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ABSTRACT

Entry Conditions and the Transition from Tertiary Education to Employment: A Cross-Country Perspective*

This paper uses monthly data on tertiary education graduates in 19 European countries covering 2004-2017 to assess the short-run effects of entry conditions on the transition into employment. Using an instrumental variables approach, a one percentage point increase in the unemployment rate is found to reduce the hazard rate of transitioning from unemployment into employment by 6%. The effect is stronger in southern European countries and, within this group, is almost entirely due to negative effects on females.

JEL Classification: J64, J11, J23

Keywords: entry conditions, tertiary education graduates, transition to employment, proportional hazards model, residual inclusion

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* This paper uses data from the European Union Statistics on Income and Living Conditions (EU-SILC). The results and conclusions are those of the authors and not those of Eurostat, the European Commission or any of the national statistical authorities whose data have been used.

1 Introduction

Previous empirical literature on the consequences of unfavourable entry conditions on labour market trajectories has provided robust evidence of long-term negative effects (e.g., Kahn, 2010; Oreopoulos et al., 2012) but mixed results on the effects on the initial duration of unemployment. For example, Fernández-Kranz and Rodríguez-Planas (2018) and Choi et al. (2020) find negative and statistically significant effects of the graduation unemployment rate on the probability of being employed one year after graduation for male college graduates from Spain and South Korea, respectively. However, the most common result from the literature, based on data from different countries, is that the effect on the probability of employment in the short-term is not statistically significant (Kahn, 2010; Altonji et al., 2016; Cockx and Ghirelli, 2016; van den Berge, 2018; Kawaguchi and Kondo, 2020). We present an overview of the extant literature's main results in terms of sign and significance of the estimated effects in Table B1 in the Online Appendix.

Fewer (high-quality) jobs are on offer during recessions (Kahn, 2010) and, at the same time, the number of unemployed searching for a job will generally be greater. Under these circumstances, it is reasonable to expect that individuals who enter the labour market during an economic downturn take longer to find a job. This delayed transition into employment may, however, be mitigated, or wholly offset, if graduates take up lower-quality jobs than they would have under more benign conditions. Indeed, selection into lower-quality jobs has been identified as a reason for why unfavourable entry conditions have lasting negative effects on labour market outcomes (e.g. Liu et al., 2016). A possible explanation for accepting such jobs is that graduates lower their reservation wage if they enter the labour market during a downturn. This would be consistent with previous evidence on the responsiveness of the reservation wage to the business cycle (Brown and Taylor, 2013, 2015). Whether unfavourable entry conditions delay the transition into employment or have no effect is therefore unclear ex ante.

As well as being of intrinsic interest, the effect of unfavourable entry conditions on post-graduation unemployment may also be relevant for the future development of young workers' careers. For example, Neumark (2002) shows that job stability in the early years of one's career has positive effects on later wage outcomes. Likewise, previous work has suggested that there are "scarring" effects of youth unemployment (e.g. Ghirelli, 2015; Schmillen and Umkehrer, 2017; Schmieder et al., 2023). Moreover, little is known about whether the effects of unfavourable entry conditions differ between countries or between men and women. One might expect the former if labour market institutions differ between countries, while the latter may result from differences in behavioural responses between men and women, for example with respect to changes in the reservation wage as suggested by Deschacht and Vansteenkiste (2021).

In this paper, we, first, analyse the impact of the unemployment rate at the time of graduation from tertiary education on the initial duration of unemployment. Our dataset consists of monthly data covering the period 2004-17 and 19 European countries. The

availability of monthly data is important because the use of annual data, as is standard in work on long-term effects, is too crude to provide detailed insights into the effects of entry conditions on early unemployment experiences and therefore may, at least in part, explain the finding from a large part of the literature that entry conditions have no significant effects on the probability of employment at the beginning of an individual's career (Kahn, 2010; Kondo, 2015; Altonji et al., 2016; Kawaguchi and Kondo, 2020). Second, we use the fact that EU-SILC provides comparable cross-country data to analyse whether the impact of unfavourable entry conditions differs across individuals who graduated in a Southern European country and individuals in other countries, following evidence that Southern European countries have more rigid labour market institutions (e.g. Nickell, 1997) and that adverse shocks have larger effects in that region (e.g. Bertheau et al., 2023). We also provide evidence on whether the differences in the effects between country groups apply equally to male and female graduates. Finally, we analyse whether graduating at a time of a higher unemployment rate lead to initial employment in lower-quality jobs.

Compared to the literature on entry conditions, the principal difference here is our focus on short-term rather than long-term effects. Short-term effects on the duration of initial unemployment have only been explicitly analysed in very few papers that use sub-annual data (Lassibille et al., 2001; Gartell, 2012; Speer, 2016). Compared to those, we provide three main improvements. First, we analyse a more recent period (that includes the Great Recession) and a much broader range of countries which allows us to evaluate cross-country differences. Second, we provide tests of the effect of entry conditions for graduates from tertiary education rather than the low-skilled. This is potentially relevant as the extant literature has shown that the long-term effects of entry conditions vary across education levels (Hershbein, 2012; Cockx and Ghirelli, 2016; Fernández-Kranz and Rodríguez-Planas, 2018; Schwandt and von Wachter, 2019). Third, we address both the potential endogeneity of entry conditions and the nature of the duration data through the application of an instrumental variable approach within the context of a Cox proportional hazards model.

Descriptive statistics suggest that entry conditions matter for the expected duration of initial unemployment: although there is little change at the 25^{th} percentile or the median, the 75^{th} percentile of the initial unemployment duration increases from five to nine months when the entry unemployment rate moves from the first to the fourth quartile (a similar change can be observed in most countries in our sample). Despite being proportionately large, this increase may still be too small to be detected when annual data is used. Consistent with these results, the coefficient estimates of the hazard model suggest that a one percentage point increase in the unemployment rate at the time of graduation leads to a reduction in the hazard of finding employment of 6.0%. These results are robust to using a range of alternative specifications. Moreover, we show that the effect of unfavourable entry conditions differs between countries. Specifically, after grouping countries together, we find that the reduction in the hazard of finding employment is 53-62% larger in Southern European compared to other European countries. Finally, we show that a higher gradu-

ation unemployment rate leads to a lower probability of finding a job in a higher-quality occupation. While not providing conclusive evidence, a possible explanation for this finding is that experiencing a longer duration of unemployment after graduation is itself a reason for the selection into lower-quality jobs which in turn gives rise to the longer-term negative effects which the literature has established (e.g. Kahn, 2010; Oreopoulos et al., 2012; Liu et al., 2016).

Section 2 reviews the relevant literature. Section 3 describes the data and the process used to identify graduates from tertiary education. Section 4 outlines the empirical methodology. Section 5 sets out the results. Section 6 concludes.

2 Literature review

Recent literature from North America has analysed the nature and persistence of the effects on college graduates of labour market entry during a recession (Kahn, 2010; Oreopoulos et al., 2012; Altonji et al., 2016; Schwandt and von Wachter, 2019; Kawaguchi and Kondo, 2020; Rothstein, 2023). Altonji et al. (2016) show that an increase in the unemployment rate at the time of graduation leads to a reduction in earnings up to three years after labour market entry among US college graduates. This is the result of lower wages and a smaller probability of working full-time but little evidence is obtained of a significant effect on the probability of being employed. Comparable results are provided by Schwandt and von Wachter (2019): they find effects on earnings for individuals with 16 or more years of schooling up to five years after labour market entry, primarily due to lower wages, but no significant effect on weeks worked. Rothstein (2023) also finds that the effect of entry conditions on the wages of college graduates is transitory but that the effect on employment lasts until at least the age of 40.[1] Evidence from other countries confirms that unfavourable entry conditions can have persistent negative effects on the labour market biographies of the high-skilled. Genda et al. (2010) and Choi et al. (2020) show that the subsequent labour earnings of male college graduates from Japan and South Korea, respectively, are significantly lower if they entered the labour market at a time of higher unemployment. Cockx and Ghirelli (2016), using Belgian data, and Fernández-Kranz and Rodríguez-Planas (2018), using Spanish data, also identify a persistent earnings penalty from graduating during a recession. The former find that this is the result of lower wages while the latter ascribe it to being stuck in less attractive jobs. Most studies rely on data from a single country and cross-country studies using comparable data sources are rare (one exception is Genda et al. (2010), who analyse the effect of unfavourable entry conditions for high school graduates in the U.S. and in Japan).

While most of this literature has focused on analysing the impact that the graduation unemployment rate has on subsequent outcomes for men, a number of papers have ad-

[1]The difference in results is attributable to the adoption by Rothstein (2023) of an empirical specification that controls for the possibility that younger workers are more sensitive to contemporary economic conditions than older workers.

dressed the question of whether the impact differs between males and females. One reason why the effects of entry conditions might differ is that men and women have been shown to differ in the extent to which their decision to participate in the labour market responds to cyclical variation (Killingsworth and Heckman, 1986). Schwandt and von Wachter (2019) find comparable patterns for both groups but Hershbein (2012), using data on US high school graduates, and Kondo (2015), based on the National Longitudinal Survey of Youth, find that wage losses are less pronounced for women. Hershbein (2012) provides evidence that women who enter the labour market during unfavourable conditions have a higher probability of being outside the workforce and spend more time in home production in the initial years after graduation. Evidence from Choi et al. (2020) also suggests that entry conditions affect male and female graduates in different ways. For example, they find that women who entered the labour market when the unemployment rate is high tend to have more children than women that enter at a time of low unemployment, while no comparable effects are found for men.

Whereas the potential existence of long-term effects has received a lot of attention in the literature, less is known about how unfavourable entry conditions affect short-term outcomes, such as the initial spell of unemployment before a job is found. While several studies provide estimates of the effect of the graduation unemployment rate on the probability of being employed one year after completing education (high school, college, vocational training), the results are not conclusive, even if the same socio-demographic groups are analysed. Table B1 in the Online Appendix summarises the findings from previous studies on the effect of the graduation unemployment rate on the probability of being employed one year after graduation. In most cases, the effects are negative, but not statistically significant. Exceptions for male college graduates are Oreopoulos et al. (2012) and Fernández-Kranz and Rodríguez-Planas (2018), who find negative effects that are statistically significant. By contrast, Kahn (2010) estimates a positive, but statistically insignificant effect. A similar result is obtained by Hershbein (2012) in the case of high-school graduates.

Typically, contributions to the entry conditions literature assess how they affect labour market outcomes in calendar years following graduation. While this is suitable for investigating long-term effects, such an approach precludes thorough analysis of the initial transition into employment since graduations generally occur in the middle of the year and, as we show below, most unemployment spells are shorter than a year. This may explain the failure of some of the studies discussed above to find statistically significant effects on the probability of employment at the beginning of an individual's career (Kahn, 2010; Kondo, 2015; Altonji et al., 2016; Kawaguchi and Kondo, 2020).

Moreover, previous research has found evidence of quantitatively large "scarring" effects on employment biographies of even short periods of unemployment at the start of one's career. For example, Ghirelli (2015) provides evidence that a one percentage point increase in the amount of time spent not working in the two and a half years after graduation reduces earnings and hours worked by 10% and 7%, respectively, six years after

graduation using data from Belgium. For Germany, Schmillen and Umkehrer (2017) find that an additional day of unemployment in the first eight years of an individual's career leads to an extra half day of unemployment over the next 16 years of their career. Using administrative data from the UK, the benchmark model of De Fraja et al. (2021) shows that an additional week of unemployment between the ages of 18 and 20 reduces earnings until the age of 40 for males and females by 0.2%-0.6%. The corresponding effects on earnings of unemployment between the ages of 21 and 23 are smaller but remain significant in the age range of 31 to 38 for men and 29 to 40 for women. The long-term effects of unemployment between the ages of 24 and 26 are much weaker, suggesting that unemployment at the beginning of an individual's career is more harmful than in later periods. These studies therefore suggest that use of annual data would fail to capture short spells of unemployment that have potentially lasting effects on an individual's career.

Very few papers have analysed the short-term effects of entering the labour market during a recession. One exception is Lassibille et al. (2001) who study the transition of Spanish school-leavers into employment. Using a multinomial logit model, they find that increases in the the regional unemployment rate are associated with longer durations of unemployment after completing school. Gartell (2012) shows that the risk of exiting unemployment varies considerably across the business cycle for graduates of two Swedish universities who entered the labour market during the 1990s. However, the absence of a variable measuring the state of the economy prevents a direct test of whether adverse entry conditions lead to longer unemployment durations. To the best of our knowledge, the only paper that provides such a test is Speer (2016). Using weekly data on low-skilled men who completed school between 1978 and 1987 in the US, Speer (2016) finds that a one percentage point increase in the entry unemployment rate increases the time taken to find the first job by 2.3 weeks and the amount of time registered as unemployed by 0.8 weeks. This extended search period accounts for a substantial part of the reduction in hours worked resulting from unfavourable entry conditions.

Finally, while the extant literature has analysed the effects of unfavourable entry conditions using data from different countries (see Table B1), comparability of the findings is restricted due to differences in the empirical methodology and the underlying data. One advantage of EU-SILC is that it provides harmonised cross-country data that allows meaningful comparisons across different European countries. This is important since economic shocks may affect countries differently due to variations in labour market institutions. For example, Adams-Prassl et al. (2020) propose that the Covid-19 pandemic caused a smaller initial increase in unemployment in Germany compared to the U.S. or the UK due to the existence of short-time work schemes in Germany. More generally, Fernández-Kranz and Rodríguez-Planas (2018) argue that labour market institutions such as minimum wages create downward wage rigidity which, during times of adverse demand shocks, prevent wage adjustment from taking place, thereby leading to unemployment. According to the authors, Spain is an example of a country with a relatively rigid labour market (as opposed to the U.S. or Canada). Nickell (1997) also provides evidence that the countries of

Southern Europe tend to have labour market institutions that are associated with a higher degree of rigidity. There also is empirical evidence that shows that the extent to which workers' labour market prospects are affected by adverse shocks differs between countries. For example, Bertheau et al. (2023) estimate that the costs of job loss in terms of foregone earnings are up to three times larger in several Southern European countries than in other European countries.

3 Data

The analysis is based on the European Union Statistics on Income and Living Conditions (EU-SILC) dataset, which contains nationally representative individual-level data from various countries and has been used for research in different fields of labour economics (e.g. Andreoli and Fusco, 2019; Michael and Christofides, 2020). It is a rolling panel in which individuals are observed for at most four years. To increase the coverage of the dataset we combine different longitudinal releases of EU-SILC. This process of combining different releases and the necessary adjustments to the weights are described in the Online Appendix. While the EU-SILC dataset covers a larger number of countries, some cannot be used in the empirical analysis. For example, the ages of individuals in Finland and Iceland are randomly perturbed to prevent disclosure and a large share of individuals in Denmark, Netherlands and Sweden do not provide monthly data on economic activity. Since accurate information on age and economic activity is necessary for the empirical analysis, individuals from these countries are removed from the dataset. Other countries are omitted because the process outlined in the next paragraph identified insufficient numbers of graduates. This is the result of these countries either entering EU-SILC late (Germany, Norway, Serbia and Switzerland) or having small populations (Malta). The dataset that is used for the empirical analysis covers the years 2004 to 2017 and contains data from the following countries: Austria (2004-17), Belgium (2004-17), Bulgaria (2006-17), Cyprus (2005-17), Czech Republic (2005-17), Estonia (2004-17), Greece (2004-17), Spain (2004-17), France (2004-16), Croatia (2010-17), Hungary (2005-17), Italy (2004-17), Lithuania (2005-17), Latvia (2005-17), Luxembourg (2008-2017), Poland (2005-17), Portugal (2004-16), Slovenia (2005-2017) and Slovakia (2005-15). To analyse differences in the response to unfavourable entry conditions between countries, we distinguish between Southern European (Cyprus, Greece, Italy, Portugal, Spain) and non-Southern European countries (all remaining countries). The period of analysis covers expansions as well as contractions, including the Great Recession, and therefore provides a suitable basis to identify the effect of the unemployment rate at the time of graduation on the transition into employment. Data on monthly unemployment rates at the national level for individuals aged 15-74 (16-74 in some EU member states) and 15-24 are taken from Eurostat.[2]

[2]Given the different size of countries in the sample and the focus on graduates, access to unemployment data disaggregated by region or education level would have been useful. Similarly, it may have been helpful to have access to unemployment data which better matched working ages in different countries. Unfortunately, such data is not available at the required (monthly) frequency.

In addition to information on individual characteristics, EU-SILC provides details about a person's main economic activity for each month of the calendar year preceding the interview. This information allows us to identify an individual's month of graduation and economic activity in subsequent months. We identify graduates as individuals aged between 21 and 28 whose main monthly activity changes after a spell of at least six consecutive months in education to some other activity and who are not observed to return to education thereafter. Moreover, we require graduates to report their highest education level to be at least tertiary education in the year following the transition from education. Given our interest in the initial transition to employment, we also exclude individuals with previous spells of employment.

As well as the monthly data on economic activity for the previous year, individuals are also asked about their economic activity at the time of the interview. Given the crucial role of accurate information on monthly economic activity in the analysis, we only include individuals for whom this information is consistent with the economic activity reported at the time of the interview. Since the time of the interview is given as the year and quarter of the interview, consistency is assessed by comparing the economic activity at the time of the interview with the monthly economic activity reported in the relevant three months. If the monthly economic activity does not match the economic activity at the time of the interview in at least one month, the individual is removed from the sample. Such a check is not possible for the first year of data on monthly economic activity, so we also exclude individuals observed to graduate in that year.[3] Sample means and standard deviations of the variables used in the analysis are presented in Table B2 in the Online Appendix which show the implications of these restrictions on the composition of the sample. Perhaps most noticeably, the requirement for consistency between the two measures of economic activity leads to a fall in the share of the sample from Italy and Spain.

This process yields 6,221 graduates between 2004 and 2017, who may be observed in unemployment for a maximum of thirty months (due to the need to be observed for six months in employment and the requirement for consistency across reported activity statuses). 76.2% of graduates are observed to find employment while the remaining are treated as censored in the analysis below and comprise 499 graduates that transitioned into inactivity (either immediately after graduation or after a period of unemployment) and 985 graduates who are not observed to leave unemployment. Weighted means and standard deviations on the variables used in the analysis are provided in Table B3 and the Kaplan-Meier survivor function is shown in Figure B1 of the Supplementary Material.

The left-hand-side of Table 1 presents the 25^{th}, 50^{th} and 75^{th} percentiles of unemployment durations by country. One of the most noticeable features of the table is that the 25^{th} percentile for all countries (except Croatia) and the 50^{th} percentile of the unem-

[3]For example, an individual that is interviewed in 2011-2014 will provide their activity at the time of the interview for 2011-2014 and their monthly activity for 2010-2013. As such, it is only possible to check that the monthly activity status is consistent with the activity status at the time of the interview for 2011-2013. No such check is possible for 2010 and so an individual who graduates in that year is excluded from the analysis.

Table 1: Unemployment duration by country for all individuals and individuals in 1st and 4th quartiles of graduation unemployment rate

	All			1st Quartile			4th Quartile		
	Percentiles								
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Austria	1	1	3	1	1	2	1	1	2
Belgium	1	1	4	1	1	4	1	1	3
Bulgaria	1	1	14	1	1	12	1	1	2
Cyprus	1	4	12	1	3	9	3	7	17
Czech Republic	1	1	3	1	1	2	1	1	4
Estonia	1	1	2	1	1	1	1	1	2
Greece	1	14	*	1	3	*	1	10	*
Spain	1	1	5	1	1	2	1	3	12
France	1	1	5	1	1	3	1	1	10
Croatia	2	6	13	3	10	20	1	3	9
Hungary	1	1	7	1	1	5	1	2	9
Italy	1	3	10	1	2	10	1	3	10
Lithuania	1	1	4	1	1	1	1	1	12
Luxembourg	1	1	3	1	1	3	1	1	5
Latvia	1	1	5	1	1	2	1	3	5
Poland	1	1	6	1	1	12	1	1	6
Portugal	1	2	10	1	1	4	1	3	10
Slovenia	1	1	9	1	1	3	1	2	12
Slovakia	1	3	7	1	1	4	1	3	13
Total	1	1	6	1	1	5	1	1	9

Note: Sampling weights are used in the estimation. Empty cells denote censoring.
Source: Eurostat, own calculations.

ployment duration for a majority of countries is one month. This demonstrates that a high proportion of individuals are observed to find employment in the month after leaving tertiary education across all countries. An obvious outlier is Greece where the median unemployment duration is 18 months. Further variation is evident at the 75th percentile, which exceeds nine months in Bulgaria, Cyprus, Greece, Croatia, Italy and Portugal but is three months or less in Austria, Czech Republic and Estonia. Within our sample, there is therefore a clear pattern of longer unemployment durations in Southern European countries. In anticipation of the empirical analysis, which will rely on variation in unemployment durations within countries, Table 1 also presents the 25th, 50th and 75th percentiles for individuals graduating at times of low unemployment (the 1st quartile of the country-specific graduation unemployment rate) and at times of high unemployment (the 4th quartile of the country-specific graduation unemployment rate). One concern for an empirical analysis based on data from different countries is that a positive association between the graduation unemployment rate and the duration of initial unemployment might be spurious. Specifically, it may simply reflect graduates taking longer to find employment in countries in which the unemployment rate tends to be higher rather than a causal relationship between entry conditions and unemployment durations. However, the evidence in columns 4-6 and 7-9 in Table 1 shows that for most countries the distribution of the unemployment duration shifts to the right during times of higher (columns 7-9) as opposed to lower graduation unemployment rates (columns 4-6). This finding provides descriptive evidence consistent with unfavourable entry conditions leading to a longer duration of initial unemployment.

Table 2 shows the equivalent information disaggregated by year. Increases in the median and 75th percentile of unemployment durations are evident for individuals that graduated in 2009 and 2012, two years in which GDP in the European Union fell. Unemployment durations, particularly in later years, are generally higher in countries where unemployment rates are high.

4 Empirical methodology

We estimate the effect of the graduation unemployment rate on the transition into employment using a Cox proportional hazards model.[4] The principal advantage of this method is that, unlike fully parametric approaches, it does not require the specification of a functional form for the baseline hazard. This is desirable since the incorrect specification of the baseline hazard would lead to inconsistent coefficient estimates (Cameron and Trivedi,

[4]Speer (2016) estimates a model in which the dependent variable is the length of unemployment using two-stage least squares. This approach is problematic for two main reasons. Firstly, it leads to the loss of observations that are not observed to find employment (unless an assumption is made concerning the length of unemployment). Secondly, such an approach allows for negative predicted values. Implementing this method using our dataset also provides positive effects, although the estimates are somewhat smaller than those in Speer (2016). The results are provided in Table B4. One potential explanation for this difference is that our analysis is based on high-skilled individuals who are less affected by cyclical variation in entry conditions (Huckfeldt, 2022).

Table 2: Unemployment duration by year for all individuals and individuals in 1^{st} and 4^{th} quartiles of graduation unemployment rate

	All			1^{st} Quartile			4^{th} Quartile		
	Percentiles								
	25^{th}	50^{th}	75^{th}	25^{th}	50^{th}	75^{th}	25^{th}	50^{th}	75^{th}
2004	1	1	3	1	1	3	1	1	1
2005	1	1	8	1	1	9	1	1	6
2006	1	1	6	1	1	6	1	1	4
2007	1	1	3	1	1	4	1	1	3
2008	1	1	4	1	1	5	1	1	4
2009	1	1	9	1	1	10	1	2	13
2010	1	1	6	1	1	5	1	1	6
2011	1	1	7	1	1	5	1	3	10
2012	1	1	9	1	1	3	1	5	18
2013	1	2	9	1	1	6	1	6	16
2014	1	1	9	1	1	3	1	1	9
2015	1	1	5	1	1	3	1	1	6
2016	1	1	12	1	1	8	1	1	9
2017	1	1	7	1	1	4	1	3	*
Total	1	1	6	1	1	5	1	1	9

Note: Sampling weights are used in the estimation. Empty cells denote censoring.
Source: Eurostat, own calculations.

2005). Equation 1 shows the specified hazard rate:

$$h_{icsp}(t|UR_{csp}, X_{icsp}, \eta_c, \phi_s, \psi_p) = h_0(t) \exp \beta UR_{csp} + \boldsymbol{\gamma X_{icsp}} + \eta_c + \phi_{sG(c)} + \psi_{pG(c)} \quad (1)$$

The hazard rate represents the probability that individual i, who completed tertiary education in country c in calendar month s of year p, finds employment t months after graduation, given that the individual has not found employment until that month. $h_0(t)$ is the baseline hazard rate common to all individuals. The main explanatory variable is the unemployment rate for individuals aged 15-74 in country c at the time of graduation, UR_{csp}, while x_{icsp} measures an individual's sex. η_c represent country dummies, which control for cross-country differences in transitions from education into employment arising from country-specific factors such as labour market institutions. Year-of-graduation dummies, $\psi_{pG(c)}$, account for macroeconomic shocks which we allow to vary by country group, $G(c)$, i.e. Southern European and non-Southern European countries. As the opportunities to find employment may vary within years, we also include calendar month-of-graduation dummies, $\phi_{sG(c)}$ that are interacted with country group dummies. Standard errors are clustered at the level of the graduation month-year-country combination to account for the fact that the unemployment rate is constant within these cells.[5] As the data are compiled using non-random sampling, regressions are weighted using the corresponding sampling weights. To evaluate whether the effect of the entry unemployment rate differs between countries, we also estimate the model separately by country groups.[6]

If individuals have discretion over the timing of graduation, they may delay entry into the labour market until entry conditions become more favourable. Empirical evidence in favour of this proposition is provided by Brunello and Winter-Ebmer (2003) and Carmen Aina and Casalone (2011). The unemployment rate at the time of graduation is therefore potentially endogenous. To address this concern, we follow Kahn (2010) and use the unemployment rate in the month that an individual would graduate if they did not delay their graduation as an instrumental variable. In our preferred specification, this variable refers to the unemployment rate in June when an individual is aged 22. We also experiment with using the unemployment rate when the individual is at the most frequently observed age of graduation in their country. This is likely to be a stronger predictor of the graduation unemployment rate but is potentially endogenous since the most frequently observed age of graduation is the result of decisions on when to graduate.

We employ a two-stage residual inclusion approach (2SRI) which allows the use of an instrumental variables estimator in a nonlinear model (Terza et al., 2008; Wooldridge, 2015). This involves estimating a first-stage model in which the graduation unemployment rate is regressed on the unemployment rate in the predicted month of graduation as

[5] We also estimated the model using standard errors that are clustered at the country and year-country levels and found this had little effect.

[6] In that case, we use dummies for the year and month of graduation instead of their interactions with the country group dummy.

well as the control variables. The first stage is therefore the same as in linear two-stage least squares models, which are widely used in economics to identify causal effects (see Angrist and Krueger, 2001, for some early applications). In the second stage, rather than replacing the endogenous variable with the predicted values from the first-stage model as in standard two-stage least squares, the first-stage residuals are included as an additional regressor in the second-stage model.[7] In the context of a linear model, 2SRI gives identical coefficient estimates as two-stage least squares but the latter does not generally give consistent estimates when the model is nonlinear (for example, Terza et al., 2008).

5 Results

5.1 Average effects of the graduation unemployment rate

The complete results from estimation of Equation 1 for all individuals are presented in Table B5 of the Online Appendix. Consistent with the descriptive statistics shown in Table 1, the probability of finding employment after t months, having remained unemployed until period t, is significantly lower in Bulgaria, Cyprus, Greece, Croatia, Italy and Slovenia than the baseline country, Austria, in the standard model (column 1), having controlled for other variables. The hazard rate is significantly lower for individuals that graduated in Northern Europe in 2016 and for individuals that graduated in Southern Europe in 2005, 2006, 2009, 2012 and 2013 relative to 2004. This is broadly consistent with the figures presented in Table 2. Ceteris paribus, we do not find any evidence that the duration of the transition into employment differs between males and females. The country group-month-of-graduation dummies are generally not statistically significant.

The results in Table 3 show that entering the labour market under less favourable conditions is associated with a statistically significant reduction in the probability of transitioning into employment, having failed to find employment until that period, and thus a longer period of initial unemployment. According to the standard Cox model (first panel, column 1), an increase in the graduation unemployment rate of one percentage point reduces the hazard rate of finding employment by 2.2%, ceteris paribus. When we use 2SRI and instrument the graduation unemployment rate with the unemployment rate at the predicted time of graduation (first panel, column 2), the estimated coefficient on the first-stage residuals is positive and statistically significant which supports our hypothesis that the graduation unemployment is endogenous. Moreover, the estimated coefficient on the graduation unemployment rate is almost three times as large as when it is treated as exogenous, implying a reduction in the probability of finding employment of 6.0%, having not found employment until that month, if the graduation unemployment rate increases by one percentage point. Since it is reasonable to assume that individuals that have discretion over the timing of their graduation choose to graduate at a time of lower unemployment,

[7] We also used the approach proposed by Martínez-Camblor et al. (2017), which involves augmenting the 2SRI model with an individual frailty term to address potential collider bias, but found that this made no substantive difference to the estimated coefficients.

this increase in the estimated coefficient is consistent with expectations. The F-statistic associated with the instrument in the first-stage regression exceeds the threshold value proposed by Lee et al. (2022) for a test at the 5% significance level which indicates that the instrument is not weak. Compared to the results that are obtained from using our preferred instrumental variable in column 2, the use of the alternative instrument in column 3 has very little effect on the estimated coefficient of the graduation unemployment rate.[8]

Table 3: Cox model regression results for the hazard rate of finding employment

	(1)	(2)	(3)
	Standard	2SRI	
		Preferred instrument	Alternative instrument
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.022**	-0.060***	-0.062***
	(0.009)	(0.020)	(0.020)
residual		0.051**	0.053**
		(0.022)	(0.022)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic		152.034	149.731
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.011**	-0.037***	-0.038***
	(0.005)	(0.014)	(0.014)
residual		0.031**	0.031**
		(0.015)	(0.015)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic		107.575	107.808

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Column 1 shows results from a standard Cox model. Columns 2 and 3 show results from a 2SRI approach using the unemployment rate at the predicted time of graduation (column 2) and the unemployment rate in the individual's country of residence in June of the year that the individual is at the most frequently observed age of graduation in their country (column 3) as instrumental variables. The first (second) panel defines the graduation unemployment rate using the national unemployment rate amongst individuals aged 15-74 (15-24). Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Complete results for the first panel are in Table B5 in the Supplementary Material.
Source: Eurostat, own calculations.

[8]The standard errors presented in Table 3 are clustered at the level of the month-year-country of graduation; Table B6 in the Online Appendix shows that clustering at the year-country of graduation and country of graduation level tends to lead to slightly lower standard errors. Table B7 shows that significant effects of a similar magnitude are also obtained when age of entry is added as a covariate (column 2) and the year and month-of-entry dummies are replaced by the dummies based on the predicted values used to construct the preferred instrument (column 3). The estimated effects are slightly larger if we use parametric hazard models (see Table B9) but, as discussed above, we prefer the Cox model as it allows us to be agnostic about the distribution of the baseline hazard)

The second panel of Table 3 presents the results obtained when the graduation unemployment rate is defined using the unemployment rate for individuals aged 15-24 (i.e. the youth unemployment rate) rather than the unemployment rate for individuals aged 15-74. The estimated coefficients of the graduation unemployment rate are between 50% and 61% as large as those in the first panel. This will largely reflect the greater variability of the youth unemployment rate: the standard deviation of the unemployment rate for individuals aged 15-74 is 45% as large as that for individuals aged 15-24 (see Table B3).

The finding that graduates who enter the labour market at a time of higher unemployment, on average, take longer to find employment is robust to alternative ways of identifying graduates and defining transitions out of unemployment. Firstly, we extend the period for which an individual must be observed in education to be considered a graduate from six to 12 months. This will increase the likelihood that individuals in the sample are university graduates. Across all individuals, this restriction causes a small reduction in the sample size but the effect of the graduation unemployment rate in the 2SRI model based on our preferred instrumental variable remains almost unchanged, as shown in column 1 of Table 4.

Secondly, to evaluate whether transitions into inactivity may be distorting our results, we assess the effect of the graduation unemployment rate on the hazard of finding employment from either unemployment or inactivity (rather than just unemployment). Transitions into inactivity are therefore no longer treated as censoring events. The estimated effects are around 10% smaller than the baseline effects but remain statistically significant, confirming that the hazard rate of finding employment is reduced during times of adverse labour market conditions.

Thirdly, in an attempt to identify transitions to "stable" employment rather than into temporary jobs, we only consider transitions when the subsequent employment spell lasts at least six months (transitions into shorter periods of employment are treated as censored). Compared to our baseline results in column 2 of Table 3, the estimated effect of the graduation unemployment rate on the hazard rate of finding employment is again slightly smaller in magnitude. As an alternative measure of stable employment, we only consider transitions if they lead to full-time employment (treating spells of part-time employment as censored) in column 4 of Table 4. The graduation unemployment rate continues to have a negative and significant effect on the hazard rate of finding employment, which is very similar in magnitude to the results in column 3.

Finally, to understand whether the results are driven by effects on the hazard of finding employment in the months immediately following graduation or over a longer period, we experiment by artificially censoring individuals who fail to find employment after a given period (from three to thirty months) so that later transitions to employment are ignored. If adverse entry conditions predominantly reduced the probability of late transitions into employment, we would expect that artificially censoring after a short period will lead to a reduction of the size of the estimated effect of the graduation unemployment rate. The coefficient estimates, shown in Figure 1, are negative and statistically significant at

Table 4: Cox model regression results for the hazard rate of different labour market transitions

	(1) Transitions from at least 12 months of education	(2) Transitions from inactivity or unemployment to employment	(3) Transitions to at least 6 months of employment	(4) Transitions to full-time employment
Unemployment rate of individuals aged 15-74				
Graduation unemployment rate	-0.061***	-0.054***	-0.052**	-0.054**
	(0.020)	(0.019)	(0.025)	(0.021)
First-stage residuals	0.051**	0.047**	0.040	0.044*
	(0.023)	(0.022)	(0.027)	(0.024)
Individuals	6,031	6,221	6,221	6,221
Failures	4,596	5,033	3,547	4,179
First-stage F statistic	152.935	152.034	152.034	152.034
Unemployment rate of individuals aged 15-24				
Graduation unemployment rate	-0.039***	-0.033**	-0.029*	-0.029*
	(0.015)	(0.014)	(0.017)	(0.015)
First-stage residuals	0.032**	0.027*	0.022	0.022
	(0.015)	(0.015)	(0.018)	(0.017)
Individuals	6,031	6,221	6,221	6,221
Failures	4,596	5,033	3,547	4,179
First-stage F statistic	107.580	107.575	107.575	107.575

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

each censoring date and well within the 95% confidence interval of the baseline result. This indicates that the negative effects of the graduation unemployment rate are not primarily due to differences in the probability of finding employment after long periods of unemployment.

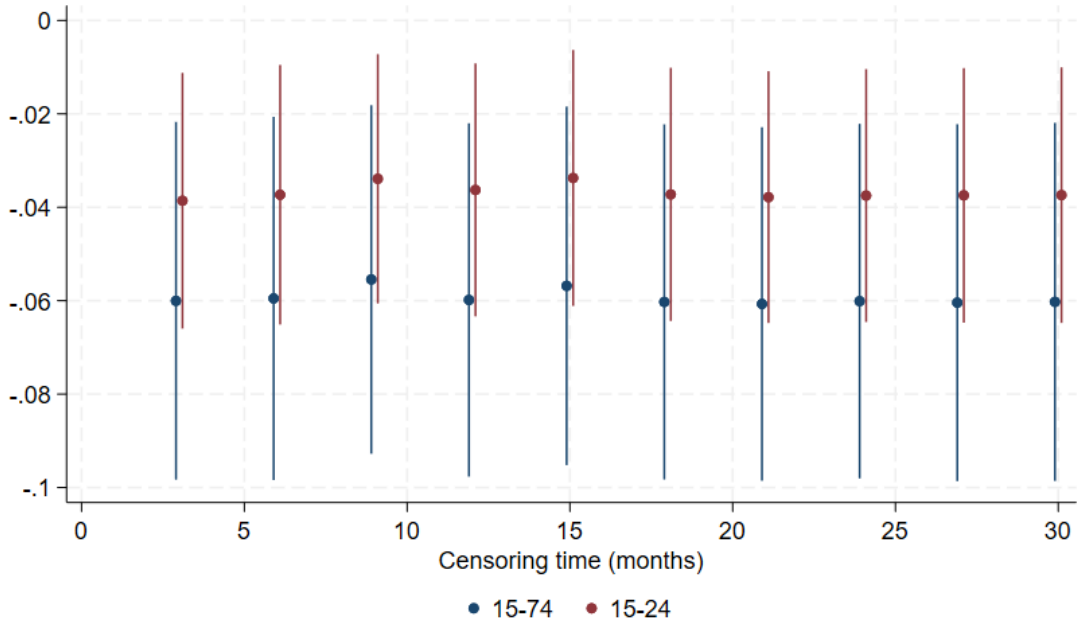
5.2 Cross-country differences in the effects of the graduation unemployment rate

We continue by assessing whether the effects of graduating during adverse labour market conditions differ between groups of countries. Since adverse shocks have been found to have larger effects for individuals in Southern European countries (Bertheau et al., 2023), we compare the effect of the graduation unemployment rate for graduates in Cyprus, Greece, Italy, Portugal or Spain with those from all other countries.

The results in columns 1 and 4 of the top panel of Table 5 show that graduates from both country groups experience a delayed transition into employment when they graduate during an economic downturn.[9] However, the magnitude of this effect is larger for graduates from Southern European countries, where an increase in the graduation unemployment rate is predicted to reduce the hazard rate of finding employment by 7.6%.

[9]We report results from a standard Cox model in which we do not instrument the graduation unemployment rate and from using the alternative instrument, described in Section 5.1, in Table B8 in the Appendix.

Figure 1: Estimated effects (and 95% confidence intervals) of the graduation unemployment rate, defined using individuals aged 15-74 and 15-24, on the hazard rate of finding employment obtained from different censoring dates



Notes: Standard errors are clustered at the level of month-year-country of graduation. Results are derived from a 2SRI approach using the unemployment rate at the predicted time of graduation as the instrumental variable. The graduation unemployment rate is defined using the national unemployment rate amongst individuals aged 15-74(15-24).

The corresponding effect for graduates from the remaining countries is 4.7%. The lower panel of Table 5 shows that larger estimates of the effect of entry conditions are also obtained for Southern European when the unemployment rate of individuals aged 15-24 is used to define the graduation unemployment rate.

The finding that the adverse effects of unfavourable entry conditions are more pronounced in Southern European countries is in line with existing evidence that shocks have greater effects in the South of Europe. The remaining columns of Table 5 provide evidence about whether these effects apply equally to males and females since the existing literature has tended to find heterogeneous effects across genders (Hershbein, 2012; Kondo, 2015; Choi et al., 2020).[10]

Our results in the top panel of columns 5 and 6 of Table 5 show that the costs of unfavourable entry conditions among graduates from Southern European countries are almost exclusively borne by female graduates. For this group, an increase in the graduation unemployment rate is found to reduce the hazard rate of finding employment by 10.1%, whereas we find little effect on male graduates. A possible explanation for this finding is that male graduates in Southern Europe are quicker to lower their reservation wages than

[10]When we compare all males to all females, the effects for females are slightly larger and more precisely estimated. The results are presented in B10.

Table 5: Cox model regression results for the hazard rate of finding employment, by country group

	(1)	(2)	(3)	(4)	(5)	(6)
	Non-Southern European countries			Southern European countries		
	All	Male	Female	All	Male	Female
Unemployment rate of individuals aged 15-74						
Graduation unemployment rate	-0.047**	-0.077**	-0.030	-0.076**	-0.018	-0.101**
	(0.021)	(0.038)	(0.023)	(0.036)	(0.079)	(0.041)
First-stage residuals	0.039*	0.067	0.021	0.065*	0.018	0.077
	(0.023)	(0.043)	(0.028)	(0.039)	(0.084)	(0.047)
Individuals	4,581	1,866	2,715	1,640	665	975
Failures	3,606	1,480	2,126	1,137	462	675
First-stage F statistic	84.102	45.659	94.894	70.812	21.932	95.650
Unemployment rate of individuals aged 15-24						
Graduation unemployment rate	-0.030*	-0.033	-0.028*	-0.046*	-0.005	-0.061**
	(0.015)	(0.030)	(0.016)	(0.025)	(0.059)	(0.028)
First-stage residuals	0.024	0.027	0.024	0.038	0.006	0.041
	(0.016)	(0.031)	(0.018)	(0.026)	(0.061)	(0.031)
Individuals	4,581	1,866	2,715	1,640	665	975
Failures	3,606	1,480	2,126	1,137	462	675
First-stage F statistic	52.088	26.646	59.679	58.890	16.967	72.453

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. The graduation unemployment rate is defined using the national unemployment rate amongst individuals aged 15-74 (15-24). Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable. Southern European countries are Cyprus, Greece, Italy, Portugal and Spain.
Source: Eurostat, own calculations.

women, which would be consistent with evidence showing a grater responsiveness of reservation wages with respect to the duration of unemployment among men (Deschacht and Vansteenkiste, 2021). Among graduates from the remaining countries, the point estimate is larger for males than females although the difference is smaller, particularly when the youth unemployment rate is used to measure entry conditions. The results for Southern European countries are therefore consistent with the finding of Hershbein (2012) that unfavourable entry conditions have a larger impact on the employment probability of female high school graduates during the first years of their career in the US but differs from that of Choi et al. (2020), which only finds persistent negative effects on the employment probability of male college graduates in South Korea.

5.3 Entry conditions and occupation quality

Various studies have provided evidence concerning the mechanisms by which unfavourable entry conditions lead to persistent costs on the labour market. These include a reduced match quality (Liu et al., 2016) as well as an increased likelihood of working for low-quality employers (Oreopoulos et al., 2012; Brunner and Kuhn, 2014; Arellano-Bover, 2022) and in low-skilled occupations (Kahn, 2010; Huckfeldt, 2022). Having shown above that an increase in the graduation unemployment rate leads to an increase in the initial unemployment duration, we analyse whether it also reduces the probability of finding employment in a high-quality occupation. Such a finding would allow for the possibility that the longer unemployment durations resulting from adverse entry conditions are in part responsible for a lower probability of finding employment in a high-quality occupation. Potential reasons for this are that employers view longer durations of initial unemployment as a negative signal about a graduate's quality or that graduates choose to search for a job in a lower-quality occupation as their unemployment duration increases because they become more pessimistic about their employment prospects. However, we acknowledge that the following analysis cannot directly establish that the effect of the graduation unemployment rate on occupational quality is mediated by initial unemployment duration.[11]

We define high-quality occupations based on the ISCO(HE) definition of Henseke and Green (2017). Specifically, the ISCO-08 categories of *Managers* (ISCO 1), *Professionals* (ISCO 2), *Teaching Association Professionals* (ISCO 33) and *Information and Communications Technicians* (ISCO 35) are defined as high-quality occupations (results using ISCO 1-2 and ISCO 1-3 to define high-quality occupations are presented in Table B11). The indicator for a high-quality occupation takes the value one if an individual's first observed job is in any of these occupations and zero otherwise.[12] This variable is regressed on the graduation unemployment rate, which is instrumented by the predicted unemployment rate, and the same set of control variables that were included in Equation 1.

[11] To establish this would require an instrumental variable for unemployment duration, which our dataset does not provide.

[12] Some individuals from Slovenia only provide occupation codes at the 1-digit level so are excluded from the analysis.

Table 6: Results for probability of being employed in high-quality occupations

	(1) All	(2) Non-Southern European countries	(3) Southern European countries
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.012	0.006	-0.044*
	(0.014)	(0.017)	(0.026)
Individuals	4,241	3,172	1,069
First-stage F statistic	119.951	81.955	42.485
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.020*	-0.010	-0.038**
	(0.010)	(0.012)	(0.018)
Individuals	4,241	3,172	1,069
First-stage F statistic	87.612	56.589	33.947

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. The graduation unemployment rate is defined using the national unemployment rate amongst individuals aged 15-74 (15-24). Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Sampling weights are used in the estimation. Estimation is done by 2SLS using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

Table 6 shows that individuals who graduate during a period of high unemployment are less likely to find a high-quality job, ceteris paribus. Across all countries, an increase in the youth unemployment rate of one percentage point is estimated to reduce the probability of finding a high-quality job by 2.0%. The corresponding coefficient is also negative, but not statistically significant, when the unemployment rate of individuals aged 15-74 is used. As in Table 5, the effects are stronger in Southern European countries. The results are therefore broadly in line with previous literature. One possible interpretation is that adverse entry conditions lead to longer unemployment durations (as shown in sections 5.1 and 5.2) which, in turn, lowers the quality of an individual's first job. Alternatively, a higher graduation unemployment rate may reduce the probability of finding a high-quality occupation, regardless of unemployment duration. We leave a direct analysis of the relationship between initial unemployment duration and occupation quality to future research.

6 Conclusion

Using monthly data covering 19 European countries, we estimate the effect of the state of the economy at the time of graduation on the transition into employment. Employing a Cox proportional hazards model and addressing the potential endogeneity of the graduation unemployment rate using a 2SRI approach, we find that unfavourable entry conditions significantly increase the period of unemployment following graduation from tertiary education. Specifically, results from our baseline model show that a one percentage point increase in the unemployment rate at the time of graduation reduces the hazard of finding employment by 6%. The estimated effect is half as large if no attempt is made

to address endogeneity. The results are robust to using different definitions of graduates, a different measure of entry conditions and a different instrumental variable.

We also find that the costs of entering the labour market during unfavourable conditions varies across countries. Specifically, we show that an increase in the graduation unemployment rate leads to a longer period of initial unemployment for graduates in Southern Europe, which is consistent with previous evidence suggesting that these countries have more rigid labour market institutions. Moreover, we show that in Southern European countries, the negative effects are almost entirely due to effects on the unemployment durations of females.

The finding that graduates that enter the labour market during recessions tend to take more time to find employment suggests that governments should consider the countercyclical application of active labour market policies targeted at recent entrants to the labour market. Such policies were widely adopted in response to the Great Recession (International Labour Organisation and World Bank, 2012) and are supported by evidence from meta-analyses of active labour market polices which have found that the effects of active labour market policies are strongest during recessions (Kluve, 2010; Card et al., 2017). Job search assistance represents an attractive option since it has been found to be a relatively effective form of policy (for example, Caliendo and Schmidl, 2016; Card et al., 2017) and should have direct effects on the initial periods of unemployment.

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APPENDIX FOR ONLINE PUBLICATION

The material contained in this document represents an Online Appendix to the paper "Entry Conditions and the Transition from Tertiary Education to Employment: A Cross-Country Perspective". It provides supplementary information related to the data and to empirical results.

A Data and sample

A.1 Combining different longitudinal releases of EU-SILC

In its longitudinal form, EU-SILC is a multi-country individual-level panel dataset. For each country, observations are organised in rotational groups. EU-SILC is a rolling panel as the individuals in each rotational group are followed for at most four years before dropping out of the sample and being replaced by a new rotational group. If rotational group A is initially sampled in year t, its members will be observed up to year $t+3$. Further rotational groups will be added to the dataset during that period: rotational group B will be added in year $t+1$ and observed until year $t+4$, while rotational groups C and D are first included in years $t+2$ and $t+3$ and are retained until years $t+5$ and $t+6$, respectively. After dropping out of the sample at the end of year $t+3$, rotational group A will be replaced by rotational group E, which in turn will be part of the dataset from year $t+4$ until year $t+7$. There are exceptions from this structure. For example, data from France is based on nine rotational groups. Further information on the structure of EU-SILC can be found in Berger and Schaffner (2015) and Moffat and Roth (2016).

While every rotational group can in principle be observed for four years and every four-year period consists of data from four separate rotational groups, a typical longitudinal release only contains information on three rotational groups, which are available for four, three and two years, respectively. Through combining data from different longitudinal releases we are able to increase the sample size for two reasons. Firstly, we include data from all rotational groups that are available within a four-year period. Secondly, for each rotational group, we include data for all available years. We do this by retaining only that rotational group from each release that is available for the full four-year period and combining these groups in a single dataset. The most recent release in our analysis also contains data from two rotational groups that are only available for two and three years. Likewise, there are rotational groups in the first releases which are only followed for two and three years. We also include these rotational groups in the final dataset. Table A1 illustrates the structure of the combined dataset for the case of Austria (which uses the typical system of rotational groups that are followed for four years). The columns refer to a specific rotational group (labelled by letters) and show the longitudinal release from which the data are taken, while the rows refer to the sample year.

A.2 Sampling weights

After combining the data from the different longitudinal releases, we make an adjustment to the sampling weights to ensure that they provide an accurate estimate of the size of the target population for each combination of country and year. By construction, the weights provided in EU-SILC are designed in a way that their sum over all observations in a given rotational group, country and year should provide an accurate estimate of the number of people in that country and year who are aged 16 years and older.

In a first step, we assess how well the sampling weights match the target population by comparing the sum of the weights within a rotational group, country and year with the official population size of those aged 16 years and older. If the implied size of a rotational group is either too large or too small compared to the official population figure, we discard it from the dataset. Specifically, if a rotational group is either more than 25% larger or 25% smaller than the corresponding Eurostat figure in at least one year, we remove the observations from that rotational group from the sample for all years in which it is observed. The number of rotational groups and observations that are dropped as a result of this requirement is relatively small. In total, six countries are affected and at most two rotational groups are dropped per country. In total, eight rotational groups are removed and, in six cases, this applies to the country's first rotational group which is available only for the years 2004 and 2005. In the case of Austria one rotational group (out of a total 16) including 3,252 observations is excluded (which amounts to 2.04% of the total number of observations from Austria). For the other affected countries, the number of observations that are excluded amounts to, 1.59% (France), 1.99% (Spain), 3.95% (Italy), 4.07% (Greece) and 7.85% (Belgium).

In a second step, we construct a new weighting variable to ensure that the weighted sum of observations within a given country and year provides an accurate estimate of the size of the target population. This is done by dividing the sampling weights by the number of rotational groups in a given country and year. Doing so ensures that an observation's weight compared to an observation from a different country or year does not depend on the number of rotational groups in the sample.

Table A1: Data structure after combining several longitudinal releases (Austria)

Release	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018	2018
Rotational group	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2004	X	X	X													
2005	X	X	X	X												
2006		X	X	X	X											
2007			X	X	X	X										
2008				X	X	X	X									
2009					X	X	X	X								
2010						X	X	X	X							
2011							X	X	X	X						
2012								X	X	X	X					
2013									X	X	X	X				
2014										X	X	X	X			
2015											X	X	X	X		
2016												X	X	X	X	
2017													X	X	X	X
2018														X	X	X

Note: Rows refer to the year of observation.

B Empirical analysis

Table B1: Estimated effect of graduation unemployment rate on probability of employment after one year of potential experience

Author	Country	Sex	Education	Effect	Source
Genda et al. (2010)	Japan	Men	High school	-ve**	Table 3, col. 1
			College	-ve	Table 3, col. 2
	US	Men	High school	-ve**	Table 3, col. 3
			College	-ve	Table 3, col. 4
Kahn (2010)	US	Male	College	+ve	Table 5, col. 5
Oreopoulos et al. (2012)	Canada	Male	College	-ve***	Table 2, col. 1
Hershbein (2012)	US	Men	High school	+ve	Table 3b, col. 1
		Women	High school	-ve***	Table 3a, col. 1
Altonji et al. (2016)	US	All	College	-ve	Table 3, col. 2
Cockx and Ghirelli (2016)	Belgium	Men	Low	-ve	Fig. 2, top-left panel
			High	-ve	Fig. 3, top-left panel
Fernández-Kranz and Rodríguez-Planas (2018)	Spain	Men	College	-ve**	Table 4, col. 7
van den Berge (2018)	Netherlands	All	Vocational college	-ve	Fig. 4, top-right panel
			Academic college	-ve	
Choi et al. (2020)	South Korea	Men	College	-ve**	Fig. 2, top panel
		Women	College	-ve	
Kawaguchi and Kondo (2020)	US	Men	College	-ve	Table 3, col. 2

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Oreopoulos et al. (2012) use 'fraction zero earnings'. Genda et al. (2010) and Kawaguchi and Kondo (2020) effects refer to 1-3 years of potential experience.

Table B2: Means and Standard Deviations, by sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Sample 1		Sample 2		Sample 3	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Unemployment duration	4.099	6.060	3.614	5.440	3.423	4.865
15-74 graduation unemployment	10.758	5.124	10.044	4.495	9.951	4.346
15-24 graduation unemployment	25.226	10.960	23.395	9.799	23.230	9.656
Pred. 15-74 graduation unemployment	10.461	5.103	9.925	4.638	9.819	4.521
Pred. 15-24 graduation unemployment	24.181	10.615	22.804	9.757	22.579	9.573
Male	0.403	0.491	0.403	0.491	0.407	0.491
Female	0.597	0.491	0.597	0.491	0.593	0.491
Country						
Austria	0.021	0.143	0.019	0.137	0.019	0.136
Belgium	0.048	0.214	0.052	0.222	0.044	0.206
Bulgaria	0.020	0.141	0.019	0.137	0.019	0.137
Cyprus	0.075	0.263	0.108	0.310	0.114	0.318
Czech Republic	0.048	0.213	0.061	0.240	0.066	0.249
Estonia	0.035	0.184	0.047	0.212	0.050	0.218
Greece	0.051	0.219	0.027	0.163	0.021	0.145
Spain	0.107	0.309	0.062	0.241	0.058	0.233
France	0.044	0.206	0.057	0.232	0.061	0.239
Croatia	0.026	0.158	0.023	0.151	0.021	0.144
Hungary	0.058	0.234	0.058	0.234	0.057	0.232
Italy	0.086	0.281	0.039	0.194	0.034	0.181
Lithuania	0.033	0.180	0.040	0.196	0.041	0.197
Luxembourg	0.022	0.146	0.030	0.171	0.030	0.171
Latvia	0.023	0.149	0.019	0.138	0.019	0.135
Poland	0.082	0.275	0.086	0.280	0.079	0.271
Portugal	0.042	0.200	0.037	0.188	0.037	0.189
Slovenia	0.103	0.304	0.118	0.322	0.121	0.327
Slovakia	0.077	0.267	0.098	0.297	0.108	0.311
Year of graduation						
2003	0.017	0.131	0.015	0.122	0.000	0.000
2004	0.047	0.211	0.042	0.200	0.021	0.144
2005	0.062	0.242	0.058	0.234	0.057	0.232
2006	0.070	0.255	0.069	0.254	0.067	0.250
2007	0.075	0.263	0.075	0.264	0.073	0.261
2008	0.066	0.248	0.070	0.255	0.071	0.258
2009	0.078	0.268	0.079	0.270	0.081	0.273
2010	0.085	0.279	0.089	0.285	0.092	0.289
2011	0.085	0.279	0.090	0.286	0.098	0.298
2012	0.085	0.279	0.086	0.281	0.093	0.290
2013	0.078	0.269	0.076	0.266	0.079	0.271
2014	0.079	0.270	0.077	0.267	0.080	0.272
2015	0.083	0.276	0.079	0.269	0.080	0.272
2016	0.059	0.236	0.057	0.231	0.056	0.230
2017	0.030	0.171	0.037	0.190	0.049	0.216
Individuals	12,440	12,440	8,189	8,189	6,227	6,227

Sample 1 includes all individuals identified as graduates based on their monthly economic status. Sample 2 contains the individuals in sample 1 but excludes those for whom there is an observed inconsistency between monthly economic status and the economic activity at the time of the interview. Sample 3 (the estimation sample) contains the individuals in sample 2 but excludes those who graduate in the first year for which monthly economic data is provided.
Source: Eurostat, own calculations.

Table B3: Weighted Means and Standard Deviations, by country group

	(1)	(2)	(3)	(4)	(5)	(6)
	All		Non-Southern countries		Southern European countries	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Unemployment duration	3.100	4.288	2.884	4.017	3.682	4.899
15-74 graduation unemployment	10.329	4.504	9.066	2.649	13.728	6.337
15-24 graduation unemployment	24.915	9.564	21.917	5.927	32.982	12.405
Pred. 15-74 graduation unemployment	10.349	4.432	9.489	3.238	12.663	6.078
Pred. 15-24 graduation unemployment	24.296	9.097	22.226	6.647	29.866	12.004
Male	0.436	0.496	0.447	0.497	0.406	0.491
Female	0.564	0.496	0.553	0.497	0.594	0.491
Country						
Austria	0.021	0.144	0.029	0.168		
Belgium	0.064	0.245	0.088	0.284		
Bulgaria	0.018	0.131	0.024	0.153		
Cyprus	0.012	0.109			0.044	0.205
Czech Republic	0.055	0.229	0.076	0.265		
Estonia	0.007	0.086	0.010	0.100		
Greece	0.023	0.151			0.086	0.280
Spain	0.128	0.335			0.474	0.499
France	0.257	0.437	0.352	0.478		
Croatia	0.010	0.098	0.013	0.115		
Hungary	0.042	0.200	0.057	0.232		
Italy	0.067	0.250			0.247	0.431
Lithuania	0.021	0.143	0.028	0.166		
Luxembourg	0.002	0.047	0.003	0.054		
Latvia	0.005	0.072	0.007	0.084		
Poland	0.166	0.372	0.227	0.419		
Portugal	0.040	0.197			0.149	0.356
Slovenia	0.013	0.114	0.018	0.133		
Slovakia	0.048	0.214	0.066	0.248		
Year of Graduation						
2004	0.057	0.233	0.056	0.229	0.063	0.242
2005	0.076	0.265	0.071	0.257	0.089	0.285
2006	0.083	0.275	0.084	0.277	0.079	0.270
2007	0.083	0.276	0.084	0.277	0.080	0.272
2008	0.064	0.245	0.061	0.240	0.072	0.259
2009	0.077	0.266	0.076	0.265	0.079	0.270
2010	0.079	0.269	0.081	0.273	0.071	0.257
2011	0.097	0.296	0.103	0.304	0.080	0.272
2012	0.076	0.265	0.082	0.275	0.059	0.237
2013	0.060	0.237	0.056	0.230	0.069	0.253
2014	0.081	0.272	0.073	0.261	0.100	0.300
2015	0.082	0.274	0.086	0.280	0.070	0.256
2016	0.049	0.215	0.046	0.211	0.055	0.228
2017	0.038	0.191	0.040	0.196	0.032	0.177
Individuals	6,227	6,227	4,582	4,582	1,645	1,645

Source: Eurostat, own calculations.

Table B4: Results for the duration of unemployment

	(1)	(2)	(3)
	Standard	2SRI	
		Preferred instrument	Alternative instrument
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	0.049	0.126	0.134
	(0.037)	(0.080)	(0.084)
Individuals	4,743	4,743	4,743
First-stage F statistic		130.039	129.510
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	0.025	0.077	0.077
	(0.019)	(0.059)	(0.060)
Individuals	4,743	4,743	4,743
First-stage F statistic		93.192	97.558

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Sampling weights are used in the estimation. The instrument is the unemployment rate in the individual's country of residence in June of the year that the individual is aged 22.
Source: Eurostat, own calculations.

Table B5: Cox model regression results for the hazard rate of finding employment

	(1)	(2)	(3)
	Standard	2SRI	
		Preferred instrument	Alternative instrument
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.022**	-0.060***	-0.062***
	(0.009)	(0.020)	(0.020)
Female	0.033	0.033	0.033
	(0.033)	(0.033)	(0.033)
Countries			
Belgium	0.021	0.127	0.133
	(0.100)	(0.109)	(0.109)
Bulgaria	-0.331**	-0.149	-0.140
	(0.153)	(0.172)	(0.173)
Cyprus	-1.020*	-1.016*	-1.018*
	(0.540)	(0.533)	(0.533)
Czech Republic	0.104	0.130	0.131
	(0.082)	(0.083)	(0.083)
Estonia	0.163*	0.297***	0.305***
	(0.096)	(0.115)	(0.116)
Greece	-1.379**	-1.143**	-1.132**
	(0.568)	(0.570)	(0.570)
Spain	-0.509	-0.190	-0.175
	(0.546)	(0.557)	(0.558)
France	-0.056	0.084	0.092
	(0.095)	(0.114)	(0.114)
Croatia	-0.416***	-0.031	-0.007
	(0.155)	(0.233)	(0.236)
Hungary	-0.050	0.071	0.078
	(0.101)	(0.116)	(0.117)
Italy	-0.988*	-0.975*	-0.977*
	(0.546)	(0.538)	(0.539)
Lithuania	0.059	0.247*	0.258*
	(0.103)	(0.131)	(0.132)
Luxembourg	-0.000	0.019	0.019
	(0.111)	(0.110)	(0.110)
Latvia	0.059	0.288*	0.301*
	(0.121)	(0.160)	(0.161)

Poland	-0.028	0.135	0.145
	(0.095)	(0.120)	(0.121)
Portugal	-0.872	-0.769	-0.763
	(0.540)	(0.535)	(0.535)
Slovenia	-0.235**	-0.144	-0.138
	(0.100)	(0.110)	(0.110)
Slovakia	-0.005	0.278	0.294*
	(0.115)	(0.174)	(0.176)
Country group-year of entry interactions			
North × 2005	-0.091	-0.023	-0.021
	(0.146)	(0.149)	(0.148)
North × 2006	0.000	0.015	0.015
	(0.134)	(0.134)	(0.134)
North × 2007	0.038	-0.005	-0.009
	(0.138)	(0.138)	(0.139)
North × 2008	-0.130	-0.207	-0.212
	(0.142)	(0.145)	(0.146)
North × 2009	-0.188	-0.193	-0.194
	(0.158)	(0.159)	(0.159)
North × 2010	-0.156	-0.125	-0.123
	(0.151)	(0.152)	(0.151)
North × 2011	-0.149	-0.132	-0.133
	(0.144)	(0.144)	(0.144)
North × 2012	-0.117	-0.084	-0.083
	(0.153)	(0.154)	(0.154)
North × 2013	-0.194	-0.152	-0.150
	(0.161)	(0.163)	(0.162)
North × 2014	-0.205	-0.189	-0.189
	(0.149)	(0.149)	(0.149)
North × 2015	-0.154	-0.169	-0.170
	(0.140)	(0.140)	(0.140)
North × 2016	-0.305**	-0.346**	-0.349**
	(0.146)	(0.147)	(0.148)
North × 2017	-0.211	-0.342*	-0.350*
	(0.175)	(0.183)	(0.184)
South × 2005	-0.233*	-0.282**	-0.285**
	(0.134)	(0.131)	(0.131)
South × 2006	-0.256**	-0.337**	-0.341***
	(0.129)	(0.131)	(0.131)
South × 2007	-0.049	-0.155	-0.160
	(0.152)	(0.158)	(0.158)

South × 2008	-0.065	-0.098	-0.098
	(0.146)	(0.145)	(0.145)
South × 2009	-0.449***	-0.341*	-0.334*
	(0.172)	(0.188)	(0.188)
South × 2010	-0.178	-0.016	-0.006
	(0.186)	(0.197)	(0.198)
South × 2011	-0.213	0.032	0.047
	(0.150)	(0.186)	(0.187)
South × 2012	-0.540*	-0.171	-0.149
	(0.277)	(0.297)	(0.297)
South × 2013	-0.351*	0.059	0.083
	(0.197)	(0.263)	(0.265)
South × 2014	-0.144	0.218	0.239
	(0.171)	(0.232)	(0.233)
South × 2015	-0.035	0.241	0.257
	(0.150)	(0.197)	(0.199)
South × 2016	-0.178	0.032	0.042
	(0.175)	(0.195)	(0.195)
South × 2017	-0.166	0.081	0.096
	(0.427)	(0.457)	(0.458)
Country group-month of entry interactions			
North × February	-0.109	-0.115	-0.116
	(0.220)	(0.217)	(0.217)
North × March	-0.010	-0.015	-0.013
	(0.250)	(0.250)	(0.251)
North × April	0.007	-0.001	-0.000
	(0.164)	(0.163)	(0.163)
North × May	-0.135	-0.149	-0.150
	(0.136)	(0.135)	(0.135)
North × June	-0.216*	-0.235*	-0.235*
	(0.124)	(0.122)	(0.123)
North × July	-0.118	-0.142	-0.143
	(0.138)	(0.136)	(0.137)
North × August	0.081	0.060	0.060
	(0.126)	(0.124)	(0.124)
North × September	0.014	-0.012	-0.014
	(0.129)	(0.127)	(0.127)
North × October	0.139	0.121	0.120
	(0.137)	(0.135)	(0.135)
North × November	0.139	0.116	0.116
	(0.149)	(0.146)	(0.146)

North × December	-0.104	-0.138	-0.139
	(0.177)	(0.175)	(0.176)
South × February	0.646	0.650	0.648
	(0.523)	(0.516)	(0.517)
South × March	0.333	0.288	0.288
	(0.549)	(0.544)	(0.544)
South × April	0.620	0.580	0.579
	(0.550)	(0.542)	(0.542)
South × May	0.775	0.738	0.738
	(0.520)	(0.512)	(0.513)
South × June	0.577	0.538	0.538
	(0.496)	(0.489)	(0.489)
South × July	0.366	0.296	0.293
	(0.504)	(0.499)	(0.499)
South × August	1.071**	1.036**	1.037**
	(0.499)	(0.492)	(0.492)
South × September	0.755	0.723	0.723
	(0.500)	(0.493)	(0.493)
South × October	0.669	0.625	0.625
	(0.502)	(0.496)	(0.496)
South × November	0.884*	0.838*	0.839*
	(0.508)	(0.502)	(0.502)
South × December	0.612	0.606	0.608
	(0.497)	(0.490)	(0.491)
First-stage residuals		0.051**	0.053**
		(0.022)	(0.022)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic		152.034	149.731

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Column 1 shows results from a standard Cox model. Columns 2 and 3 show results from a 2SRI approach using the unemployment rate at the predicted time of graduation (column 2) and the unemployment rate in the individual's country of residence in June of the year that the individual is at the most frequently observed age of graduation in their country (column 3) as instrumental variables. The graduation unemployment rate is defined using the national unemployment rate amongst individuals aged 15-74. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Complete results for the first panel are in Table S5 in the Supplementary Material.
Source: Eurostat, own calculations.

Table B6: Cox model regression results for the hazard rate of finding employment using standard errors clustered at different levels

	(1) month-year-country	(2) year-country	(3) country
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.060***	-0.060***	-0.060***
	(0.020)	(0.018)	(0.014)
First-stage residuals	0.051**	0.051**	0.051**
	(0.022)	(0.022)	(0.023)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	152.034	37.479	40.760
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.037***	-0.037***	-0.037***
	(0.014)	(0.013)	(0.013)
First-stage residuals	0.031**	0.031**	0.031*
	(0.015)	(0.015)	(0.017)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	107.575	26.043	41.739

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

Table B7: Cox model regression results for the hazard rate of finding employment using actual and predicted year-of-graduation and month-of-graduation dummies

	(1) Baseline	(2) Age of entry	(3) Predicted year and month of entry
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.060***	-0.062***	-0.047***
	(0.020)	(0.020)	(0.017)
First-stage residuals	0.051**	0.052**	0.027
	(0.022)	(0.022)	(0.018)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	152.034	154.938	138.189
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.037***	-0.041***	-0.028**
	(0.014)	(0.014)	(0.011)
First-stage residuals	0.031**	0.034**	0.017
	(0.015)	(0.015)	(0.011)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	107.575	111.456	84.437

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

Table B8: Cox model regression results for the hazard rate of finding employment using standard model and alternative instrument, by country group

	(1)	(2)	(3)	(4)	(5)	(6)
	Non-Southern European countries			Southern European countries		
	All	Male	Female	All	Male	Female
	Standard					
Graduation unemployment rate	-0.019	-0.024	-0.016	-0.025*	-0.002	-0.047**
	(0.012)	(0.016)	(0.013)	(0.015)	(0.025)	(0.019)
Individuals	4,581	1,866	2,715	1,640	665	975
Failures	3,606	1,480	2,126	1,137	462	675
	2SRI (alternative instrument)					
Graduation unemployment rate	-0.045**	-0.083**	-0.026	-0.084**	-0.033	-0.111***
	(0.021)	(0.039)	(0.022)	(0.036)	(0.079)	(0.042)
First-stage residuals	0.036	0.075*	0.014	0.075*	0.035	0.090*
	(0.023)	(0.043)	(0.028)	(0.039)	(0.083)	(0.047)
Individuals	4,581	1,866	2,715	1,640	665	975
Failures	3,606	1,480	2,126	1,137	462	675
First-stage F statistic	82.752	46.425	91.247	70.246	21.866	94.965

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. The top panel shows results from a standard Cox model. The bottom panel show results from a 2SRI approach using the unemployment rate in the individual's country of residence in June of the year that the individual is at the most frequently observed age of graduation in their country as instrumental variables. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Complete results for the first panel are in Table S5 in the Supplementary Material.
Source: Eurostat, own calculations.

Table B9: Regression results for the hazard rate of finding employment using parametric models

	(1) Exponential	(2) Gompertz	(3) Weibull
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.103***	-0.082***	-0.098***
	(0.032)	(0.026)	(0.031)
First-stage residuals	0.079**	0.067**	0.077**
	(0.037)	(0.030)	(0.035)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	152.034	152.034	152.034
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.067***	-0.053***	-0.064***
	(0.023)	(0.018)	(0.022)
First-stage residuals	0.053**	0.044**	0.051**
	(0.024)	(0.020)	(0.023)
Individuals	6,221	6,221	6,221
Failures	4,743	4,743	4,743
First-stage F statistic	107.575	107.575	107.575

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

Table B10: Cox model regression results for the hazard rate of finding employment, by sex

	(1) All	(2) Males	(3) Females
Unemployment rate of individuals aged 15-74			
Graduation unemployment rate	-0.060***	-0.058	-0.059***
	(0.020)	(0.036)	(0.022)
First-stage residuals	0.051**	0.051	0.042
	(0.022)	(0.040)	(0.026)
Individuals	6,221	2,531	3,690
Failures	4,743	1,942	2,801
First-stage F statistic	152.034	63.611	189.516
Unemployment rate of individuals aged 15-24			
Graduation unemployment rate	-0.037***	-0.025	-0.041***
	(0.014)	(0.028)	(0.015)
First-stage residuals	0.031**	0.020	0.031*
	(0.015)	(0.029)	(0.017)
Individuals	6,221	2,531	3,690
Failures	4,743	1,942	2,801
First-stage F statistic	107.575	41.199	129.244

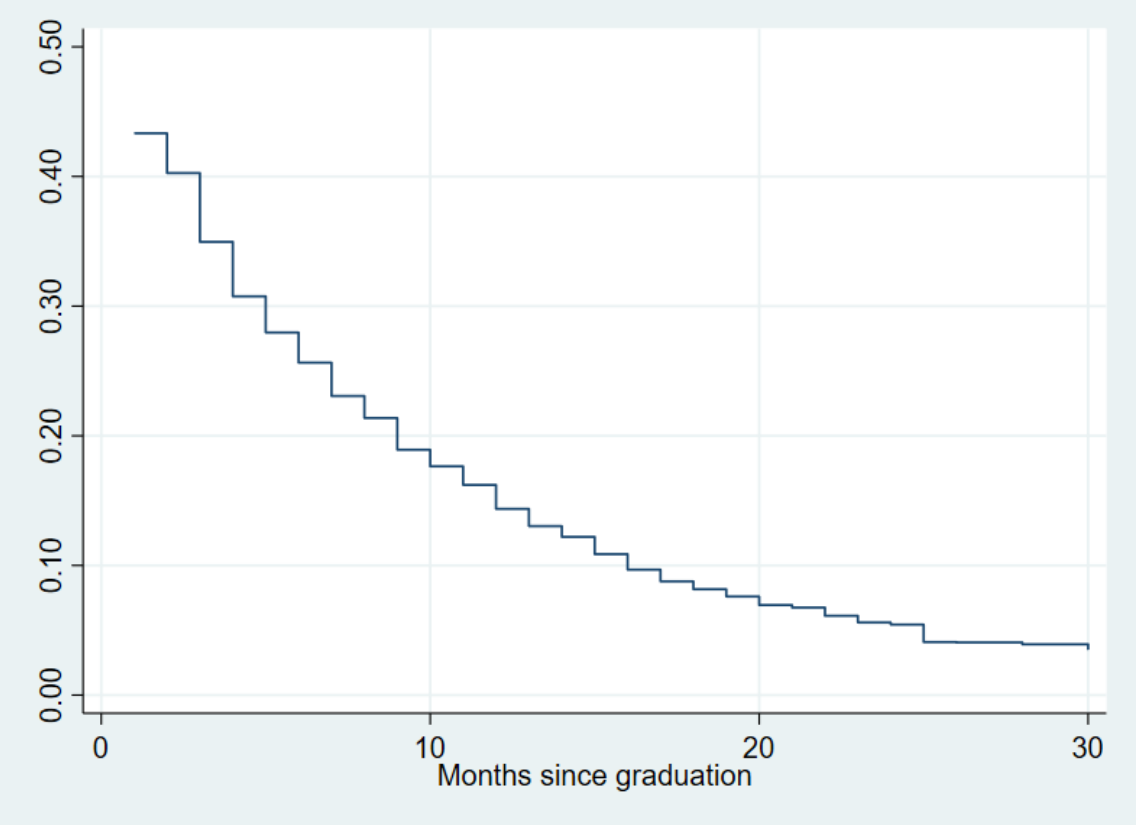
Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. Failures refer to the number of number of individuals that find employment. Sampling weights are used in the estimation. The Breslow method is used to handle individuals observed to find employment in the same month. Estimation is done by 2SRI using the unemployment rate at the predicted time of graduation as an instrumental variable.
Source: Eurostat, own calculations.

Table B11: Results for probability of being employed in high-quality occupations, by country group

	(1)	(2)	(3)	(4)	(5)	(6)
	Non-Southern European countries			Southern European countries		
	All	Male	Female	All	Male	Female
	ISCO HE					
Graduation unemployment rate	-0.010	-0.042	0.006	-0.038**	-0.107**	-0.017
	(0.012)	(0.026)	(0.012)	(0.018)	(0.052)	(0.020)
Individuals	3,172	1,316	1,856	1,069	436	633
First-stage F statistic	56.589	23.737	64.342	33.947	9.330	38.812
	ISCO 1-2					
Graduation unemployment rate	-0.014	-0.053**	0.004	-0.022	-0.075	-0.010
	(0.012)	(0.026)	(0.013)	(0.017)	(0.047)	(0.019)
Individuals	3,172	1,316	1,856	1,069	436	633
First-stage F statistic	56.589	23.737	64.342	33.947	9.330	38.812
	ISCO 1-3					
Graduation unemployment rate	-0.007	-0.045*	0.013	-0.030*	-0.053	-0.026
	(0.011)	(0.025)	(0.011)	(0.017)	(0.037)	(0.017)
Individuals	3,172	1,316	1,856	1,069	436	633
First-stage F statistic	56.589	23.737	64.342	33.947	9.330	38.812

Note: ***/**/* indicate statistical significance at the 0.01/0.05/0.1 level. Standard errors are clustered at the level of month-year-country of graduation. Models include the following control variables: an individual's sex, country dummies, country group-year-of-graduation and country group-month-of-graduation dummies. The graduation unemployment rate is defined using the national unemployment rate amongst individuals aged 15-24. Sampling weights are used in the estimation. Estimation is done by 2SLS using the unemployment rate at the predicted time of graduation as an instrumental variable. Southern European countries are Cyprus, Greece, Italy, Portugal and Spain.
Source: Eurostat, own calculations.

Figure B1: Estimated Survivor Function



Notes: The figure shows the estimated survivor function.

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