Abstract
In this paper I analyse whether non-employment periods at the initial stage of the work career may increase the propensity to experience non-employment in subsequent years too, using data on young individuals in Italy. The role of labour market conditions in moderating these scarring effects is investigated, exploiting the regional differences across the country. The results provide evidence of negative effects induced by early non-employment. Moreover, the negative repercussions of early non-employment are smaller (higher) in regions with higher (lower) unemployment rates. This evidence can be interpreted using the signaling theory.

Keywords  Scarring effects · Non-employment · Labour market conditions

JEL Classification J64 · C26

1 Introduction
The aim of this paper is to study whether a non-employment experience at the beginning of the career harms individual outcomes in terms of later non-employment. Using data on young individuals in Italy, I explore whether these adverse effects, commonly known in the literature as the scarring effects of non-employment, exist and vary across the country, depending on the regional labour market conditions.

Understanding if the effects of early-career non-employment are lasting as well as their determinants is crucial in order to implement the necessary policy responses aimed at addressing school-to-work transition and targeted interventions early in peoples’ careers. If not finding a job early in the career can cause joblessness many years later, preventing non-employment of youths has pay-offs well beyond the reduction of
contemporaneous non-employment costs, because of their effect in improving future employment chances too.

Despite the large number of works that tried to estimate these effects, the empirical literature does not agree unequivocally on their existence and size. More importantly, only a few works have studied the moderating effects that may exist within a country according to the specific labour market conditions, over time or across regions (Lupi et al. 2002; Biewen and Steffes 2010; Ayllón 2013). Precisely because of this lack of investigation, I believe that this analysis, which exploits regional differences within Italy in terms of unemployment rates, can contribute to better understanding the role of labour market circumstances in mitigating or in amplifying the scarring effects.

Why should we expect that an early experience of non-employment means long-term negative repercussions for young people’s careers and that these repercussions vary according to the labour market conditions? There are three main theories that predict the existence of the scarring effects of non-employment. First, according to the signalling theory, employers have imperfect information about applicants and are unable to differentiate perfectly between persons with poor work skills from those with superior work qualities. For these reasons, they use past non-employment records as a signal of low or high productivity (Vishwanath 1989; Lockwood 1991; Gibbons and Katz 1991). Second, according to the human capital models, early spells of non-employment would deprive the individual of work experience during that part of the life cycle that yields the highest return. This strong depreciation of human capital and loss of specific job skills results in high non-employment in later periods (Pissarides 1992; Acemoglu 1995). Third, according to the job matching theory, non-employment periods may alter individuals’ job application behaviour, making them more prone to accept unsuitable or poor quality jobs that are more likely to end or to be destroyed (Mortensen 1986).

It is reasonable to assume that these mechanisms may work differently according to the conditions of the relevant regional labour market (Omori 1997; Biewen and Steffes 2010). As regards the first mechanism, based on the signalling theory, the weakness of the labour market may influence the way in which employers interpret past non-employment records as a sign of individual ability. In regions with poor labour market conditions or in times of relatively high unemployment, past unemployment spells may not necessarily be perceived as a sign of low productivity and the disadvantage of having been unemployed may become smaller. So, the higher the regional unemployment rate, the less severe any adverse effect of past spells of non-employment of a given length in the evaluation of the job recruiter will be. On the contrary, according to the job matching theory, the scarring effects could be amplified in a weak labour market, because in this scenario individuals’ discouragement increases as they become

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1 In the United States there is little evidence that early non-employment sets off a vicious cycle of recurrent non-employment (Heckman and Borjas 1980; Ellwood 1982; Corcoran and Hill 1985; Mroz and Savage 2006). On the contrary, in more recent works there is a stronger evidence of the adverse effects of non-employment in European countries (such as Great Britain, Germany, Norway and Sweden; see Sect. 2).

2 In addition, some cross-country analyses studied whether the magnitude of the scarring effects differs according to institutional and labour market conditions. For example, more pronounced scarring effects emerged in countries with a low level of youth unemployment and smooth school-to-work transitions (Brandt and Hank 2014; Kawaguchi and Murao 2014; Imdorf et al. 2019).
aware that it is more difficult to find a job. Finally, according to the predictions of
the human capital theory, the labour market conditions should not play a part in the
scarring effects: the amount of the human capital decay only depends on the duration
of non-employment, but is independent of the labour market circumstances.

This paper explores the existence of scarring effects in Italy and whether their
magnitude depends on the heterogeneity, over time and across regions, in the labour
market conditions. I draw on a sample of Italian administrative micro-data. These data
contain information on all the contracts that were signed and terminated in the period
2009–2018, relative to a representative sample of workers born on 24 dates of the
year. The availability of individual data over a decade constitutes a value added of this
work, since it allows us to evaluate the scars of non-employment in the medium and
long term. In order to estimate them, for each individual, I compute the yearly average
time spent in non-employment during the first three years after the theoretical date of
graduation (the early period) and in the subsequent 6 years (the later period).

Italy is an interesting case for two reasons. First, Italy is one of the countries with
the highest youth unemployment rates and one of the most rigid labour markets among
OECD countries (Cockx and Ghirelli 2016). If we consider the signalling theory, in
rigid labour markets, employers have more incentives to screen job applicants before
hiring, because they are forced into longer-term relationships with their employees.
Thus, we can reasonably expect that the early experience of non-employment may
inflict considerable damage on young people’s career (Kawaguchi and Murao 2014).
Second, Italy is characterized by a strong heterogeneity in social, economic and labour
market conditions across regions, which I exploit in order to understand whether the
labour market conditions are relevant in generating variations in the scarring effects
of early non-employment.

Empirical investigation poses a major methodological challenge because of endo-
genicity. While being able to control for many individual characteristics, there may
still be determinants of the individual propensity to be non-employed that remain
unobserved. It may be that individuals who are unemployed in one period are in this
situation because they have characteristics that make them particularly vulnerable to
unemployment, such as low levels of motivation, unfavourable attitudes or a general
lack of abilities. The unemployment risk for future periods will also increase if these
characteristics persist over time. To avoid a spurious relationship between current
and future unemployment, it thus becomes crucial to separate the differences in later
non-employment, which are causally related to early non-employment, from the dif-
fences due to unobserved personal characteristics that are also correlated with early
non-employment.

A number of methods has been used in the literature to handle this endogeneity
issue. Some studies relied on exogenous events (Jacobson et al. 1993; Farber et al.
1993), on the propensity score matching (Nilsen and Reiso 2011; Nordstrom Skans
2011) and on field experiments (Eriksson and Rooth 2014), but the majority of them
chose an instrumental variable approach (Gregg 2001; Neumark 2002; Gregg and
Tominey 2005; Ghirelli 2015; Schmillen and Umkehrer 2017). In addition, a part
of the recent literature has given up on the attempt to estimate directly the effect of
early non-employment on later non-employment, focusing instead on the reduced form
relationship between labour market conditions at the time of graduation and subsequent
individual labour market outcomes. In particular, this literature showed how adverse initial conditions push college graduates into initial lower-quality placements, which translate into long-term penalties on earnings or wages (Kahn 2010; Oreopoulos et al. 2012; Altonji et al. 2016).

In this paper, I consequently follow a double approach: after showing the OLS results, I first consider the results of the reduced form relationship, estimating a linear regression model of the outcome of interest on the regional youth unemployment rate in the last year of school or university. In particular, I consider, for those with a high school diploma (degree), the regional unemployment rate of the 19–28 (25–34) age group with the same level of education, measured in the last year of school (university), before entering the labour market. The variation in the youth unemployment rates exploits differences among the 21 Italian regions, among the education levels of the individuals and among the two cohorts of new entrants in the labour market (respectively in 2009 and in 2010). I then move to the instrumental variables approach and, as an instrument, I used, as in the reduced form regression, the state of the labour market at the time of the individual potential entry. As regards the relevance of the instrument, this directly affects the labour market experience of those who are ready to enter and can be considered exogenous to the individual unobserved characteristics. However, it must be noted that the exclusion restriction assumption, i.e. the fact that the labour market conditions at the time of entry should affect later outcomes only through their effect on early non-employment, is likely to be violated. For example, poor labour market conditions at the time of entry may force a worker to accept a bad job early on, which then puts him/her to a path of additional poor outcomes, both in terms of employment and in terms of wages. The possible failure of this assumption imposes a certain caution in the interpretation of my IV estimates.

The evidence suggests that the experience of youth non-employment leads to penalties in terms of persistent non-employment. According to the OLS estimates, each additional day of yearly non-employment during the first three years increases non-employment in the following six years by half a day per year. This negative effect is also confirmed by the findings of the reduced form and of the IV estimates, but its magnitude differs according to the methodology considered. Moreover, the results show that the past individual non-employment experience is more scarring in regions with good labour market conditions, i.e. in regions with low unemployment rates. On the contrary, the damage associated with past non-employment seems to be reduced if a worker is non-employed in an area with more difficult labour market conditions. This evidence of heterogeneity can easily be interpreted using the signalling theory. In fact, the scarring effects are lower in those regions where the experience of unemployment is considered part of a typical individual’s labour market history, and unemployment spells are not necessarily perceived as a signal of low productivity. Employers seem to tolerate longer past search duration when the labour market conditions are bad, while they become stricter when general unemployment is low or when things are getting better.

These results can thus be helpful in getting a better understanding of which theory explains the existence of the scarring effects, for which there is no consensus yet, and are important from a policy point of view. The existence of negative effects of early
experience in non-employment strengthens the case for policies aimed at addressing school-to-work transition and at reducing the incidence of youth unemployment.

The rest of the paper is organized as follows: after a brief review of the literature, Sect. 3 presents the data and the main descriptive statistics. Section 4 describes the empirical strategy and discusses the identification issues, the results are reported in Sects. 5 and 6 concludes.

2 Literature Review

The structural dependence of non-employment consists in the increase in the propensity to experience non-employment as the past spells of non-employment increase. This means that experiencing non-employment in a given period may increase in itself the chances of suffering unemployment again in the future. These are the so-called scarring effects of non-employment.

As mentioned, the existence and the size of the scarring effects of initial non-employment on later non-employment have been widely studied. As regards the European countries, strong evidence of significant and long-lasting scarring effects has been found in Britain (Gregg 2001; Arulampalam et al. 2000 for males), in Germany (Schmillen and Umkehrer 2017) and in Northern European countries (Nilsen and Reiso 2011; Nordstrom Skans 2011).3 Little or no evidence of the persistence of unemployment spells on the incidence and duration of future unemployment spells has been found mainly in the US setting (Heckman and Borjas 1980; Ellwood 1982; Mroz and Savage 2006) but also in other works that focus on European countries (Eriksson and Rooth 2014). These analyses suggested that the effects of initial non-employment experiences seem to die off very quickly because subsequent work experiences outweigh the evidence of an unfavourable past employment records. Other works reported adverse effects of past non-employment only on individuals with certain characteristics: Burgess et al. (2003) found a lasting adverse effect only on low-skilled individuals. This is explained by the fact that the more able, when facing a period of non-employment, are more likely to improve their qualifications, becoming more attractive to employers.

This literature, although very rich, has little focus on the empirical investigation of the variability in state-dependence according to labour market conditions. The most relevant works are those of Biewen and Steffes (2010), which considers the magnitude of the scarring effects according to cyclical conditions within Germany, and Lupi et al. (2002), which estimates, as in my work, the existence of scarring effects of non-employment in Italy, focusing on the differences between the North and the South of the country. It is important to notice that there are several differences between my analysis and this last work. First, in their paper the individuals are observed only over a 2-year period (1993–1995) while in my work I can observe the individuals over a 9-year period. Second, their main dependent variable is the re-employment wage, while I consider the later non-employment experiences.

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3 Some works focused on the effects of past non-employment on other outcomes: earnings and wages (Gregory and Jukes 2001; Gregg and Tominey 2005; Mroz and Savage 2006; Eliason and Storrie 2006) and on long-lasting jobs (Cockx and Picchio 2012).
Both Biewen and Steffes (2010) and Lupi et al. (2002) found that the adverse effect of unemployment on later outcomes is lower during periods of economic downturn or in regions with high levels of unemployment. This can be explained by the signalling theory: recruiters might be less careful about hiring applicants with any sort of early unemployment, since past unemployment is seen as a common experience. Differently from the two cited works, Ayllón (2013) reported contrasting evidence, stating that in countries with high unemployment the scarring effects are higher because individuals’ discouragement may increase as the individuals are aware that it has become more difficult to find a job.

As mentioned in the previous paragraph, this work is also linked to the literature that, instead of estimating directly the effect of early non-employment on later non-employment, has focused on the reduced form relationship between labour market conditions at the time of graduation and subsequent labour market outcomes (among the others: Burgess et al. 2003; Raum and Røed 2006; Kahn 2010; Oreopoulos et al. 2012; Altonji et al. 2016). According to these works, that explore both the US and the European setting, graduating from college during a recession seems to impose a modest but long-lasting penalty on earnings, which are essentially due to a decline in hourly wages, but not in employment or hours worked.

3 Data and Descriptive Statistics

I use a representative sample of administrative micro-data of Comunicazioni Obbligatorie (Mandatory reporting), which are available from 2009 to 2018. From this year, whenever an employment contract is signed, terminated or changed, employers must electronically submit this information to the regional agency in charge of active labour market policies, which then forwards it to the Ministry of Labour. The administrative archive built on these communications therefore contains information on all the contracts that have been signed, terminated or changed starting from 2009. Obviously, this dataset does not cover self-employment and hence the focus of this analysis is on payroll employment only. The Ministry releases a sample of micro-data relative to all workers born on 24 dates (the 1st and 15th day of each month).

My sample of interest is composed of individuals at the age of the theoretical school-to-work transition, depending on the level of education reported (high school, 3-year degree or 5-year degree). I analyse two cohorts of individuals that potentially completed their education and were available to enter the labour market respectively in 2009 and in 2010, and I follow them for 9 years. I consider the first three years in order to compute the early non-employment duration, defined as the average yearly duration, in days, of the non-employment spells of each individual in the first three years after school (Period 1). I then consider the subsequent six years (Period 2) in order to compute the later yearly average duration in days of non-employment, which is my dependent variable. These time windows are chosen in order to be able to consider a long enough period for evaluating adult labour market outcomes and, at the

4 In a related paper, it has been shown that employers’ recruitment strategies may change in response to different conditions on the relevant regional labour market (Russo et al. 2001).
same time, to capture the majority of individuals’ transitions from education to work in Period 1, as explained later in this Section.

Unfortunately the data do not show the exact time of the end of their education and consequently the theoretical moment of the end of their education, rather than the actual one, is used instead to determine the length of the initial spell of non-employment. To identify those that theoretically should have ended the education process in 2008 and 2009 (and that were potentially able to enter the work force in 2009 and 2010), I consider, for individuals with a high school diploma, those who were born in 1990 and 1991. These boys and girls potentially finished high school in 2008 and 2009, aged 19, and were able to enter the labour market respectively in 2009 and 2010. In the same way, for 3-(5-)year graduate students, I consider those born in 1987 and 1988 (1985 and 1986), who potentially graduated in 2008 and 2009 (aged 22 and 24).\(^5\) Since the data only cover the individuals that signed or terminated at least one contract in the 9 years after the theoretical end of education, some might argue that the sample of this analysis can be endogenous since it is conditional on job finding in the period. However, I believe that this sample selection bias is reasonably negligible over such a long period of 9 years, even considering the strong differences across Italian regions in the likelihood of finding the first job.

The use of the theoretical end of education may generate measurement errors in my main variables of interest because I cannot distinguish correctly between individuals who finished school on time and were not able to find a job from those who did not end education on time and were not looking for a job. This issue is less problematic for individuals with high school diploma, who represent 66% of my sample. In fact, in Italy the percentage of people who repeat at least one year of secondary school is quite low and equal to around 9% in the period of my analysis, according to the official statistics. On the contrary, this measurement issue can be more relevant for university students, because of the higher shares of people who are not able to graduate on time.\(^6\) However, we can assess that, from the perspective of an employer, having been unemployed or having finished school late are both signals of low productivity that can generate scarring effects. These, in fact, are years of potential work experience that the individual loses because of non-employment or because of the delay in completing education. The fact that the signalling theory at the basis of the scarring effects can also refer to effort and ability in education is confirmed in several works in the literature, which studied the impact of having to repeat a school year and delays in graduation.

\(^5\) It is important to stress that the level of education of each individual does not change over time, because the data only report the highest level of education achieved, recorded in 2018. So, in order to select the sample correctly, I consider, for example, only those born in 1990–1991 that in 2018 still have a high school diploma as the highest level of education. On the contrary, in the sample, I do not consider those individuals born in 1990–1991 that in 2008, having completed high school, started and obtained a degree.

\(^6\) According to the National Agency ANVUR, for the last cohorts of 3-year graduates the percentage who graduate on time is around 50%. After 6 years from enrolment, the percentage of graduates increases to 80%. This means that almost all the 3-year graduates may potentially enter the labour market in the Period 1 time window.
## Table 1: Descriptive statistics. Source: CICO and National Labour Force Survey

|                          | Mean | SD  | Min | Median | Max |
|--------------------------|------|-----|-----|--------|-----|
| Days per year of non-employment in P2 | 195  | 128 | 0   | 208    | 365 |
| Days per year of non-employment in P1  | 291  | 98  | 0   | 344    | 365 |
| Sex                      | 0.5  | 0.5 | 0   | 1      | 1   |
| Age                      | 20.6 | 2.3 | 19  | 19     | 24  |
| High school diploma      | 0.66 | 0.47| 0   | 1      | 1   |
| Degree                   | 0.34 | 0.47| 0   | 0      | 1   |
| Moved to another region  | 0.2  | 0.4 | 0   | 0      | 1   |
| Worked during school     | 0.1  | 0.2 | 0   | 0      | 1   |
| Total number of observations | 67,952 |

**Notes**  
Sex is equal to 0 for male and equal to 1 for female; the age is computed at the beginning of Period 1; High school diploma (degree) is a dummy equal to 1 for individuals with high school diploma (degree); the variable Moved to another region is equal to 1 if the region of the first work is different from the region of birth on employment and wages and tested for the presence of job-market signalling effects (Brodaty et al. 2008; Aina and Pastore 2012) for Italy).  

Data show that around 25% of the individuals started a job within the first year after the potential end of school, another 20% in the second and 15% in the third year, while the remaining 40% only entered the labour market in Period 2. This large fraction of individuals that has not been employed for the entire Period 1 explains the high average value of the early duration of non-employment, as shown in Table 1. However, since the percentage of entrants drops consistently starting from the fourth year and shows a decreasing trend year after year, I chose to consider a three-year window for Period 1, in order to have a sufficient number of individuals that were employed in Period 1 but, at the same time, to have a enough time over which the variable is observed in Period 2. These very high values of non-employment in Period 1 are related to the slow and hard school-to-work transition that characterizes Italy, linked to the failure of the education and training systems to deal with and overcome the lack of general and job specific work experience (Pastore 2019). Obviously, these high values for early non-employment can also be related to the mentioned measurement error in the non-employment variable relating to the fact that we have information only on the theoretical year of the end of education. Another measurement error may derive from the fact that some individuals may become, at a certain point of their working life, self-employed or they may start their career as self-employed, moving later to payroll employment. However, notice that we are considering young individuals that are 19–

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7 These works find evidence that delay information is used by employers to discriminate, consistent with the employer-learning theory: a delay in graduation is certainly seen by employers as the consequence of a lower skill endowment, motivation and effort across individuals and inflicts a wage penalty on those who experience it.

8 The percentage of entrants within 3 years does not significantly differ between individuals with high school diploma or degree.
31 years old, an age group in which self-employment is not so common.\(^9\) Moreover, notice also that self-employment becomes a relevant issue for a correct measure of non-employment only if the individual moves from self-employed to payroll work (or from payroll to self) in this restricted time span.

As regards the dependent variable, in order to have the best representation of the propensity to experience non-employment in Period 2, the duration of non-employment is computed on the remaining 6 years, the maximum period available in the data. Considering shorter or partial time periods would not make much sense in this analysis, because it would give a partial and incomplete view of the individual history of non-employment and employment experiences. In Period 2, the data show that, on average, the individuals were non-employed for 195 days in each year. Only around 10\% of the sample has been employed for the entire period 2 and for these, the non-employment duration in Period 2 is set equal to 0. On the contrary, around 8\% was non-employed during the whole of Period 2, and for them the yearly non-employment duration in Period 2 is set equal to 365 days. The statistics show great variability in the duration of the non-employment experience in Period 2 according to the education and the prevalent sector of work (Table 2). The highest values for non-employment spells are recorded for individuals with a high school diploma and for those that work in agriculture and in some specific services. The lowest values for non-employment are found for university graduates and for those working in financial services and manufacturing.\(^{10}\) The table also shows the average length of non-employment in Period 2 according to the region of work and the cohort. There are significant differences across regions: the regions of Southern Italy are characterized by the highest values of yearly non-employment.

Table 3 shows an easily identifiable correlation between non-employment during the first 3 years and in the subsequent 6 years (column 3). Moreover, a positive correlation is also shown between the duration of early non-employment and the probability of being non-employed at the end of Period 2 (column 4) and job instability, measured by the number of contracts that ended during Period 2 (column 5), which will be considered as additional outcome variable in the analysis.

A part from the CICO dataset, I also use the National Labour Force Survey in order to compute the regional labour market conditions. In particular, as control variables for my specification, I compute the regional unemployment rate in the region of work at the beginning of Period 2 and, according to the level of education, the variation in the number of unemployed individuals between the last and the first year of Period 2 and the percentage variation in the stock of employed individuals (15–64) in the same

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\(^9\) According to Istat, in the period 2009–2018, only 18.9\% of the individuals between 15 and 34 years were self-employed, over the total number of employed individuals in the same age group. Moreover, the self-employed individuals between 15 and 34 years represented only 10\% of the self-employed individuals between 15 and 64 years.

\(^{10}\) The considered sectors are: Agriculture and Fishery, Manufacturing, Construction, Wholesale and retail trade, Transport, Information and communication, Financial services, Real estate and business services, Public administration, Education and Health care, Other services.
Table 2  Days of non-employment per year in P2, by individual characteristics, cohorts and regions. Source: CICO

| Education                  | 10% p. | Median | 90% p. | Mean  | N   |
|----------------------------|--------|--------|--------|-------|-----|
| High school diploma       | 2      | 230    | 364    | 209   | 44,700 |
| Degree                    | 0      | 167    | 350    | 169   | 23,249 |

| Prevalent sector of work  | 10% p. | Median | 90% p. | Mean  | N   |
|----------------------------|--------|--------|--------|-------|-----|
| Agriculture and Fishery    | 23     | 252    | 363    | 226   | 1592 |
| Manufacturing              | 0      | 144    | 348    | 156   | 8985 |
| Construction               | 0      | 195    | 365    | 188   | 2336 |
| Wholesale and retail trade | 0      | 186    | 349    | 127   | 11,567 |
| Leisure and hospitality    | 18     | 238    | 364    | 216   | 9621 |
| Transport                  | 0      | 208    | 357    | 195   | 2269 |
| Information and communication | 0    | 207    | 365    | 197   | 4200 |
| Financial services         | 0      | 96     | 342    | 131   | 1200 |
| Real estate and business services | 3  | 229    | 364    | 209   | 10,156 |
| Public administration      | 0      | 208    | 355    | 191   | 962 |
| Education and Health care  | 3      | 212    | 352    | 196   | 9966 |
| Other services             | 25     | 264    | 365    | 230   | 5098 |

| Cohorts                   | 10% p. | Median | 90% p. | Mean  | N   |
|----------------------------|--------|--------|--------|-------|-----|
| Entered in 2009            | 0      | 196    | 358    | 186   | 33,857 |
| Entered in 2010            | 0      | 218    | 363    | 204   | 34,092 |

| Region of work            | 10% p. | Median | 90% p. | Mean  | N   |
|----------------------------|--------|--------|--------|-------|-----|
| Bolzano                   | 0      | 140    | 358    | 162   | 642 |
| Lombardy                  | 0      | 159    | 355    | 166   | 13,041 |
| Emilia Romagna            | 0      | 164    | 352    | 169   | 4179 |
| Calabria                  | 39     | 273    | 365    | 242   | 2111 |
| Sicily                    | 46     | 271    | 365    | 239   | 4960 |
| Molise                    | 41     | 253    | 363    | 225   | 341 |

**Notes** As regards the cohorts, the first cohort enters the labour market in 2009 and the number of days of non-employment in P2 is computed in the years 2012–2017, while the second cohort considered enters in 2010 and the number of days of non-employment in P2 is computed in the years 2013–2018. As regards the regions, I reported only the 3 regions with the lowest and the highest values for the average yearly days of non-employment per year in Period 2.

region and with the same individual level of education. Moreover, I consider also the youth regional unemployment rates for years 2008 and 2009, which I use in the reduced form regression and as an instrument for early individual non-employment.\(^{11}\)

\(^{11}\) Notice that Labour Force Survey does not provide data for the Val d’Aosta region in 2008. Consequently, I have to drop the individuals born in that region (5513 observations).
Table 3  Correlation between early and late non employment. Source: CICO data

| Yearly average days of non-emp. in P1 | (1) | (2) | (3) | (4) | (5) |
|--------------------------------------|----|----|----|----|----|
| Number of indiv. of sample | % of sample | Yearly average days of non-emp. in P2 | P. of non-emp. | No. of contracts |
| 0 | 409 | 0.6 | 78.6 | 16.8 | 1.66 |
| 1–90 | 3639 | 5.3 | 108.1 | 24.3 | 1.88 |
| 91–180 | 7021 | 10.3 | 121.3 | 27.6 | 1.94 |
| 181–270 | 10,010 | 14.7 | 152.5 | 35.2 | 2.55 |
| 271–364 | 18,861 | 27.7 | 210.1 | 47.6 | 3.14 |
| 365 | 28,009 | 41.2 | 233.5 | 39.1 | 2.38 |

Notes: Column 3 reports the number of days in which the individual is not employed in Period 2, column 4 reports the percentage of individuals that are non-employed at the end of Period 2, while the last column reports the number of contracts terminated in Period 2.

4 Estimation Strategy

The individual later non-employment experience, measured in Period 2, can be driven by the individual’s early non-employment history, by the individual characteristics and by the local labour market conditions. I estimate the following equation, where subscript i indicates the individual, c the cohort, r is the prevalent region of work and d is the level of education (degree or high school diploma). T is the moment in which every variable is considered: \( t_1 \) is the time window in which we measure early non-employment (first 3 years) and \( t_2 \) is the time window in which we measure later non-employment (subsequent 6 years).

\[
Non\text{Emp}_{icrdt_2} = \alpha + \beta Non\text{Emp}_{icrdt_1} + \gamma IND_{icr} + \delta F'_{crdt_2} + \eta R'_{r} + \kappa C'_c + \lambda C'_c F'_r + \epsilon_{icrdt_2}
\]  

where \( Non\text{Emp} \) are the average days per year spent in non-employment. \( IND \) is a set of time invariant individual characteristics, which comprehend sex, age squared, dummy variables for the level of education (diploma, 3-year degree, 5-year degree), a dummy equal to 1 if the individual starts to work before the end of the school and a dummy equal to 1 if region of birth is different from the region of the first work.

\( F'_{crdt_2} \) are the regional labour markets conditions in Period 2 that comprehend, for individuals that work in region r and with education d and that belong to cohort c, the unemployment rates at the beginning of Period 2, the variation in the number of unemployed individuals and the variation in the number of employed individuals between the beginning and the end of Period 2 (standardized for the corresponding values at the beginning of period 2). These variables capture both the supply and the demand of work that is relevant for the individual, which comprehend similar workers in terms of education and region of work. \( R'_r \) and \( C'_c \) are regional and cohort dummies, while \( C'_c F'_r \) are the interactions between these dummies, in order to capture time-varying regional differences too.
\( \beta \) is the coefficient of interest and it represents the effect of a one-day increase in the number of days per year spent in early non-employment on the number of days per year spent in non-employment in later years. If \( \beta \) is greater than 0, other things being constant, individuals who experienced non-employment in the early period are more likely to be non-employed in the later period, i.e. there is a state dependence effect or scarring effects of non-employment.

In order to capture correctly the effects of early non-employment, it is necessary to distinguish differences in the later non-employment that are causally related to early non-employment from the differences due to unobserved personal characteristics (for example, ability or motivation) that are correlated with both early and subsequent non-employment. It is reasonable that different individuals are more vulnerable to unemployment both in early and later stages of their career because of some unobserved characteristics. If these characteristics are not properly controlled for, we run the risk of getting a bias in the estimate of the magnitude of the coefficient of interest.

Thus, I follow two strategies. First of all, I study the reduced form relationship between the regional labour market conditions at the end of the school/university time period and the outcome of interest. In particular, I estimate a linear regression model for the average yearly days spent in non-employment in Period 2 on the regional unemployment rate measured in \( t_0 \). There are three main sources of variation in this variable: longitudinal variation (cohorts that potentially entered the workforce respectively in 2009 and 2010), regional variation (21 regions) and variation by educational level (high school diploma or degree). Specifically, for the individuals with a high school diploma (degree), I consider the regional unemployment rate of the 19–28 (25–34) age group with a diploma (degree), measured in the last year of school (university), before the individual’s entry into the labour market.

Second, I move to the instrumental variables approach, where the instrument is the same variable used as an independent variable in the reduced form specification.\(^{12}\)

As regards the relevance of the instrument, it is reasonable to assume that the state of the labour market at the time of the individual entry may directly affect the labour market experience of those who are ready to enter. In fact, difficult entry conditions may lead to a disorderly entrance with long early spells of non-employment, influencing the likelihood of finding and keeping a job. Unfortunately, the data do not report the region where the individuals completed their education, which is likely to be the region where the young person starts to look for a job, but only the region of birth. This may entail some measurement errors: if many individuals get their diploma or obtain their degree in a different region with respect to that of birth and start looking for a job in this region, the relevance of the instrument is reduced, because the unemployment rate measured in the region of birth is not able to capture the early economic conditions the individual really faced. The only other information available in the data is the region where the first job contract was signed. However, the choice to use the unemployment rate in the region of birth with respect to the one measured in the region where the first

\(^{12}\) In the related literature, the instruments used for the individual early labour non-employment were local unemployment at age 16, the age at which the entry into the labour market can first take place (Gregg 2001; Gregg and Tominey 2005), the variation in the unemployment rate faced by young people (Neumark 2002), the provincial unemployment rate at graduation (Ghirelli 2015) and the firm-specific labour demand shocks (Schmillen and Umkehrer 2017).
job contract was signed helps in reducing the more difficult problem of endogenous migration and spacial sorting, i.e. the fact that individuals sort into regions according to unobservables characteristics in order to have more job opportunities. Since the relevance of the instrument can be tested, while this is not the case for exogeneity, I prefer to use the unemployment rate of the individual region of birth, for which a more convincing case for exogeneity can be made.

The second condition that the instrument has to fulfill is the exogeneity condition. The labour market conditions in the last year of school/university and in the region of birth are exogenous to the individual unobserved characteristics, generating variation in early job non-employment that is unrelated to unobserved factors that may jointly influence early and later non-employment. It is worth noticing that the unemployment rates in the last year of school, used as an instrument, refer to the year 2008 for the first cohort and to 2009 for the second cohort. In these years of Great Recession, the cyclical Italian situation deteriorated rapidly for the vast majority of firms and the main factor at the basis of the reduction in GDP was the drop in exports (Caivano and Siviero 2010; Bugamelli and Zevi 2009). Thus, the crisis was not anticipated but imported from abroad and this is in favour of an exogenous variability in my instrument. Moreover, the data show that the crisis has not increased the unemployment rates in the regions proportionately, but had different effects on regions that shared similar characteristics in terms of economic development (Table 4). This means that the instrument is able to capture an exogenous variation in the labour market conditions, and not just the specific regional long-term differences.

Finally, the instrument has to fulfil the exclusion restriction, according to which any effect of the instrument on the dependent variable occurs uniquely through the channel of the endogenous regressor. This assumption is certainly a very strong one. For example, an alternative channel that possibly links labour market conditions at graduation with the later non-employment experience could be the quality of the first job. In fact, students who finished school during downturns would not only experience higher early non-employment, but could also accept lower-quality jobs with a higher probability with respect to those who graduate during favourable times, because of the pressure to quickly find a job. Those individuals may be trapped in a low-paid job path (Cappellari and Jenkins 2004), which may influence the duration of later non-employment. A second channel may be related to the fact that the local labour market conditions may determine households’ fertility choices (Aksoy 2016), which may affect the female labour force participation. However, notice that this channel may not be so predominant since the ages at which I observe individuals in my sample are generally below the typical age at first birth.13 A third channel may link labour market conditions to schooling decisions. In fact, labour market conditions may determine the individuals’ choice of educational attainment, thus influencing the unobserved composition of new entrants in the labour market by year and region.14 Anther violation of the assumption may derive from the fact that, if the local labour conditions are strongly

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13 According to Istat, the average age at first birth in Italy, in the period considered, is around 31 for mothers and 35 for fathers.

14 For example, Adamopoulou and Tanzi (2017) showed that in Italy the drop-out probability of university students decreased as a result of the Great Recession, because the lower opportunity cost of tertiary education translated into stronger incentives to continue studying.


| Region          | High school diploma |                     | Degree |                     |                     |
|-----------------|---------------------|---------------------|--------|---------------------|---------------------|
|                 | Un. rate 2008 | Un. rate 2009 | Un. rate 2010 | Un. rate 2008 | Un. rate 2009 | Un. rate 2010 |
| Abruzzo         | 17.5               | 21.2 (−21.6) | 24.8 (16.6) | 11.7               | 12.2 (3.6)    | 31.6 (159.8) |
| Basilicata      | 34.3               | 36.2 (−5.5)  | 32.9 (−8.9) | 19.0               | 17.7 (−7.0)   | 53.7 (203.7) |
| Calabria        | 35.2               | 31.9 (−9.2)  | 37.2 (16.4) | 21.2               | 24.0 (12.9)   | 39.7 (65.7)  |
| Campania        | 28.7               | 36.2 (26.4)  | 41.8 (15.4) | 22.6               | 25.0 (10.5)   | 44.5 (78.0)  |
| Emilia Romagna  | 8.5                | 16.1 (88.8)  | 18.3 (13.5) | 4.6                | 7.1 (53.0)    | 19.2 (171.3) |
| Friuli          | 5.1                | 11.6 (129.9) | 13.7 (17.6) | 6.8                | 10.6 (56.0)   | 10.3 (−2.5)  |
| Lazio           | 23.1               | 26.1 (12.7)  | 27.6 (5.7)  | 9.8                | 12.6 (28.7)   | 17.8 (41.5)  |
| Liguria         | 19.1               | 18.1 (−5.6)  | 16.9 (−6.5) | 5.3                | 7.4 (40.8)    | 9.3 (24.8)   |
| Lombardy        | 7.0                | 12.1 (73.9)  | 15.2 (25.5) | 4.5                | 5.6 (23.7)    | 5.2 (−7.7)   |
| Marche          | 10.8               | 19.3 (78.5)  | 12.4 (−35.8)| 6.7                | 13.1 (95.6)   | 28.3 (116.5) |
| Molise          | 26.0               | 24.2 (−7.1)  | 27.7 (14.5) | 20.2               | 27.9 (37.9)   | 39.6 (41.9)  |
| Piedmont        | 11.1               | 19.6 (76.3)  | 21.5 (9.7)  | 4.9                | 7.4 (49.9)    | 11.7 (57.8)  |
| Puglia          | 30.8               | 31.5 (2.5)   | 31.5 (−0.2) | 18.7               | 19.9 (6.4)    | 38.7 (94.5)  |
| Sardinia        | 39.3               | 43.4 (10.4)  | 36.3 (−16.3)| 14.1               | 18.2 (29.0)   | 24.8 (35.9)  |
| Sicily          | 36.1               | 37.4 (3.6)   | 41.1 (9.9)  | 19.2               | 19.8 (3.1)    | 32.5 (64.5)  |
| Tuscany         | 10.8               | 14.9 (38.5)  | 19.2 (28.7)| 7.0                | 10.7 (52.8)   | 8.1 (−24.8)  |
| Umbria          | 12.3               | 15.5 (26.1)  | 14.4 (−7.2) | 10.7               | 10.8 (1.3)    | 20.0 (84.0)  |
| Val d’Aosta     | 13.8               | 15.7 (14.1)  | 4.5         | 4.3                | 8.9 (106.8)   | 6.9 (−22.4)  |
| Veneto          | 8.7                | 9.6 (11.4)   | 11.9 (23.7) | 4.3                | 8.9 (106.8)   | 6.9 (−22.4)  |

**Notes** The first 3 columns report the unemployment rates—in percentage points—of individuals with a high school diploma in the 19–28 age group, while the other columns show the rates of individuals with a degree in the 25–34 age group. In parentheses the percentage variations with respect to the previous year are reported, which measure the changes that occurred in the labour market conditions in the year of entrance in the labour market for the two cohorts. Notice that the LFS does not provide data for the Val d’Aosta region in 2008.

Prenant, there might be a correlation between later individual non-employment and the instrument, other than through the first stage. To avoid this, it is crucial to properly control for local unemployment conditions in the second period (Gregg 2001; Neumark 2002). All these concerns relating to the possible failure of the exclusion restriction assumption suggest that we use a certain caution in the interpretation of the IV estimates.

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15 The correlation between the instrument and the average unemployment rate in Period 1 is 0.82, while the correlation between the unemployment rate in Period 1 and in Period 2 is very high and equal to 0.92.
5 Results

Table 5 reports the OLS results. In column 1, I show the results of a simple regression that includes only the main variable of interest, while in the other columns I add the set of individual controls and the economic conditions in Period 2 (column 2), the set of regional and cohort fixed effects (column 3) and the interactions between fixed effects (column 4). The coefficient for the early duration of non-employment is quite stable in all the considered specifications and in the most complete one it is statistically highly significant and equal to 0.45. This means that each additional day of yearly non-employment during the first three years increases non-employment in the following 6 years by half a day per year. These results demonstrate, as also emerged in the descriptive statistics, that early non-employment is a good predictor of subsequent non-employment.

I then move to different forms and measures of the independent variable. First, I split the sample into intervals of youth non-employment (less than 3 months, from 3 to 6, from 6 to 9 and more than 9 months) and I create dummies that I insert into the regression, instead of the continuous variable. The results (column 5) show a clear increase in days of later non-employment as early non-employment days progressively increase. The increase is particularly marked in correspondence to the dummy that takes value 1 when when youth unemployment exceeds 9 months. This is in line with the findings of Schmillen and Umkehrer (2017) who shows that the scarring effects are much stronger for individuals who suffered from lengthy spells of unemployment. Moreover, I consider the duration of the first and of the maximum spell of non-employment (the results are not reported, but they are available from the author upon request). In fact, it could be that the most significant spell of non-employment is the first one, which creates a vicious circle, or the maximum one, which constitutes a marked sign on the productivity of the worker or a strong loss of human capital. These two variables (duration of the first non-employment spell and duration of the maximum non-employment spell in Period 1) are both strongly correlated with the total duration of non-employment, and the results of the OLS regressions show that they are both important in influencing the total duration of non-employment in Period 2, since their coefficients are positive and statistically significant.

In column 6, I present the coefficient obtained using the reduced form specification, in which I directly regress the individual later non-employment on the the regional labour market conditions in the last year of school/university. I find that an increase of one percentage point in the regional youth unemployment rate in the last year of school/university is associated with only around one day per year of later non-employment. The scarring effects appear to be smaller: in terms of standard deviation, a one standard deviation increase in the unemployment rate corresponds to an increase of 5.2% in the average value of the dependent variable, while this percentage is equal to 22.6% in the OLS specification (for a one standard deviation increase in the individual non-employment is about 0.55 days. This means that the linear method provides a good approximation of the coefficient of interest.

16 Since the dependent variable is censored, I also applied the maximum likelihood estimation of a Tobit model (results available on request). In the Tobit specification, the marginal effect of early non-employment is in line with the coefficient found in the OLS regression: the average marginal effect of early-career non-employment is about 0.55 days. This means that the linear method provides a good approximation of the coefficient of interest.
Table 5  OLS and reduced form results. Source: CICO and National Labour Force Survey

| Average yearly days spent in non-emp. in P2 | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------------------------------|-----|-----|-----|-----|-----|-----|
| Yearly days in non-emp. in P1             | 0.46*** | 0.45*** | 0.45*** | 0.45*** |     |     |
|                                           | (0.02) | (0.02) | (0.02) | (0.02) |     |     |
| Youth unemp. rate, 0-6 months             |     |     |     |     | 0.93*** |     |
|                                           |     |     |     |     | (0.14) |     |
| >6 and ≤9 months                          | 17.48*** |     |     |     |     |     |
|                                           | (3.05) |     |     |     |     |     |
| >9 months                                 | 38.3*** |     |     |     |     |     |
|                                           | (3.27) |     |     |     |     |     |
| Individual controls                       | No | Yes | Yes | Yes | Yes | Yes |
| Economic conditions in P2                 | No | Yes | Yes | Yes | Yes | Yes |
| Region and cohort fixed effects           | No | No | Yes | Yes | Yes | Yes |
| Interaction reg./coh. fixed effects       | No | No | No | Yes | Yes | Yes |
| N. obs.                                  | 67,952 | 67,952 | 67,952 | 67,952 | 67,952 | 67,952 |
| R squared                                 | 0.12 | 0.17 | 0.18 | 0.18 | 0.16 | 0.08 |

Notes The individual characteristics comprehend sex, age squared, a dummy for the level of education, a dummy equal to 1 if the region of birth is different from the region of the first work, a dummy equal to 1 if the individual starts to work before the end of school; the controls for the economic conditions in period 2 are the initial unemployment rate in the region of work for people with the same level of education and the variations in the employed and unemployed individuals in the same region and with the same level of education. Standard errors are clustered according to the region of birth, the cohort and the educational level. Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

unemployment duration in P1). As regards the results in similar papers, only Kahn (2010) looked at the effect of conditions at the time of graduation on the labour supply (weeks supplied per year and the probability of being employed), finding that they are largely unaffected by economic conditions at the time of college graduation (the majority of the other papers in the related literature mainly focused on the effects of recessions on wages, for graduates).

5.1 Heterogeneous Effects: The Role of Labour Market Characteristics

The aim of this section is to understand if there are differences in the magnitude of the scarring effects according to the specific regional labour market conditions. I allow the effect of the individual’s non-employment history to depend on both the contemporaneous labour market conditions, i.e. the regional unemployment rate measured in Period 2, and the past ones, i.e. the unemployment rate measured in Period 1. The
choice of these indicators is in line with other works in the literature that exploit labour market differences.\[17]\n
In order to capture the different size of the scarring effects, I first split the sample according to the first quartile of the distribution of the unemployment rate at the beginning of Period 2 (measured in the region of work for individuals with the same education). The results show that, for the individuals employed in regions with lower unemployment rate, the scarring effects are stronger in magnitude (Table 6). This means that the past non-employment experience is more (less) scarring in regions with low (high) unemployment rates. This difference, which emerged in particular in the reduced form estimation, can be explained by the signalling theory. In fact, employers are more suspicious about the past individual experience of non-employment when the average regional unemployment rate is lower. On the contrary, the adverse impact of unemployment experience is relatively lower in regions with worse labour market conditions. It may be the case that employers recognize that the signal of past individual unemployment is less informative about worker productivity because experiencing unemployment is more common among workers. As mentioned, the evidence should have been in the opposite direction according to the job matching theory. Under the human capital decay hypothesis, we would have not expected any difference in the coefficients, because the amount of human capital decay should only depend on the duration of past non-employment, but not on the current circumstances.

The choice of the contemporaneous conditions is in line with Biewen and Steffes (2010) and Ayllón (2013), and it is related to the fact that for the recruiter it is difficult to remember exactly the past labour market conditions in which past non-employment occurred and consequently, when screening job applications, in their evaluation they just consider the current conditions.

However, other works in the literature do consider the past conditions in which the past non-employment occurred (Omori 1997; Mooi-Reci and Ganzeboom 2015). In fact, Omori (1997) argued that the effect of past unemployment spells on the length of future unemployment should depend on the circumstances under which past unemployment occurred and not on the current conditions. The argument would be that employers discount past unemployment if it was experienced in times of difficult labour market conditions and consider it more negatively if it was experienced when finding a job was relatively easy. For this reason, in Table 7 I split the sample according to the unemployment conditions experienced in P1. The results show that also the specific circumstances in which past unemployment spells occurred are important in determining the size of these effects. This means that for the employer the labour market conditions in the early years of the worker’s career are also relevant in order to decide how much weight to give to the signal of the early non-employment duration, through which something about the productivity and the ability of the worker can be inferred. However, the past conditions seem to be less relevant with respect to the contemporaneous ones, as emerged in the reduced form estimations (columns 3 and 4). This may be explained by the fact that the recruiter knows that the initial part of a

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17 For example, in order to show how the dependence duration of non-employment varies according to the business cycle, Kroft et al. (2013) used the median unemployment rate and the median ratio of vacancies to unemployment, while Biewen and Steffes (2010) and Ayllón (2013) use the deviations of the unemployment rate from its linear time trend.
Table 6 Heterogeneous results by regional unemployment rate in P2. Source: CICO and National Labour Force Survey

|                      | Average yearly days spent in non-emp. in P2 | Reduced form |
|----------------------|--------------------------------------------|--------------|
|                      | OLS                                        | Reduced form |
| (1)                  | (2)                                        | (3)          | (4)          |
| ≤ 25 pct             | 0.48***                                    | 1.34***      | 0.69***      |
| > 25 pct             | 0.43***                                    | (0.16)       | (0.17)       |

Notes The sample is split according to the 25th percentile of the distribution of the initial value of the regional unemployment rate in P2. All the regressions include individual characteristics (sex, age squared, a dummy for the level of education, a dummy equal to 1 if the region of birth is different from the region of the first work, a dummy equal to 1 if the individual starts to work before the end of the school), dummies for the region of work and for the cohort, the interactions between these two and controls for the economic conditions in period 2. Standard errors are clustered according to the region of birth, the cohort and the educational level. Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

worker’s career may be noisy and characterized by a drifting from one job to another, independently of the actual conditions of the local labour market.

5.2 IV Estimates’ Results

The IV results are displayed in Table 8. The coefficients of first-stage estimates indicate that individual early non-employment is statistically and positively correlated with the regional level of unemployment measured in the last year of school/university and in the region of birth. The F-statistic, bigger than the standard threshold, also assesses the relevance of the instrument. The second stage estimate shows that the average amount of later non-employment that is induced by an additional day of early non-employment is statistically highly significant and equal to 1.15 (column 1).

These results suggest that the OLS estimates are downward biased. If unobserved individual characteristics were likely to be negatively correlated with both early and subsequent non-employment (like ability and motivation), this will have upwardly biased the OLS estimates of the coefficient of interest. However, there may be a a downward bias if the unobservables are positively correlated with early non-employment but negatively correlated with later non-employment. For example, omitting information on unobserved differences in individuals jobs search behaviour might introduce a downward bias. New entrants to the labour market need to discover their own skills and
### Table 7  Heterogeneous results by regional unemployment rate in P1. Source: CICO and National Labour Force Survey

|                      | Average yearly days spent in non-emp. in P2 | Reduced form |
|----------------------|--------------------------------------------|--------------|
|                      | (1) ≤25 pct                                 | (2) > 25 pct  | (3) ≤25 pct | (4) > 25 pct |
| Yearly days in non-emp. in P1 | 0.48*** (0.03)                           | 0.44*** (0.02) |              |              |
| Youth unemp. rate$_{t_{ord}}$ |                          |              | 0.91*** (0.19) | 0.76*** (0.15) |
| Individual controls | Yes                                        | Yes          | Yes          | Yes          |
| Economic conditions in P2 | Yes                                        | Yes          | Yes          | Yes          |
| Region and cohort fixed effects | Yes                                        | Yes          | Yes          | Yes          |
| Interaction reg./coh. fixed effects | Yes                                        | Yes          | Yes          | Yes          |
| N. obs.               | 16,522                                     | 51,430       | 16,522       | 51,430       |
| $R^2$                 | 0.17                                       | 0.16         | 0.05         | 0.07         |

**Notes** The sample is split according to the 25th percentile of the distribution of the average value of the regional unemployment rate in P1. All the regressions include individual characteristics (sex, age squared, a dummy for the level of education, a dummy equal to 1 if the region of birth is different from the region of the first work, a dummy equal to 1 if the individual starts to work before the end of the school), dummies for the region of work and for the cohort, the interactions between these two and controls for the economic conditions in period 2. Standard errors are clustered according to the region of birth, the cohort and the educational level. Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

preferences as well as the opportunities available to them. If the returns to search are higher for some individuals, they may spend more time searching in the early stages and this will extend the time during which they are unemployed in the first years on the labour market but it will also make them more successful in their search efforts, with more stable matches in their adult period.\(^\text{18}\)

Up to now, all the works in the literature have been in favour of the hypothesis that the OLS coefficients are downward biased (Gregg 2001; Neumark 2002; Schmillen and Umkehrer 2017). However, this bias may also suggest that there may be a violation of the exclusion restriction. So, in the interpretation of the results, caution should be exercised. The magnitude of the IV coefficients is slightly bigger than those found in the existing literature, but we should consider the longer time span considered in these works. For example, Gregg (2001) shows that in Great Britain an extra three months’ youth unemployment (pre-23) for men leads to an extra 1.33 months out of work between 28 and 33, while Schmillen and Umkehrer (2017) found that in Germany each additional day of unemployment during the first eight years on the labour market increases unemployment in the following 16 years by half a day.

18 Another explanation for the downward bias may be due to the fact that, in the specific case of higher education students, highly motivated individuals may want to obtain very high grades, resulting in a delay in graduation. This would generate more days of non-employment in P1 but potentially less days in P2.
Table 8  Results with IV regressions. Source: CICO and National Labour Force Survey

|                               | Average yearly days spent in non-emp. in P2 |       |       |       |       |       |
|-------------------------------|--------------------------------------------|-------|-------|-------|-------|-------|
|                               | (1) Baseline                    | (2) Area of birth | (3) Region of work | (4) ≤25 pct | (5) >25 pct |
| Yearly days in non-emp. in P1 | 1.15*** (0.16)               | 1.04*** (0.21) | 1.60*** (0.35) | 1.56*** (0.22) | 0.97*** (0.19) |
| First stage                   |                              |       |       |       |       |       |
| Youth unemp. rate_t0         | 0.80*** (0.07)               | 1.21*** (0.22) | 0.76*** (0.17) | 0.85*** (0.12) | 0.71*** (0.09) |
| F stat.                      | 131.33                       | 30.23 | 19.86 | 51.1  | 67.94 |
| Prob > F                     | (0.00)                       | (0.00) | (0.00) | (0.00) | (0.00) |
| Individual controls          | Yes                          | Yes | Yes | Yes | Yes |
| Economic conditions in P2    | Yes                          | Yes | Yes | Yes | Yes |
| Region and cohort fixed effects | Yes                         | Yes | Yes | Yes | Yes |
| Interaction reg./coh. fixed effects | Yes                     | Yes | Yes | Yes | Yes |
| N. obs.                      | 67,952                       | 67,952 | 67,952 | 67,952 | 67,952 |
| Uncentered R squared         | 0.68                         | 0.91 | 0.56 | 0.40 | 0.73 |

Notes: All the regressions include the same controls as in the full specification. In column 1, I used the preferred instrument (with full set of controls), in column 2 I use the unemployment rate in the area of birth as an instrument; in column 3 I use the regional unemployment rate in the region of work. In columns 4 and 5 I split the sample according to the 25th percentile of the distribution of the value of the regional unemployment rate in P2 Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

I also explore the sensitivity of the results to using, as an instrument, the unemployment rate in different forms. I firstly use the unemployment rate in the area of birth (the North or the Centre or South of Italy), instead of the rate measured in the region of birth (column 2). This measure allows me to remove from the instrument part of the cross-regional variation within a year that is prone to endogeneity bias from migration and residence decisions. The results are confirmed since the coefficient of interest is in line with the baseline one (1.04). Then, I show the results using, as an instrument, the unemployment rate measured in the region where the first contract is signed, instead of the unemployment rate of the region of birth (Column 3). The choice of this instrument may potentially violate the exogeneity condition, if individuals sort into regions according to unobservable characteristics in order to have more job opportunities. The coefficient of the duration of the early non-employment duration is statistically significant and even larger than the one found with the baseline IV specification (1.60).

In Columns 4 and 5, I looked at the heterogenous effects according to the contemporaneous labour market conditions. Again, as emerged with the other estimation strategies, the scarring effects appear to be stronger in regions with better economic conditions.
Table 9  Results on different outcomes (OLS and reduced form). Source: CICO and National Labour Force Survey

|                          | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                          | OLS       | Reduced form |
|                          | Job inst. | Wage      | Overeduc. | Job inst. | Wage      | Overeduc. |
| Yearly days in non-emp. in P1 | 0.02***   | −0.22***  | −0.001*** | 0.03***   | −4.7***   | −0.001*** |
|                          | (0.006)   | (0.04)    | (0.000)   | (0.004)   | (1.11)    | (0.000)   |
| Youth unemp. rate in P1   | 0.03***   | −4.7***   | −0.001*** |
|                          | (0.004)   | (1.11)    | (0.000)   |
| Individual controls       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| Economic conditions in P2 | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| Region and cohort fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Interaction reg./coh. fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| N. obs.                  | 67,952    | 67,952    | 63,054    | 67,952    | 67,952    | 63,054    |

Notes: The first three columns are estimated with OLS, while the last three with the reduced form estimation. Job instability is measured as the number of contracts that ended in Period 2, the wage is the initial wage of the last contract signed in Period 2, Overeducation is a dummy equal to 1 if the individual is overeducated in the last contract signed in Period 2. All the regressions include individual characteristics (sex, age squared, a dummy for the level of education, a dummy equal to 1 if the region of birth is different from the region of the first work, a dummy equal to 1 if the individual starts to work before the end of the school), and dummies for the region of work and for the cohort and their interactions. Controls for the economic conditions in period 2 are the initial unemployment rate in the region of work for people with the same level of education and the variations in the employed and unemployed individuals in the same region and with the same level of education. The wage regression also includes, as control, a variable that reports the year in which the contract was signed. Standard errors (in parentheses) are clustered according to the region of birth, the cohort and the educational level

* p < 0.10, ** p < 0.05, *** p < 0.01

5.3 Other Outcomes

In this last part, I move to understanding whether past non-employment affects other outcomes of the later individual job experience (Table 9). This gives a more comprehensive view of the long-term consequences of the early non-employment for workers. In particular, I consider the effect of the early non-employment on three different outcomes.

The first outcome considered is job instability in the later years of the career, which is proxied by the number of contracts that terminated in Period 2. This may help in understanding whether the increased availability of temporary jobs, associated with frequent spells in unemployment when young, facilitates the integration into regular stable employment or spurs the development of a secondary labour market, in which the most vulnerable workers get trapped in a cycle between temporary dead-end jobs and unemployment. The evidence points out that an additional day of non-employment in the early period is statistically and positively correlated to job instability, but the magnitude of the coefficient is very small.

In addition, I consider the effect of past non-employment on wages. In particular, I consider the initial wage of the last contract that was signed in Period 2. I am aware
of the fact that selection into employment is non-random due to some observable or unobservable factors. This may bias the results if those who were employed at least once in Period 2 constitute a positively selective group of individuals. In principle, Heckman’s selection model is the appropriate approach to address selectivity (Heckman 1979). Unfortunately, I do not have a valid exclusion restriction for the selection equation. To avoid selectivity in wages, I set the wage equal to zero in the case of non-employment, as if earnings were censored. This allows me to estimate unconditional effects and hence rules out the problem of selectivity. In the regression I obviously control for the year in which the contracts were signed, in order to have a more comparable picture. The evidence shows that longer spells of non-employment in the early period are statistically and negatively correlated to wages, in line with other findings in the literature (Gregory and Jukes 2001; Gregg and Tominey 2005; Mroz and Savage 2006; Eliason and Storrie 2006).

The third outcome considered is the probability to being overeducated in the last job. For graduate individuals, it is a dummy equal to 1 for individuals with job with no qualification or with low qualification, while for high school individuals it is equal to 1 for individuals with job with no qualification. In this case too, it is necessary to keep in mind that there may be selection problems because of those who were not employed in Period 2 and consequently do not enter the sample. In fact, people may choose to stay voluntarily unemployed if the available jobs do not match their level of qualification or do not satisfy their reservation wage. The results show a negative correlation between the early non-employment and the probability of being overeducated: the more the individual experienced early unemployment, the lower the probability of being overeducated. This may be explained by the positive returns to early job shopping, since in early periods workers learn about their skills and aptitudes by trying different jobs, leading to better matches as young workers move through a series of jobs. However, the coefficient is approximately equal to zero and the effect is negligible.

6 Conclusions

The available empirical evidence does not provide a unique answer on the existence and on the magnitude of the scarring effects of early non-employment. I contribute to these studies by examining whether an individual’s non-employment experience in the early career harms labour market outcomes in terms of future employment prospects, using a novel database, and by investigating the heterogeneous effects in different economic conditions. It must be noted though that the analysis has some limitations, due to the fact that the actual time of graduation cannot be exactly identified, with possible measurement errors in the main variables, and that the instrument is not without its problems.

19 The professions with no qualification include plant and machine operators, unskilled manual workers, doormen and cleaners. The professions with low qualifications include office clerks, workers involved in the provision of information and services to clients, sales workers, craftsmen, cooks and food preparation assistants.
Understanding whether the effects of early-career non-employment are lasting or fade away after a while and verifying the existence of moderating effects is crucial for justifying policies aimed at addressing school-to-work transition and at preventing the incidence of youth unemployment. This has become a greater issue since the Great Recession, which had severely negative impacts mainly on younger individuals. To fight youth unemployment, many countries have implemented a wide range of policies. For example, Italy, like other European countries, committed to the Youth Guarantee Programme, to ensure that all young people under the age of 25 receive a good quality offer of employment within a period of four months of becoming unemployed or of leaving formal education. The results of this analysis appear to be even more relevant in relation to the COVID-19 shock and the concerns emerging about the career trajectories of the cohort of young people that are at the beginning of their career. So, this research question has a very high relevance for policy design and, although a large number of papers have approached this question before, the answer is still up for debate.

My findings show that an increase in the duration of the non-employment spell increases the likelihood of suffering non-employment again in the future, confirming the state dependence on non-employment. The presence of a negative and causal relationship between past labour market experiences and later outcomes means that the adverse effect of a past unemployment spell undermines the functioning of the labour market and generates social costs.

The major contribution to the literature is related to the findings that show some heterogeneity in the scarring effects with respect to labour market conditions. The scarring effects are smaller when the unemployment rate is high: the greater the unemployment, the less informative and scarring it is in order to detect the real worker’s characteristics. Thus, the scarring effects are likely to be weaker during a severe recession than when they are experienced during a moderate recession. These results are also important for shedding light on which prevailing mechanism underlies the scarring effects. The fact that the scarring effects are lower in regions with bad labour market conditions reveals the importance of signalling theory in explaining the scarring effects, as opposed to human capital and matching theories.

Acknowledgements I would like to thank Rosario Ballatore, Andrea Comisso, Albrecht Glitz, Libertad González, Tiziano Ropele, Diego Scalise, Marco Tonello and all the participants at the internal seminars of the Bank of Italy. The views expressed in the paper are those of the author and do not necessarily reflect those of the Bank of Italy.

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