contract, number of working hours, sector, firm size, union membership) and macro measures to check for business cycle variations and differences in the state of the local labour market (GDP growth, annual rate of unemployment).

There are some econometric issues to take into account. First, the individual fixed characteristics may drive the unemployment scarring effects and it is important to separate their spurious effect from true state dependence. These characteristics are difficult to observe or measure at all. Variables as motivation, ability, self-confidence, job search behaviour are indeed very likely to affect labour market performances, but they are not observed by the analyst in most cases. As a consequence, the relationship between early unemployment and subsequent labour market outcomes may be not causal but reflect this kind of unobserved heterogeneity. The econometric estimation of the causal effect is likely to be biased and policy treatments aimed at reducing the incidence or duration of unemployment spell might be misdirected. Ghirelli (2015) discusses in detail four possible sources of bias: ability and motivation are negatively correlated with early unemployment and positively correlated with the outcome; heterogeneous returns to job search may arise because of differences in the search intensity and behaviour; individuals with high liquidity constraints have low reservation wages and are likely to accept low quality jobs and obtain worse labour market performances over time; measurement error. Reverse causality is a second major source of endogeneity: the direct comparison between treated and untreated workers will be biased because the treatment is correlated with unobserved reasons behind the different outcomes. Therefore, the estimation of causal effects in the presence of endogeneity often biases results.

We do not know what would have happened in the absence of a choice or intervention, the counterfactual: it is never observable so we identify a good comparison group and rely on average treatment effects. The gold standard approach for dealing with this problem and estimating

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the effects of treatments or interventions on outcomes is the *randomized control trial* (RCT). Randomization guarantees that individuals belonging to the treated and counterfactual groups are equal with respect to all observed and unobserved characteristics except for treatment reception. In RCT designs participants are randomly assigned to treatment and control groups, ensuring that treatment status will not be confounded with either measured or unmeasured baseline characteristics. Therefore, the effect of treatment on outcomes can be estimated over time by comparing average outcomes directly between the two groups and the selection bias goes away in presence of random assignment. However, randomization of treatment is often infeasible in labour market studies because most of the individuals, either employed or non-employed, cannot be forced to receive the treatment of the RCT. The decision to participate or not may be correlated to the benefits of the treatment, that is there might be self-selection into treatment and selection bias still arises when the treatment variable is correlated with the error in the outcome equation. This correlation could be induced by incorrectly omitted observable variables (*selection on observables*) or by unobserved factors (*selection on unobservables*). The problem in the former is solved using regression and matching methods. In the latter using IV or DiD estimators, RD design, timing of events approach or other tools, mainly focused on dynamic panel fixed or random effects methods. The literature investigating the causal effect on labour market entries and exits has made use of a variety of these methodologies to overcome selection bias and endogeneity problems. In this section, we mention the following main approaches:

1. *Control Function Estimator* is motivated by the possibility that a set of observables determining the treatment variable may be correlated with the dependent variable. The idea is to introduce into the model all the observables that could possibly be correlated with the treatment variable and explain the outcome, estimating the augmented model by OLS or GLS.

2. *Propensity Score Matching (PSM)* reduces estimation bias by reducing large differences between the two groups on their characteristics (Rosenbaum and Rubin, 1983). In order to implement this method, the unobserved variables have to be assumed to be equally distributed in treated and control groups. In other words, the undelying assumptions are the following: there are no systematic differences between the two groups in unobserved characteristics that influence the outcome; all the variables that affect simultaneously the outcome and the treatment are observed; similar propensity scores between individuals of the two groups are based on similar observed covariates. The researcher calculates the probability, known as the "propensity score", of each individual receiving the treatment. PSM improves causal estimations with respect to using all untreated individuals as a control as long as unobservable variables correlate with observables. These methods are based on selection on the observables but tell nothing about selection on unobservables. The main difference between these first two approaches is that while the conditional mean is specified parametrically considering a linear model in the former, this is not requested in the latter.

3. *Instrumental Variables (IV)* relies on finding an additional variable that is related to the independent variable but not correlated with the outcome. This means that it should not be correlated with the error term (Wooldridge, 2010). This variable is known as the "instrument". This procedure allows researchers to isolate the exogenous variation in the treatment to get unbiased estimates of the causal relationship between the outcome and the predictor. When a convincing instrument is found, causal effects can be identified with cross-sectional observations. In practice, this effect is usually estimated by implementing the two-stage least squares (2SLS) approach. The first stage consist of a regression where the endogenous regressor is a function of the IVs and other exogenous variables that are used as covariates in the second stage. Finally, the second stage estimates a regression replacing the original treatment variable by the treatment prediction estimated in the previous stage whilst maintaining the same set of covariates. Exogenous sources of variation are difficult to find. Therefore, this approach requires researcher creativity and the availability of a valid instrument. The main instruments used are the local unemployment rate at age 16 (Gregg, 2001; Gregg and Tominey, 2005) or before graduation (Ghirelli, 2015; Schmillen and Umkehrer, 2017) or both the national and federal unemployment rate at 22 and 14 (Kahn, 2010), while the predicted duration was used as a regressor in the post displacement wage equations by Addison and Portugal (1989) and some early labour market conditions by Neumark (2002). The use of these instruments is based on the idea that the variation in the labour market conditions at such a young age or at school leaving is exogenous since individuals do not choose the area in which they live or the time to graduate, and therefore this variation in the individual early unemployment is unrelated to unobserved characteristics that could influence both early and adult labour market performances.

4. *Difference-in-Differences (DiD)* is normally used to estimate the effect of a specific intervention by comparing the changes in outcomes over time between treated and untreated units, e.g. between workers who experience a job loss and subsequent unemployment and a control group of continuously employed workers. Indeed, if one group is exogenously exposed to a treatment or policy shift and the other is not, then the effect of the treatment can be easily measured taking the differences between the average results for the two groups before and after the intervention. Subsequently, the impact or causal effect of the treatment is calculated as the difference between those two differences. The main benefit of this approach is that it accounts for a changes within units of interest only. This limits the bias caused by time-invariant unobserved or uncontrolled differences between these units. The key assumption required to identify the effect of the treatment is that the trends in the outcome of interest must be identical in both groups in the absence of treatment. For this reason, this approach is normally performed with a panel or pseudo-panel database that can be used to test the equal trends hypothesis assuming that any existing heterogeneity is constant over time. In several studies the availability of longitudinal data

on those who have not experienced an interruption in their job career allows to construct a control group and to estimate the effect for who suffered it, against the control group (Arulampalam et al., 2001). This estimation is the *within-group estimation in fixed-effects panel regressions*, where the individual-specific effects measure unobserved heterogeneity that is possibly correlated with the regressor and is obtained by subtraction of the time-averaged model from the original model.

5. *Regression Discontinuity Design (RDD)* can be applied in specific settings when the participation in an intervention or treatment changes discontinuously with some running variables. Thus, the key point of this method is that the probability of participating is determined by a certain cut-off value of a running variable. This scenario is very close to an experimental design with random assignment, since we have a control group (below the cut-off) and a treatment group (above the cut-off) that can be compared. In this framework, the jump or discontinuity in outcomes that can be observed at the threshold can then be interpreted as the causal effect. In most cases, however, the cut-off does not always divide the sample into two groups, since it is sometimes possible to find control and treatment observations below and above the cut-off. In this framework, the usual estimation strategy is a *fuzzy regression discontinuity design*. In both the sharp and the fuzzy RDD, the probability of treatment jumps discontinuously at the cut-off point: in the first case, the probability of treatment jumps from 0 to 1 at the cut-off, while in the second one the probability jumps by less than 1. This exploits discontinuities in the probability of treatment using the legal cut-off point as the instrumental variable. The most common problem for implementing the RDD approach is that the treatment effect is identified only around the cut-off point and it is not generalizable to the full sample (see e.g. Cameron and Trivedi, 2005; Lee and Lemieux, 2010).

6. *Timing of Events* (Abbring and Van den Berg, 2003) aims to assess how the hazard rate is affected by treatment. In this model we can distinguish the selection effect from the causal effect of the treatment without imposing exclusion restrictions or without instruments and avoiding conditional independence assumptions. The extra information in duration data that allows identifying the treatment effect is the timing of events. The main limit of this approach concerns the parametrization of the hazard rate, because the mixed proportional hazard (MPH) specification is requested. However, if multiple realizations per individual of the outcome variables are available, identification can be attained without strictly exogenous regressor variation and the MPH assumption is relaxed (Horny and Picchio, 2010).

7. *Other methods*: several studies use other models to allow the econometric issues discussed above. We can include here the non-linear panel models, such as the *dynamic random-effects probit models*. In these models, unlike in linear ones, we cannot eliminate the individual-specific effect in the context of fixed-effect, so the idea is to treat

the unobserved heterogeneity as randomly distribuited in the population. The parameter estimates are biased if unobserved and observed heterogeneity are correlated. This problem can be allowed by specifying a distribution for the unobserved heterogeneity conditional on the leads and lags of time-varying explanatory variables (Chamberlain, 1984); or using a conditional maximum likelihood estimator that considers the distribution of the unobserved effect conditional on the initial period value and explanatory variables (Wooldridge, 2005); or following Mundlak (1978), who allowed unobserved and observed heterogeneity to be mutually dependent via the means of time-varying explanatory variables. A further approach is based on *cohort differences*, where it is assumed that the unobserved heterogeneity is constant across a number of cohorts and the relationship between this heterogeneity and unemployment is also constant, but cohorts do differ in their unemployment experience because of the business cycle. So, if the cohorts that experience more youth unemployment also have more adult unemployment, it is due to scarring effect and not to heterogeneity. For example, this type of approach is followed by Burgess et al. (2003) and Cruces et al. (2012).

There are some studies which do not apply any of the previous methods in order to estimate the causal effect, so we can consider their results as weak causality, or traditional regression analysis without causal inference and are not reported in the Appendix, where a descriptive synthesis of the papers revealing causal implications is provided. Table 1 classifies the studies referred to in this survey according to some criteria: the study specifically concerns the estimate of scarring effects, not using data before 1990s and according to the methodologies of causal inference suggested in the previous list. After applying these criteria, Table 1 selects 63 papers.

In addition, Figure 2 highlights that the most common strategy employed in the cited papers is the within-group estimation in fixed-effects panel regression, in particular in order to estimate the scarring effects on wages, closely followed by the dynamic random-effects probit models, mainly used to evaluate the unemployment state dependence. Among 63 studies covered by our review, 9 articles make use of IV estimators, mainly by resorting to previous local unemployment rate as instrument; 6 articles adopt a timing of events approach and 12 use selection on observables methods, i.e. PSM (8) or control function estimator (4). In this case, at our knowledge there are no studies on unemployment scarring effects which estimate causal effect through RD design.
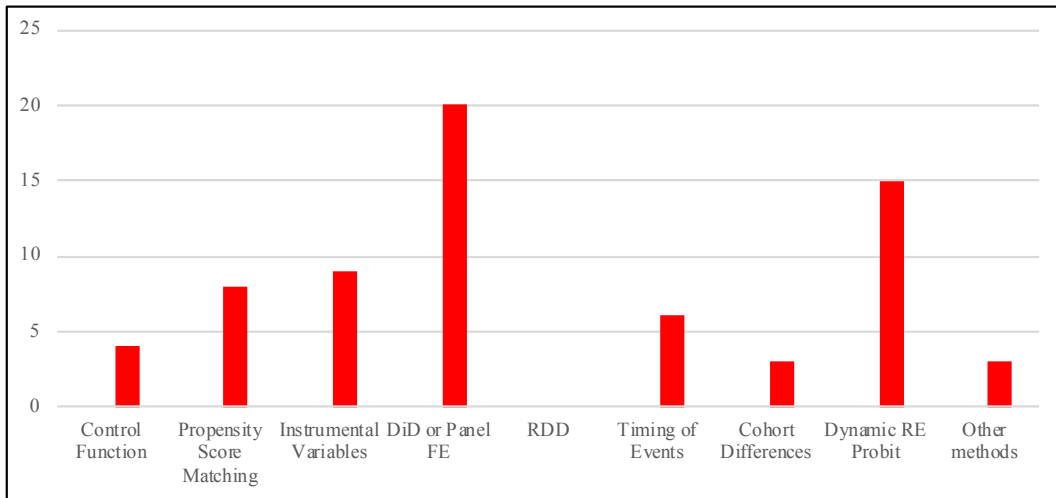
Figure 2: Causal inference methods used in empirical studies.

4 Empirical literature

4.1 Impact on wages

In this subsection we report evidence from the empirical literature about the effects of previous unemployment spells on subsequent wages (and employment outcomes in the next subsection), not only concerning youth unemployment episodes but considering job displacement in general. As mentioned in the previous section, most of these studies concern US labour market, where significant wage scars are found. Early nonemployment causes lower future earnings also 10 years after school completion in Corcoran (1982). Long-term wage scarring effects are estimated also in the case of job displacement in general: we report findings by Ruhm (1991), where permanent layoffs are estimated to cause permanent wage scar (after 4 years the loss is still around 14%); Stevens (1997) find that much of the estimated persistence in low earnings and hourly wages after displacement are due to the fact that the displaced worker can experience repeated job losses and multiple spells of unemployment. She estimate a reduction in earnings and hourly wages, on average, of 25% and 12%, respectively, in the year of displacement and of 9% on average after 6 years. Finally, high-tenure prime-age workers experience substantial and persistent earning losses when they are displaced during or following mass layoffs and even 6 years after the separations their quarterly earnings are 25% below of their pre-displacement earnings (Jacobson et al., 1993). The direct negative impact of youth unemployment on wages is long-lived by adults in several other studies (Chowdhury and Nickell, 1985; Ellwood, 1982; Kletzer and Fairlie, 2003; Mroz and Savage, 2006; Spivey, 2005; Podgursky and Swaim, 1987). Investigating the economic implications of involuntary job loss occasioned by plant closing and employment cutbacks, Addison and Portugal (1989) estimate that increasing unemployment du-

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ration by 10% causes wage losses from 0.8% to 1.4%, and also industry shifts and occupational shifts lower the post-displacement wages (Addison and Portugal, 1989; Carrington, 1993). Other studies estimate the large negative impact of graduating in a worse economy on wages, an effect that persist also 15 years after college graduation (Kahn, 2010), while previous job tenure is positive related to post-displacement earnings (Kletzer, 1989; Neumark, 2002). About US, to our knowledge Gardecki and Neumark (1998) are the only ones who conclude that early labour market experience do not affect adult wages.

Focusing on Canada, results from Belzil (1995) may be interpreted in favour of the weak existence of an unemployment stigma caused by unemployment duration, because over a spell of unemployment both the expected wage received and the reservation wage decrease, in particular at the end of benefit period. More unemployment between the ages of 18 and 32 is associated with lower incomes and job quality at 32 and self-esteem change does not mediate the career-scarring effect of unemployment on job quality (Krahn and Chow, 2016). Analysing the magnitude of long-term earnings declines associated with graduating from college during a recession, Oreopoulos et al. (2012) conclude that the average worker faces earnings losses that are very persistent but not permanent and these effects are much larger in the first year of career. They estimate loss in earnings of 9% during the first 5 year associated to an increase in the unemployment rate of 5 percentage points, and finally fades to 0 by 10 years. Moreover, the only paper which focuses mainly on the role of unionization estimates a loss of hourly wage by 2.73$ and more than half of all displacement-induced wage losses are associated purely with the loss of union coverage (Kuhn and Sweetman, 1998). Instead, no significant effect of unemployment duration on wage losses of displaced workers are found in Houle and Van Audenrode (1995), once the simultaneity bias and unobserved heterogeneity are correctly accounted for.

About Europe, the studies on scarring effects were mainly conducted on British labour market. Papers find significant wage penalties due to employment interruptions, in line with American evidence. Blanchflower (1991) found that past unemployment reduces wages (about 10%) and bargaining power of workers, and that the fear itself of becoming unemployed leads to wage losses, especially in non-unionization sectors. Using a within-group estimation that control for unobservable and addressing the possibility of sample selection bias using the Heckman correction term in the wage equation, in Arulampalam (2001) the wage penalty attached to a spell of unemployment on re-entry job is estimated to be around 6% during the first year with respect to a worker who did not experience unemployment spells, increasing over the next 3 years within the same employment spell to about 14% before declining to about 11%, so a person who experienced an unemployment spell is permanently scarred. The same methods are used and similar results are found in Gregory and Jukes (2001) and Nickell et al. (2002): in the former, the wage penalty associated with a job interruption is estimated to be around 10% over the first year, decreasing to about 7% in the second year, with a long-run or permanent loss especially for over 45. The paper focuses also on the duration of unemployment spell and estimates that 30 days spell of unemployment have not a large effect on wage losses (-0.8%), but 6 months or one

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year of unemployment reduce wages by a further 5.1% and 11.1%, respectively. Nickell et al. (2002), after the first unemployment spell, find an immediate loss in hourly earnings between 10-20% throughout the first year and these losses are larger for highest skilled group and more mature men. Permanent scar in terms of wage losses is found also in Gregg and Tominey (2005) through the instrumental variables approach.

Several studies cover also Germany and Scandinavian countries. Persistent wage losses are found in Burda and Mertens (2001) for displaced workers and in Couch (2001) following job displacement due to plant closure. However, Grund (1999) does not confirm the stigma effects of layoffs found in USA and Canada by Gibbons and Katz (1991), probably due to differences in labour market institutions, while Möller and Umkehrer (2015) highlight that the most substantial and persistent wage losses arise for workers at the bottom of the prime-age earnings distribution. Comparing UK and Germany and focusing on the effects of job shifts on the wage growth, Pavlopoulos et al. (2014) do not find any significant effect, with the exception of in-firm changes which are favourable for British low-paid movers. Ackum (1991) confirms that unemployment involves losses in hourly wages (-2%), while education, age and experience have a positive effect on earnings. Moreover, Stafford and Sundström (1996) find that time-out for childcare has a negative impact on wages both for women (-1.7%) and for men (-5.2%), while Bratberg and Nilsen (2000) find significant effects of several explanatory variables such as education, gender, age, local unemployment on the time search, subsequent wages and subsequent job duration and Hällsten (2017) estimates that university dropout has scarring effects in terms of lower earnings. Using a sibling fixed-effects to remove all unobserved heterogeneity that is common within a family in order to identify the causal effects of unemployment subsequent to graduation, Nordström Skans (2011) shows a long-lasting, although not permanent, negative effects on both unemployment and earnings at least 5 years. There is a strong and negative association between unemployment upon graduation and individual future earnings (about 30% lower 5 years after graduation) in Sweden: the results are robust to the inclusion of a rich set of observed covariates including parental education level and grade point average from high school as well as for choice of method, i.e. control function OLS and propensity score matching (Gartell, 2009). Adopting a propensity score methods, Verho (2008) highlights a strong persistence of unemployment scarring effects on earnings: after 6 years, there is a 25% annual earnings penalty for being unemployed and this wage scar recovers relatively slowly over time. The same tecnique is adopted by Eliason and Storrie (2006) and find that there are long-lasting scarring effects of job displacements, estimating a large wage differential after 12 years.

Using an OLS regression and controlling for location dummy, industry and sector, an individual who was unemployed obtains a subsequent wage lower by 10% in Bosnia (Tiongson and Fares, 2007), while Petreski et al. (2017) do not find any wage scarring in Macedonia. Helbling and Sacchi (2014) use a propensity score matching method and find that high-skilled prime-age men in Switzerland could earn 7% higher wages if they had not experienced early unemployment. Evidences of wage scars are documented also in the Netherlands, where the

wage losses (about 17%) due to early unemployment spell present some gender differences. The stronger effects of unemployment scarring among men suggest that they are likely influenced through more channels than women (Mooi-Reci and Ganzeboom, 2015). Furthermore, authors suggest different stigma effects across age (-24% if older than 54), business cycle (-23% if during recession) and nationality (-12% if immigrant). Consistent evidences that the wage penalty increases as unemployment spell lengthens, reaching about 7% and 10% respectively in terms of hourly and monthly wage for one year unemployment spell (Gangji and Plasman, 2007; Ghirelli, 2015) and reducing the probability of moving into employment (D'Addio et al., 2002), are found also in Belgium. In order to account for the joint determination of duration and post-unemployment wages, Pichelmann and Riedel (1993) adopt a simultaneous equation model with selectivity-adjustment and establish that longer duration of unemployment in Austria resulted in significantly lower post-unemployment wages and annual earnings. The same in Spain, where Rosolia and Paul (1998) estimate a wage loss on average equal to 32%, with consistent differences across gender. Using a within-group estimation like in Arulampalam (2001), Arranz et al. (2003) conclude saying that the wage losses associated with the lenght of previous non-employment spells increase with the number of job interruptions and the wage gains after re-employment decrease with that number. Moreover, average wage reductions 3 years or more after a job loss are above 6% for men and 3% for women; 10% in the case of laid-off workers and 4% in the case of workers whose contract ended and the greater penalties are relative to over 45 and manual skilled workers. Labour market conditions and earnings have deteriorated across cohorts in Italy, where the entry wages of youngest cohort is 11% lower and male wage penalties are greater than female's one (Naticchioni et al., 2016), and longer unemployment spells reduce wages of younger white collars by 5%, while job switching from small to large firms has positive impact on wage only in the early career and tend to vanish after 3 changes (Contini, 2000).

Long-term wage scars are found also in the literature focusing on a comparative analysis across Europe (and sometimes including the US): it has been estimated that unemployment spells or inactivity periods determine subsequent wage losses, the longer the duration of the unemployment episode (Abbring et al., 2002; Arranz et al., 2005), or the higher the frequency of job mobility (Davia, 2005), or for high-wage and holder workers as well for women (Gangl, 2006), or during a recession, generating persistent and consistent wage scars for youth in Japan rather than in the US (Genda et al., 2010). However, more generous unemployment benefit systems or strict labour market regulation are able to mitigate these negative effects (Gangl, 2004, 2006).

4.2 Impact on employment outcome

While the results appear unanimous concerning the effects on wages, the same does not happen with regard to the impact of previous unemployment on the likelihood of being unemployed in the future. In this case different results can be driven by significant differences about labour market institutions. For example, several differences emerge in terms of flexibility between

anglo-saxon and continental labour markets.

About the US labour market, the empirical economic literature presents results not always homogeneous. For example, in Heckman and Borjas (1980) there are not evidences that previous occurrences of unemployment (or their duration) affect future labour market behavior once controlling for sample selection and heterogeneity bias. However, it may be due to the small sample size both in terms of number of individuals sampled (only 122) and the limited time period in which they are followed. Otherwise, there are proofs of diverging duration dependence effects across gender and race in Van den Berg and Van Ours (1996). Instead, while controlling for heterogeneity deletes the unemployment state dependence hypothesis and reduce by two third the persistence of weeks worked, any experience and Markov dependences remain (Ellwood, 1982). The same works for women: the odds that a young women works in year t are nearly 8 times higher if she worked last year than if she did not (Corcoran, 1982). While the wage scar is permanent, the unemployment scarring effect is only temporary in Ruhm (1991), where permanent layoffs initially cause an increase of 8 weeks of unemployment that vanish during the fourth year. We can observe similar findings also in Mroz and Savage (2006), in which there is strong evidence of short-lived persistence in unemployment for about 4 years. However, the likelihood of full-time re-employment increase thanks to greater education (Podgursky and Swaim, 1987). Considering the case of the Great Recession, it increases the probability of involuntary job transitions, especially for young and short-tenured workers, with long-term impact. This effect, in turn, is associated with decreased earnings in the short-term and also with a lower re-employment hazard (Dickens and Triest, 2012). Between these studies, Omori (1997) helps to explain the duration of nonemployment spells distinguishing between the effects of stigma, human capital decay and heterogeneity. His findings reveal that one month more in the duration of past episodes of nonemployment lengthens the expected duration of future nonemployment by 0.39 months, on average. More important, the lower the local unemployment rate was at the time of past unemployment episodes the larger is this effect, so the paper confirms the stigmatization effect on workers. Different methods are implemented by Kroft et al. (2013). They adopt a field experiment by sending fictious rèsumès to real job posting in 100 US cities and report clear evidence of negative duration dependence, that is stronger when the labour market is tighter. The unemployment spell length is used as a signal of unobserved low productivity by employers and it is less informative in weak labour market.

As regard British labour market, while Arulampalam et al. (2000) find evidence of state dependence in unemployment in the short run of 3 years especially for mature men, Gregg (2001) addresses the issue of how early unemployment experiences as young adults contribute to unemployment in adulthood, looking whether the cumulated experience of unemployment from ages 16 to 23 is correlated with that from ages 28 up to 33. Adopting the instrumental variables approach, the paper shows strong evidence of significant and persistent structural dependence induced by early unemployment experience for men and some observable characteristics increase the risk of future unemployment, such as a depressed local labour market or coming from

a disadvantaged family background. But a previous study was conducted by Narendranathan and Elias (1993) who, using several control variables in a fixed-effects model, estimated that the odds of becoming unemployed are 2.3 times higher for youths who were unemployed last year than for youths who were not unemployed and similar effects are found in local unemployment rate, father's social class and children. A causal relationship between past and current unemployment has a significant scarring effect in terms of increasing the probability of re-entering unemployment and these effects are lower for young men than more mature men. Examining also the role played by low-wage employment on the state dependence, Stewart (2007) suggests that an individual who was unemployed the previous year is more than twice as likely to return unemployed and low-wage jobs have almost as large an adverse effect as early unemployment on the probability of future unemployment, i.e. 3 times as great as that for someone originally in employment. Similar results are found by Tumino (2015), who analyses the extent to which unemployment experiences is related to business cycle.

In Germany, Biewen and Steffes (2010) find that past unemployment increases risk of future unemployment, especially during period of relatively low unemployment rate and hence confirming the hypothesis of stigmatization. In line with previous evidences, youth unemployment has significant and long-term scarring effects on the job career in Germany too (Schmillen and Umkehrer, 2017). Early unemployment causes greater probability of future unemployment and job careers become more complex when workers experience their first unemployment spell at older age (Manzoni and Mooi-Reci, 2011). Moreover, there are strong evidences that past unemployment causes future unemployment and older people stay longer in unemployment while foreigners and better educated individuals move faster out of unemployment (Mühleisen and Zimmermann, 1994). Focusing on Scandinavian countries, Norvegian papers of particular interest are Raaum and Røed (2006), that find patterns of youth unemployment persistence identifying the causal effect with a minimum of parametric restrictions; and Nilsen and Reiso (2011) also find a large and persistent negative relationship between previous unemployment and future labour market status for both gender. Similar results in Verho (2008), where unemployment scar determines a wage loss that is still 10% after 6 years. Moreover, an increasing unemployment spell reduces the probability of finding a good job (Gaure et al., 2008). About Sweden, similar effects of the youth unemployment are found in Lundin and Hemmingsson (2013) and another significant negative effect on the socioeconomic outcomes of youth is due to the long-term parental unemployment (Karhula et al., 2017). Moreover, displaced workers seem to be able to return to similar levels of employment and unemployment as nondisplaced workers within 4 years, but are more vulnerable to subsequent shocks on labour market, suffering long-lasting effects of job displacement (Eliason and Storrie, 2006). Otherwise, Eriksson and Rooth (2014) achieve a field experiment and report a negative association between time unemployed in the past and the transition from unemployment to work: employers appear to attach a strong negative value to unemployment spells lasting at least 9 months for low and medium jobs and this evidence confirm a stigmatization effect. Hämäläinen (2003) estimates that past unemployment

is found to increase the probability of current unemployment by almost 20 percentage points on average, and this stigmatising effect is not randomly distributed across different levels of education, but vary from 9 to 25 percentage points in terms of unemployment probability. Finally, using a dynamic random-effects model, Ahmad (2014) examines the extent state dependence among unemployed immigrants in Denmark and shows that an individual who was unemployed in the previous period has 6.5 percentage points higher probability of being unemployed again compared to an individual who was employed.

Always relative to Europe, a period of youth unemployment determines a 9% higher probability of being unemployed or NEET at 26 in Switzerland (Helbling and Sacchi, 2014) and enforcement of benefit sanctions reduces the quality of post-unemployment jobs both in terms of job duration as well as in terms of earnings and increase exits out of the labour market (Arni et al., 2013). In order to study the determinants of duration dependence of unemployment in France, Van Den Berg and Van Ours (1999) conclude that the stigma effect immediately occur for women but only after the first year of unemployment for men. Evidences of persistent scarring effects in the Netherlands suggest that the duration of unemployment in the first 3 years after leaving school increase the probability of exit from the labour market for men by 11% and an unemployment spell of at least 3 years has negative effects on the probability of re-employment for men by 12% for each additional year (Luijkx and Wolbers, 2009). Focusing on firm closures, Deelen et al. (2018) report that the negative effects of displacement on both employment probability and subsequent wages are persistent at least up to 6 years after the firm closed down and are particularly harmfull for older workers and long-tenured ones. Not only compared to individuals with permanent jobs but also compared to people starting their careers in a non-standard contract, unemployed people after leaving full-time education are more likely to become unemployed later in the career and this scarring effect diminishes with increasing work experience, but last many years (Steijn et al., 2006). About Belgium, youth unemployment not only increases the likelihood of future unemployment and its duration, but the scarring effect is persistent for at least 10 years (Heylen, 2011). Gangji and Plasman (2008) evidence a strong state dependence in unemployment persistence and estimate that an unemployed individual will be between 11.4% and 33% more likely to be unemployed again the next year, compared to an individual who was in employment. Cockx and Picchio (2013) use a mixed proportional hazard model with competing risks and estimate that further prolonging the unemployment spell by one year reduces the probability to find a job in the following 2 years from 60% to 16% for men and from 47% to 13% for women. However, the duration of unemployment does not seem to direct scar in terms of quality of employment and wages.

Ayllón (2013) evidences not only the stigma effect in Spain, but also a significant impact of discouragement: being unemployed and discouraged increase the probability of being unemployed in the future by 7.4% (by 4.7% if not discouraged). Spanish authors also studied the impact of hiring and firing costs, finding that they implies higher youth unemployment and lower old-age unemployment, respectively, and that they increase the stigma from being fired

and reduce the stigma from not being hired as regard the way in which firms form beliefs about productivity observing employment history (Canziani and Petrongolo, 2001). Evidences from Italy suggest that unemployment experiences tend to be scarring only in the North, where aggregate unemployment rate is lower than in the South (Lupi et al., 2002).

Therefore, the presence of unemployment scarring effects is a rather consolidated finding. It emerges also in Australian studies (Knights et al., 2002), which evidence an inter-related dynamics between low paid employment and unemployment too (Mavromaras et al., 2015), and New Zealand, where being inactive at an earlier is positively and significantly related to the probability of being inactive 4 years later (Maloney and Parau, 2004). However, analysing the labour force outcomes for young low-skilled in Australia, findings suggest that the duration of past unemployment spells does not matter for future unemployment probability while the impacts come from the number of previous spells, i.e. occurrence dependence rather than lagged duration dependence (Doiron and Gørgens, 2008). Cruces et al. (2012) find long-term unemployment scarring effects on labour market career and wage penalties both in Argentina and Brazil, controlling for birth cohorts heterogeneity. Using a discrete-time duration model to study the determinants of youth unemployment spell and the instrumental variables approach to analyse the impact of unemployment spells duration on the probability of being unemployed, Petreski et al. (2017) find that increasing unemployment spell in Macedonia reduces the likelihood of being employed by 28.4% in short-run, 42.6% in medium-run and 61.8% in case of a spell of long-term. Similar results in Bosnia, where young joblessness in 2001 had 11% (30%) greater probability of being unemployed (jobless) in 2004 (Tiongson and Fares, 2007); and in Greece, where duration of previous unemployment spells affect negatively the duration of the current employment spell and vice versa, especially for women, workers aged above 45 and service employees (Theodossiou and Zarotiadis, 2010).

Finally, there are some studies which make use of a comparative approach between two or more countries. Part of this literature concerns the European labour market and finds a considerable degree of state dependence as scarring effect of unemployment across Europe (Plum and Ayllón, 2015). In a panel of 20 OECD countries, youth unemployment increases the likelihood of being unemployed in subsequent years but this effect gradually fade away and disappear at about age 40 and it is stronger where labour market conditions are more rigid (Kawaguchi and Murao, 2014). Instead, other studies control for age, gender or education (Roth and Moffat, 2014), or recessions (Genda et al., 2010), or analyse both incidence of displacement and subsequent labour market transitions (Abbring et al., 2002). In Brandt and Hank (2014) long-term scarring effects are found across 11 European countries, but significant differences in the life-course patterns of unemployment between welfare state regimes arise. Finally, Dieckhoff (2011) concludes that who experienced unemployment 2 years before has a reduced probability to be employed on a permanent contract, especially in Spain.

4.3 Other topics

In this subsection we include findings related to the unemployment scarring effects but focusing on a specific topic, different from previous unemployment spells or duration, or different in terms of outcome from the wage losses or the likelihood of become unemployed as already widely discussed above. For example, a further line of research concerns the effects of previous unemployment spells on mental health, life satisfaction and, more generally, about "psychological" scarring effects. Infact, current unemployment is associated with lower levels of well-being and past unemployment scars men who are currently in work and this scarring effect is independent of the current level of income. Moreover, the interaction term between current and past unemployment confirms the habituation hypothesis, i.e. the well-being of current unemployment is attenuated for those who have experienced more early unemployment (Clark et al., 2001). However, according to Knabe and Rätzel (2011) these results work mainly through the effect on people's fear of future unemployment, rather than the direct impact of previous spells out of work. Focusing on personality traits as determinants of job search behavior and important factors for reducing individual unemployment duration and increasing job stability, Uysal and Pohlmeier (2011) find that extraversion and agreeableness have no explanatory power, while conscientiousness, neuroticism and openness to experience vary across different subgroups. Finally, the consequences of stigma consciousness correspond to lower well-being and health, higher job search effort but lower chances of re-employment (Krug et al., 2019), while Helbling and Sacchi (2014) estimate that an individual who experienced early unemployment is, on average, about 18% more dissatisfied in Switzerland and, analysing 4 European countries, Dieckhoff (2011) suggests that unemployment alterates the workers' aspiration, so there are not decreased job satisfaction about the type of job, but decreased satisfaction about job security in Austria and Spain. There are also long-term mental health scarring effects of exposure to youth unemployment or multiple episode of nonemployment during the life course in Sweden (Strandh et al., 2014) and, more generally, across Europe, where past unemployment spell is found to predict a decrease in self-reported quality of life and life satisfaction after 50 age and an increase on depression symptoms in the long-term (Mousteri et al., 2018).

As suggested in the previous subsections, an important role in determining the labour market outcomes is also played by the different labour market institutions (see e.g. Casquel and Cunyat, 2008). In particular, a part of the literature has focused on the unemployment insurance and its impact on subsequent wages or probability of employment. These studies estimate that increasing weekly benefits or its duration generate an higher post-unemployment annual earnings and the duration of the unemployment spell too (Addison and Blackburn, 2000; Burgess and Kingston, 1976; Ehrenberg and Oaxaca, 1976; Holen, 1977; McCall and Chi, 2008). Receiving UI lengthens an individual's search spell by 7.2 weeks (Hotchkiss, 1999). However, these studies do not analyse the effects of unemployment benefits on workers' job outcomes, i.e. quality of re-employment and job stability. This gap is covered by few other studies. Gangl (2004), whose paper finds that unemployment insurance has positive effects on both short- and long-

term: transfer payments reduce income loss during unemployment spells and generate smaller scarring effects by permitting workers to search for better re-employment. In another study, both the increasing duration of unemployment insurance and a lump-sum severance payment reduce the job-finding rate by 8-12% on average and by 5-9% on average, respectively (Card et al., 2007). Although benefit recipients experience longer unemployment spells, there is also a positive effect of unemployment insurance on subsequent employment stability (Tatsiramos, 2009). Otherwise, Belzil (2001) estimates that increasing the maximum benefit duration raises the expected job duration by 0.5 to 0.9 day but expected unemployment duration increases by 1 to 1.5 days; while in Jurajda (2002) neither the length nor the amount of the UI compensation appear to affect the risks of layoff, but only being entitled to UI shortens workers' employment duration. Analysing the case of Slovenia, longer unemployment benefit duration contributed to longer duration of unemployment spells of benefit recipients without improving the quality of subsequent jobs in terms of type of contract or post unemployment wages (Van Ours and Vodopivec, 2006).

5   Conclusions

Although the empirical literature has pronounced a lot on the study of unemployment scarring effects since the 1980s, especially in the United States, at our knowledge there are no rigorous and recent surveys on the matter. The present article aims to fill this gap presenting an overview of empirical evidence relating to the scarring effects of previous unemployment episodes on subsequent wages and employment opportunities. Unlike other studies, this paper focuses also on the methodological issues related to the econometric strategies employed by labour economists: our review reveals a wide range of alternative estimation approaches used in order to estimate the causal implication. According to our research, the most common strategy employed in empirical studies on the unemployment scarring effects is to apply the within-group estimation in fixed-effects panel regressions in order to reveal the causal effect on wages, closely followed by the use of dynamic random-effects probit models which are particularly applied to estimate the unemployment state dependence. Other methods are less used: finding a good instrument is often a difficult practice, propensity score matching requires a significant number of observations with similar characteristics that might be difficult to satisfy, whereas regression discontinuity design is not used at all.

Empirical evidence appears clear and homogeneous in detecting significant, and often persistent, wage losses following unemployment spells and strong state dependence in unemployment persistence, also considering articles covering time spans prior to the 1990s that are not reported in the Appendix, with irrelevant exceptions. Not only: the phenomenon of unemployment scarring effects collects empirical confirmation despite different datasets used, countries considered,

time span covered and the methodology used in order to identify the causal effect. Little differences across empirical findings concern the magnitude of these detrimental effects, based on the reason and length of nonemployment spells: while the unemployment periods experienced by school-leavers or by laid-off workers are particularly penalizing, the negative effect on subsequent labour market performance seems to be less stigmatizing in the case of plant closures or during economic recessions. In this sense, on the one hand, the creation of conditions that favor work experience as quickly as possible after school completion appears to be an urgent issue; on the other hand, policymakers should not yet follow the path of labour market reforms that facilitate layoffs, if they want to avoid that stigma effect found in the empirical literature and particularly scarring for dismissed workers. Finally, a part of the literature concerning the psychological implications of unemployment spells highlights important and negative repercussions of scarring effects also in terms of well-being, life satisfaction and mental health. One way to mitigate the wage scars highlighted in this study and to facilitate the search for a better job match could be suggested by that strand of the literature that analyses the duration of unemployment insurance, but this is not the hearth of our study and it could be a topic of investigation for future research.

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Table 1: Empirical studies on unemployment scarring effects (N=63).

Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Ahmad (2014)	Examine the extent state dependence among unemployed immigrants in a dynamic discrete choice framework.	Denmark. Danish Administrative Registers of Statistics Denmark (1994-03), N=6,767.	Probit models, using Wooldridge specifications, which include a lag dependent variable to allow for state dependence. Other methods - Dynamic Random-Effects Probit Models.	Clear evidence of state dependence in the unemployment behavior of immigrants: an individual who was unemployed in t-1 has 6.5 percentage points higher probability of being unemployed again at period t, compared to an individual who was employed.
Arni et al. (2013)	Provide an evaluation of benefit sanctions and their effects on unemployment durations, on subsequent employment stability, on exits from the labour market and on earnings.	Switzerland. UI register and Social Security Administration (1998-03), N=23,961.	Multivariate competing risk MPH model with dynamic treatment effects. Timing of Events.	Benefit reductions lower the quality of post-unemployment jobs both in terms of job duration as well as in terms of earnings: over a period of 2 years after leaving unemployment, workers who got a benefit sanction imposed face a net income loss equivalent to 30 days of full pay.
Arranz et al. (2003)	Study the impact of unemployment spells on subsequent wages.	Spain. HSIPRE (1987-97), N=65,340.	Within-group estimation of wage equation. Panel Fixed-Effects.	Wage losses increase with the number of job interruptions and the wage gains after re-employment decrease with that number. Average wage reductions 3 years or more after a job loss are above 6% for men and 3% for women; 10% for laid-off workers and 4% in the case of workers whose contract ended.
Arranz et al. (2005)	Aim to analyse the relationship between labour market transitions and individual wage growth in different European countries.	6 EU countries. ECHP (1995-01), N=9,205.	Wage equation using intra-group differences. Panel Fixed-Effects.	Unemployment spell and inactivity reduce wages by 4% and 9%, respectively. Results are consistent across countries, but larger in France and Portugal. Inactivity effects tend to persist and even aggravate with time, while unemployment effects tend to vanish with time only in UK and France.
Arulampalam et al. (2000)	Examine whether or not there is state dependence in unemployment occurrence.	UK. BHPS (1991-95), N=10,402.	Probit models, using Chamberlain's specification and Heckman procedure. Other methods - Dynamic Random-Effects Probit Models.	Strong state dependence effects exist with respect to previous unemployment incidence, especially for mature men. Local labour market conditions appear to have little effect for the unemployment probability of young men.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Arulampalam (2001)	Study whether individuals who enter a job via a spell of unemployment experience temporary or permanent wage losses.	UK. BHPS (1991-97), N=2,092.	Within-group estimation of wage equation. Panel Fixed-Effects.	An unemployed individual when return to work will earn 5% less than who come from a spell of unemployment. This gap diminishes over 5 years. That individual is estimated to be permanently scarred in terms of earning losses of about 10%, especially if the unemployment spell lasts for 6 to 12 months.
Ayllón (2013)	Focus on stigma effects and discouragement as sources of state dependence in unemployment.	Spain. ECHP (1994-01), N=4,160.	Probit models, using Wooldridge' specification. Other methods - Dynamic Random Effects Probit Models.	Past unemployment increases in itself the chances of current unemployment and its effect is greater during periods of low unemployment, showing evidence of stigma effects. State dependence in unemployment increases in relation to the level of discouragement when looking for a job.
Biewen and Steffes (2010)	Test for the existence of stigma effect.	Germany. GSOEP (1991-04), N=4,415.	Probit models, using Wooldridge's specification. Other methods - Dynamic Random Effects Probit Models.	There is a strong countercyclical behavior of unemployment persistence. The disadvantage from having been unemployed is high when unemployment is low and low when unemployment is relatively high.
Böheim and Taylor (2002)	Observe the impact of previous unemployment incidence and duration on job tenure.	UK. BHPS (1991-99), N=4,582.	Discrete time proportional hazard model. Timing of Events.	Individuals who enter a job from unemployment are found to be 4 times more likely to be laid off from their subsequent job and 3 times more likely to re-enter unemployment than those entering from another job.
Bratberg and Nilsen (2000)	Analyse the transiction from school to work and the duration of the first job.	Norway. KIRUT Database, school-leavers in 1989-97, N=11,658.	3 simyltaneous equations in a Tobit censored regression. Timing of Events.	Individuals with higher levels of schooling get jobs more quickly and have longer durations of their first job.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Burda and Mertens (2001)	Investigate the effect of displacement on subsequent waages, compared to post-reemployment wages of such workers with those who did not experience unemployment or entered unemployment for other reasons.	Germany. GSOEP and IAB (1985-94), N=2,185.	Series of probit models for imputing displacement. Control for selectivity bias using alternative probit including all workers reporting a change of job with (or not) a spell of unemployment. Other methods - Exclusion restrictions in the probit for displacement.	Displaced workers on average have 3.4% lower wage growth than nondisplaced ones. While wage growth in the lowest quartile is marginally higher in comparison with other low wage workers, high wage workers in the upper 3 quartiles exhibit average losses of around 17%.
Burgess et al. (2003)	Use the different experiences of school-leaving cohorts to contribute to the literature on the effects of early career experiences.	UK. Labour Force Survey (1981-97), N=541,489.	Pooled and fixed effects regressions controlling for cohort heterogeneity by ability. Assuming the same distribution of unobserved heterogeneity in each cohort. Other methods - Cohort differences.	Evidences of heterogeneity in responses: adverse effects on later unemployment of early career unemployment for the unskilled and the reverse for the more skilled.
Cockx and Picchio (2013)	Investigate whether and to what extent further unemployment experience for youths who are already long term unemployed imposes a penalty on subsequent labour market outcomes.	Belgium. CBSS (1998-02), N=14,660.	Multivariate MPH model explicitly allowing for lagged state and duration dependence. Timing of Events.	Job finding probability exhibits negative duration dependence: it decreases from 60% to 16% for men and from 47% to 13% for women in the following 2 years if the entry is delayed by one year. Starting wages are not affected by the lagged duration of unemployment.
Couch (2001)	Examine the experience of German workers following job displacement due to plant closure.	Germany. GSOEP (1988-96), N=4,513.	Panel Fixed-Effects.	Earnings drop and unemployment probability increases the most during the year of displacement - 13.5% and one-half of a month respectively.
Cruces et al. (2012)	Study the effects of youth unemployment and informality on adult labour market outcomes in Latin America.	Argentina and Brasil. SEDLAC (Time series of households surveys, 1980-10).	Pooled OLS and two-step estimation like in Burgess et al. (2003). Other methods - Cohort differences.	Youth unemployment and informality have effects on adult labour market outcomes. The persistence and wage penalty effects are mainly present in the early years and for lower-skilled workers and tend to dissipate over time.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
D'Addio et al. (2002)	Investigate whether unemployment traps exist and are significant in the transition from unemployment into employment.	Belgium. PSBH (1993-97), N=959.	Parametric random effect model with ML estimator to control for sample selectivity. Other methods - Dynamic Random Effects Probit models.	Long unemployment spells have a scarring effect on earnings: long-term unemployed workers have difficulties in re-entering the labour market and obtain low subsequent wages.
Deelen et al. (2018)	Study the effects of firm closures associated with bankruptcies on the employment status and wages of prime-age and older workers.	Netherlands. Dutch administrative data (2000-01).	Difference-in-differences approach.	Negative effect of displacement on both employment probability and subsequent wages is persistent, at least up to 6 years after the firm closed down, and higher for older workers (-28 percentage points and -6 percentage points, respectively).
Dieckhoff (2011)	Examine the effect of past unemployment on labour market outcomes.	4 EU countries. ECHP (1994-01), N=9,124.	Logistic regression models. DiD approach for unobservable and Propensity Score Matching for observable.	After 2 years, who experienced unemployment have a reduced probability to be employed on a permanent contract (particularly scarring in Spain).
Doiron and Gørgens (2008)	Analyse the magnitude and form of state dependence in labour force outcomes for young low-skilled.	Australia. Australian Youth Survey (1989-94), N=1,363.	Event history methods including variables representing duration, occurrence and lagged duration dependence. Timing of Events.	No lagged duration dependence, but evidence of occurrence dependence: an additional spell of unemployment increases the probability of being unemployed in the future.
Eliason and Storrie (2006)	Follow all workers displaced in 1987 due to an establishment closure over both a predisplacement period of 4 years and a postdisplacement period until 1999.	Sweden. Employer-employee data (1987-99), N=4,397 displaced workers and 115,696 non displaced ones.	Propensity Score Matching.	Displaced workers suffer both earnings losses and worsened labour market position also in the longer run: 12 years later, they suffered from lower employment levels (3.2 percentage points) and wage differential is as large as SEK 6,717.

Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Eriksson and Rooth (2014)	Analyse whether the length of the current unemployment spell has a negative effect on the callback rate and investigate whether long-term past unemployment spells leave scars.	Sweden. PES administrative data (2007), 8,466 job applications were sent to 3,786 employers.	Probit models. Other methods - Field experiment.	Negative association between time unemployed in the past and the transition from unemployment to work. Employers do not perceive short-term unemployment spells negatively, but attach a strong negative value if last at least 9 months. Long-term unemployment spells in the past do not matter.
Gangji and Plasman (2007)	Investigate the effect of the incidence and duration of unemployment on re-entry wages.	Belgium. PSBH (1994-02), N=2,826.	Panel fixed-effects estimates. There is not time-varying selection bias so they do not use Heckman's two-step. Panel Fixed-Effects.	Evidences of monthly and hourly wage penalty associated to unemployment of 6.1% and 5.1% respectively. Penalty increases as unemployment spell lengthens.
Gangji and Plasman (2008)	Analyze the determinants of unemployment persistence in term of occurrence at the individual level within the Belgian labour force.	Belgium. PSBH (1994-02), N=3,815 in 1994 and N=1,508 in 2002.	Dynamic random effect probit model, controlling for unobserved heterogeneity and for initial condition problem. Other methods - Dynamic Random Effects Probit Model.	Strong evidence of state dependence in unemployment persistence. A randomly chosen individual experiencing unemployment in t-1 will be between 11.4% and 33% more likely to be unemployed again in t than an individual who was in employment in t-1.
Gangl (2004)	Examine whether welfare state transfers reduces the longer-run scar effects of unemployment.	USA. SIPP (1984-95). Germany. GSOEP (1984-95). N=23,815.	Probit hazard models in discrete time that simultaneously address reemployment rate and post unemployment job quality (MLE). Other methods - Bivariate Random Effects Probit Models.	Increasing unemployment spells reduce the likelihood of being re-employed, while unemployment insurance have positive effects on income and career continuity.
Gangl (2006)	Comparative analysis of workers' post-unemployment earnings trajectories.	USA. SIPP (1995-99), 12 Western European countries. ECHP (1995-99). N=6,260.	DiD approach for unobservable and Propensity Score Matching for observable.	Earning losses are largely permanent and significant for high-wage and older workers as well as for women. This negative effect is mitigated through either generous UB systems or strict labour market regulation.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Gardecki and Neumark (1998)	Examine the consequences of initial periods in the labour market to help assess whether faster transitions to stable employment would be likely to lead to better adult labour outcomes.	USA. NLSY (1979-92), N=2,844.	OLS and sibling fixed-effects models. Panel Fixed-Effects.	Early labour experiences do not affect adult wages or other labour market outcomes. Adult labour market outcomes are unrelated to the stability of early labour market experiences.
Gartell (2009)	Estimate the earnings penalty of unemployment at graduation for Swedish college graduates.	Sweden. IFAU Database, administrative registers and PE office (1991-99), N=36,422.	Control Function and Propensity Score Matching.	There is a strong and negative association between unemployment upon graduation and individual future earnings. The longer the unemployment spell the more substantial are future earnings losses.
Gaure et al. (2008)	Examine the impacts of labour market policies on the duration and outcome of job search and the quality of subsequent job.	Norway. Statistics Norway (1993-01), N=373,065.	Multivariate mixed semi-proportional hazard model. Timing of Events.	Unemployment spells reduce the probability of acceptable job and participation in ALMP has a favorable impact 5-6 months later.
Ghirelli (2015)	Investigate whether early non-employment has a causal impact on workers' subsequent career.	Belgium. Sonar Survey Database (1994-02), N=3,586.	Instrumental variables approach.	1 percentage point increase in the time spent in nonemployment in the first 2.5 years since graduation decreases annual earnings and hours worked from salaried employment by 10% and 7%, 6 years after graduation.
Gregg and Tominey (2005)	Analyse the impact of youth unemployment upon the wage up to 20 years later.	UK. NCDS, N=4,449 individuals born in the week 3-9 March 1958.	Instrumental variables approach.	Large and significant wage penalty: results suggest a scar from early unemployment in the magnitude of 13-21% at age 42 and it is lower if individuals avoid repeat exposure to unemployment.
Gregory and Jukes (2001)	Estimate the impact of unemployment spells on earnings following re-employment.	UK. NESPD and JUVOS (1984-94), N=66,000 - 77,000.	Within-group estimates controlling for individual fixed-effects and including the associated Heckman correction term. Panel Fixed-Effects.	After 1 year of unemployment, there are evidence of permanent wage scars: 20% of initial wage losses and -13% after the second year.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Grund (1999)	Compare the development of the wages of dismissed employees to those who lost their job because of plant closing, to prove the existence of a stigma effect of layoffs.	Germany. GSOEP (1991-96), N=368.	3 OLS on wages. Control for education, experience, tenure, past unemployment, firm size, industrial sector and other covariates. Control Function.	In contrast to Gibbons and Katz (1991), there is no evidence for a stigma effect of layoffs in Germany.
Hällsten (2017)	Analyse the link between educational failure and future adverse outcomes.	Sweden. Swedish Population register (individuals born between 1958-77), N=703,573.	OLS/fixed-effects models with family cluster-robust standard errors. OLS with several control variables and sibling fixed-effects. Panel Fixed-Effects.	University dropouts spend 2.4 percentage points more of their first 8 years in a state of low earnings compared to never entrants. With a full set of observed controls, the effect increases.
Hämäläinen (2003)	Examine the labour market careers of young people who finished their studies or left compulsory schooling in 1988.	Finland. Population Census Data (1987-98), N=5,095.	LPM, pooled probit and random-effects probit models. Other methods - Dynamic Random Effects Probit models.	Scarring effect of the incidence of unemployment on future labour market possibilities of 20 percentage points in terms of unemployment probability.
Helbling and Sacchi (2014)	Investigate scarring effects of early unemployment among young adults who acquired vocational credentials.	Switzerland. Transition from education to employment data (2003-07), N=1,269.	Propensity Score Matching.	Young adults who hold vocational credentials are more likely to be neither in employment nor in education, and to earn less and be more dissatisfied with their career progress later in work life than they would be, had they not experienced early unemployment.
Heylen (2011)	Look at the effects of unemployment at the beginning of the career in terms of more or longer subsequent unemployment spells and future earnings.	Belgium. VDAB (1995-09), N=41,784.	Probit model for early unemployment and linear regression to model the expected duration of unemployment spell, including gender, age, educational attainment, residency, urbanization, mobility, time spent in unemployment. Control Function.	Unemployment early in the career does have a detrimental effect on both the subsequent unemployment probability, as on the duration of this later unemployment. These effects seem to fade a little as time goes by, but even a decade after leaving school they still remain substantial.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Kahn (2010)	Study the long-term consequences of graduating from college in a bad economy (before, during and after the recession of the 1980s).	USA. NLSY (1979-89), N=513.	Instrumental variables approach.	Large and persistent negative effects on wages of graduating in a worse economy, which persists for the full 15 years after college graduation.
Karhula et al. (2017)	Study the intergenerational impact of parental unemployment on the socioeconomic status of children.	Finland. Register data of Statistic Finland (1987-94), N=15,991.	Propensity Score Matching.	Negative association between parental unemployment and children's later socioeconomic status, partially driven by the duration of unemployment during the depression.
Kawaguchi and Murao (2014)	Investigate the effect of the labour market condition at school graduation on the unemployment rates of subsequent age groups.	20 OECD countries. Cross-country panel data (1960-2010).	Panel fixed-effects controlling for the country-year specific business cycle and labour market rigidities. Panel Fixed-Effects.	Experiencing 1 percentage point higher unemployment rate at 16-24 years increases the unemployment rate on subsequent ages.
Kletzer and Fairlie (2003)	Estimate the long-term costs of job displacement for young adults.	USA. NLSY (1984-93), N=53,147.	The paper uses a group of non-displaced workers to identify common age and experience effects and regressions that include individual-level fixed-effects to estimate post-displacement earnings losses for a group of non-displaced workers. Panel Fixed-Effects.	In the year of displacement and 4 years later, earning losses are large for displaced men (-18.3% and -9%, respectively) and women (-38.6% in the first year and -26% in the second one). Losses are higher for older and more established displaced workers.
Kroft et al. (2013)	Study the role of employer behavior in generating negative duration dependence in 100 US cities.	USA. Experiment on 100 US cities (2008-11), 12,054 résumés sent to 3,040 jobs.	LPM with proxies for market tightness and fixed-effects model. Other methods - Field Experiment.	The probability of receiving a callback from employers sharply declines with unemployment duration, so unemployment spell length is a signal of unobserved productivity.
Lupi et al. (2002)	Investigate the effect of individual unemployment experiences on reemployment wages.	Italy. SHIW (1993-95), N=1,112.	Feasible GLS within/between panel estimation. Panel Fixed-Effects.	Unemployment experiences tend to be scarring only in the North, where aggregate unemployment rate is lower than in the South regions.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Maloney and Parau (2004)	Study the potential scarring effects associated with inactive periods at the beginning of the career.	New Zealand. CHDS, N=813 individuals born in 1977 and who remained in the CHDS from birth through age 25.	Use the information of the database on personal and family background to control for observed heterogeneity and the quality of these measures should mitigate unobserved heterogeneity too. Other methods - Dynamic Random Effects Probit models.	Clear evidence of path dependence in the inactivity histories of the young people. Inactivity at an earlier age is associated with higher probabilities of inactivity at a later age.
Manzoni and Mooi-Reci (2011)	Examine how early unemployment affects workers' career pathways over their life course.	Germany. GSOEP (1984-05), N=9,653.	Probit model including lagged dependent variable to estimate unemployment state dependence and fixed-effects regression correcting for observed and unobserved heterogeneity using several control variables. Other methods - Dynamic Random Effects Probit models; Panel Fixed-Effects.	Early unemployment would increase the probability of future unemployment by 3.422 points and each additional unemployment spell increases this probability by 0.078 points. Moreover, previously unemployed workers experience an increasing career complexity over time, especially when unemployment occurs at older ages.
Mavromaras et al. (2015)	Investigate the inter-related dynamics of unemployment, low pay and skills under-utilisation, focusing on differences by gender and educational pathways.	Australia. HILDA (2001-10), N=62,522.	Probit models using Wooldridge and Mundlack's specifications. Other methods - Dynamic Random Effects Probit models.	The likelihood of unemployment in the next period is higher for those who are currently unemployed and there are also scarring effects of low pay and skills under-utilisation on future employment probabilities.
Miranda (2005)	Examine the effects that early market instability has on the adult earnings of young workers.	USA. Administrative UI records for the state of Maryland (1985-97), N=11,983.	Models estimated separately by sector and in two-step procedure (1. estimation of worker and firm fixed-effects using the full earnings history; 2. the higher estimate of fixed-effects is used as a measure of the quality of the job-match). Panel Fixed-Effects.	Employers in low turn-over sectors discount earnings of workers who displayed early labour market instability.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Möller and Umkehrer (2015)	Analyze the relationship between early-career unemployment and prime-age earnings.	Germany. Administrative linked employer-employee data of cohorts of 1978-80 followed over 24 years, N=728,841.	OLS of prime-age earnings on early career unemployment and then controlling for initial sorting, negative selection, voluntary mobility and fixed-effects. Instrument the early career unemployment with the event of a plant closure of the firm provides training occurring in the year of graduation. Instrumental variables approach; Control Function.	Early career unemployment has substantial negative effects on future earnings, but scars vary across the earnings distribution: for an increase of 1 standard deviation in early career unemployment, workers at the bottom of the prime-age earnings distribution suffer persistent losses of about 56%, while workers with higher earnings only 7%.
Mooi-Reci and Ganzeboom (2015)	Study how unemployment scarring and its underlying mechanisms operate across gender.	Netherlands. Dutch LFS Panel (1985-00), N=4,815.	Panel fixed-effects models correcting unobserved heterogeneity through two-step Heckman procedure. Panel Fixed-Effects.	Unemployment inflicts significant wage losses and the mechanisms underlying scarring effects vary by gender: among women are predominantly driven by human capital depreciation and among men stigma effects dominate.
Mroz and Savage (2006)	Examine the long-term effects of youth unemployment on later labour market outcomes.	USA. NLSY (1979-94), N=3,731.	Discrete factor ML and allowing complex correlation patterns across equations and over time and control for the effects of heterogeneity and endogeneity. Other methods - Dynamic Random Effects Probit models.	Unemployment in the prior period has positive effects on the likelihood of training, but short-lived. There is absence of long-lived persistence in unemployment spells, but evidence of long-lived blemishes from unemployment. Finally, unemployment spells experienced at age 22 result in an 8% lower wage rate 1 year later.
Neumark (2002)	Study whether youths in unstable jobs early in their careers suffer adverse labour market consequences as adults.	USA. NLSY (1979-92), N=1,328.	Instrumental variables approach.	Increasing tenure during the school to work transition has positive effect on adult wages, by 7% to 13% for men and by 12% to 24% for women.
Nickell et al. (2002)	Look at the probability of becoming unemployed, the wage losses and the probability that the employed will experience wage declines.	UK. New Earnings Survey (1982-86; 1987-91; 1992-97).	Regression includes fixed-effects and other characteristics. Sample selection problem solved using Heckman probit. Panel Fixed-Effects.	Little or no evidence of any trend increase in the chances of men becoming unemployed over the last 20 years, but strong evidence of wage losses consequent on unemployment.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Nilsen and Reiso (2011)	Analyze whether there are large and persistent negative relationships between unemployment and the risk of repeated unemployment and being out of labour force.	Norway. Statistics Norway (1990-98), N=29,356.	Propensity Score Matching.	Large and persistent negative relationship between previous unemployment and future labour market status. For males, the ATET starts at 40 percentage points the first year, drops to 10 percentage points in the fifth year and around 5 percentage points from year 8 and onwards.
Nordström Skans (2011)	Study the relationship between teenagers' first labour market experience and subsequent labour market performance.	Sweden. IFAU Database, 4 cohorts of individuals graduated between 1991-94.	Sibling fixed-effects model combining with data on high school programmes, grades and work experience during high school. Panel Fixed-Effects.	3 percentage points increase in the unemployment probability and a 17% reduction in annual earnings 5 years later due to post-graduation unemployment are found.
Petreski et al. (2017)	Aim to assess how the duration of the unemployment spell of youth affects later employment and wage outcomes.	Macedonia. School to work transition survey (1993-12), N=1,044.	Logistic regression with indicator variable for each of the unemployment duration period. 2 probit models using the duration of unemployment as regressor. IV approach to analyze the impact of unemployment duration on the probability of being unemployed and on wages. Instrumental variables approach.	Strong evidence of employment scar that grows with the duration of the unemployment spell: short-term spell lowers probability to get employed by 28.4%; medium- and long-term spells by 42.6% and 61.8%, respectively; but no evidence of the wage scar.
Plum and Ayllón (2015)	Assess the importance of individuals' heterogeneity related to previous unemployment experiences when measuring unemployment state dependence across Europe.	10 EU countries. ECHP (1994-01).	Other methods - Dynamic Random Effects Probit models.	The APE of past unemployment ranges between 6.5 and 11.5; between 10.8 and 28.2 when accounting for heterogeneity. So there is a strong degree of state dependence as scarring effect in Europe.

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Raaum and Røed (2006)	Examine the causal relationship between the state of the labour market at time of entry and subsequent adult labour market performance.	Norway. Administrative data (1993-00), N=840,000.	Logit models and ordered probit. The approach is similar to Burgess et al. (2003), but introducing some parametric restrictions. Other methods - Cohort differences.	Early labour market conditions have causal effects on adult labour market performance that are highly persistent although quantitatively small.
Roth and Moffat (2014)	Understand the supply side determinants of youth unemployment by using the variation in youth population structures across Europe.	27 EU countries. EU-SILC (2007-10).	Instrumental variables approach.	A 1 standard deviation reduction in age-cohort size is predicted to reduce the unemployment probability by 2.06 percentage points at the country level and the projected decline in youth population share has the potential to contribute to alleviating the high levels of youth unemployment.
Schmillen and Umkehrer (2017)	Examine whether an individual's total unemployment period for 8 years after graduation affects the overall length of unemployment spell over the next 16 years.	Germany, IEB and BHP.	Instrumental variables approach.	Youth unemployment have significant and long-lasting scarring effects, supporting signalling theory theoretical model of state dependence.
Spivey (2005)	Focus on how career interruptions and career expectations affects wages.	USA. NLSY (1979-00), N=6,111.	Panel Fixed-Effects.	Total nonemployment period has a significant and persistent depreciation effect on wages (less severe for women than for men).
Stewart (2007)	Examine the extent of state dependence in individual unemployment and the role played in this by low-wage employment.	UK. BHPS (1991-96).	Series of dynamic models and estimators to model the probability of unemployment, both singly and jointly with the probability of low wage employment. Initial condition problem using both Heckman's estimator or Wooldridge's specification. Other methods - Dynamic Random Effects Probit models.	An individual unemployed in the previous period and who finds a job is still more than twice as likely to be unemployed again. The same adverse role is played by previous low-wage employment, that act as the main conduit for repeated unemployment.

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Authors	Research question	Country, Database and Time Span	Methodologies	Main results
Theodossiou and Zarotiadis (2010)	Examine the distribution of labour market experience among the unemployed in a less developed area in Greece.	Greece. Questionnaires for ALMP Project (2002), N=6,301.	OLS regressions applying Heckit procedure. The inverse Mills ratio is used as regressor in OLS in order to explain the duration of the employment period. Instrumental variables approach (Heckman Probit).	Duration of the prior unemployment spell negative affects the duration of the current employment spell and vice versa (unemployment trap). Disadvantaged workers face shorter spells of employment along with longer duration of unemployment.
Tumino (2015)	Analyze the extent to which unemployment experiences have a scarring effect on British men during the Great Recession.	UK. BHPS (1991-95; 1999-04; 2006-12).	Probit models, using Wooldridge's specification. Other methods - Dynamic Random Effects Probit models.	Strong evidence in support of the true state dependence during the great recession and of a negative relation among true state dependence and business cycle both within and between the 3 time periods analyzed.
Verho (2008)	Evaluate the long-term cost of unemployment by focusing on the deep recession period of the early 1990s.	Finland. Employment Statistics Database combined with several administrative registers (1990s), N=22,474.	Propensity Score Matching.	After 6 years, there is a 25% annual earnings penalty for being unemployed after plant closing. Months in employment recover after the recession but are still 10% lower. The wage loss is 14%.

Concluded

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