Recent graduates in employment – Understanding EU targets and drivers

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Abstract

The European Commission is working towards a European Education Area by 2025, and believes it is now time to build on the foundations of Education and Training Strategy 2020 and greatly step up the ambitions for the 2025 targets. This paper aims to contribute to the discussion on the future employability benchmark under Education and Training Strategy 2025, with an analysis of the employment levels of recent graduates relative to the employment level of the overall population. The analysis of the employability indicator for recent graduates over the period 2007-2017 shows differences in the evolution for different age groups, education attainment levels and orientation of degree.

Using panel data analysis and a limited dependent variable regression model, the macro-economic and individual characteristics that influence the employability of recent graduates are identified. At macro-level, we have identified the positive impact of economic growth on the employment of recent graduates, which varies depending on their level of education. At micro-level, we have identified several vulnerable groups: females, medium-educated recent graduates and those living in rural areas. From a policy point of view, policies easing the transition from education to employment of recent graduates are required; we have identified that it is more likely for a recent graduate to be in employment in the second and third year than in the first year after graduation.

Disclaimer: This paper includes analysis based on data from Eurostat, Labour Force Survey 2007-2016. The responsibility for all conclusions drawn from the data lies entirely with the authors of the paper.

1   Introduction and literature review

Education and training are a key part of the EU's Strategic Framework for Education and Training 2020 (ET2020) to achieve smart, sustainable and inclusive growth. The Council of the European Union requested, in May 2009, the inclusion of a European benchmark to monitor the increase in employability through education and training in the ET2020 (Council of the European Union, 2009). Following analysis by the JRC, it was decided that the benchmark should be an increase in the employment rate of graduates (20-34 year olds) having left education, measured as an average of employment rates 1, 2 and 3 years after graduation, of at least 5 percentage points by 2020 (Garrouste, 2011). As a result, in 2012 the ET2020 monitoring benchmark on employability was set to: "the share of employed graduates (20-34-year-olds) having left education and training no more than three years before the reference year should be at least 82%" (European Commission, 2012). This target on recent graduates' employability is part of a set of other targets to be achieved by EU Member States by 2020, including reducing early school leaving, increasing the share of higher education graduates and increasing the share of adults participating in lifelong learning.

Since this benchmark was set in 2012, the employment rates of recent graduates at EU level have continued to improve, from 75.9% in 2012 to 80.2% in 2017, which is not far from the goal of 82%. However, the situation differs widely among Member States, ranging from 52.5% in Greece to 95.2% in Czech Republic.

The European Commission is working towards a European Education Area by 2025 and believes it is now time to build on the foundations of ET2020 and greatly step up the ambitions for ET2025 (European Commission, 2017). The discussion of the future of ET2020 benchmarks will start soon and should be officially presented by the Commission before the end of the current mandate.

Therefore, this paper aims to contribute to the discussion on the future employability benchmark under ET2025, with an analysis of the employment levels of recent graduates and/or young people relative to the employment level of the overall population. A secondary objective is to understand the drivers behind the employment rate of recent graduates, and whether these drivers differ from the ones for the employment rate of the overall population.

The employability of young graduates represents a proxy measure for the success rate of young people with different education levels to find employment after graduation. The empirical analysis is based on the Cedefop[1] definition of employability: "The combination of factors which enable individuals to progress towards or get into employment, to stay in employment and to progress during career." (Cedefop, 2008, p. 71) Therefore, the main drivers of employability of individuals included in the empirical analysis are: the personal attributes (including characteristics and skills that enable an individual to obtain a job); the environmental and social contexts (e.g. labour market institutions); and the economic context. Through the paper, recent graduates are defined as in the ET2020 monitoring benchmark: "20-34-year-olds having left education and

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[1] European Centre for the Development of Vocational Training.

training no more than three years before the reference year" (European Commission, 2012). The role of education and training systems is to ensure a smooth transition to work of certain labour groups when socio-economic factors affect them negatively. In the case of recent graduates, the responsiveness of the education and training systems to labour demand is measured by the time interval between education and first job, i.e. the lower the time interval the better is matched the recently graduated labour supply to labour demand (Garrouste, 2011).

The European Commission (2016) suggests considering different measures to increase the employability of recent graduates: labour market forecasting (analysis of the demand/supply of skills), involvement of employers in external quality assurance procedures, incentivising student work placements, providing career guidance and the use of graduate tracking surveys.

1.1   Literature review

There are different possibilities to study the employability of recent graduates. Garrouste and Rodrigues (2012) studied the determinants of the employability of young graduates in Europe. Through the use of LFS data, they estimate a probit model with various breakdowns, for example by education level (measured using ISCED level) and by type of contract. They conclude that the contribution of educational attainment is significant for employability, even after controlling for labour market contextual variables. Sarkar *et al.* (2016) analysed the issue from the point of view of both Science graduates and employers. More specifically, the data analysis focused on the potential mismatch between the skills developed during undergraduate studies and those required by post-graduation activities and employers. Their conclusions are of a qualitative nature, such as that generic skills have a higher level of usefulness in workplaces compared to discipline-specific knowledge and skills and that clear and useful career advice at an early stage of a degree programme would be helpful for graduates. Moreover, the field of study plays a significant role in the employability of young graduates across countries and time (Garrouste & Rodrigues, 2014).

In addition to the field of study, gender has an impact of the probability to find employment. Vuorinen-Lampila (2016) found that men were able to secure permanent and full-time employment more often than women and achieved a better correspondence between their degree and their employment. This aspect is not limited only to the recent graduates. The employment prospects over time of the older cohort (aged 50-64) compared with the benchmark cohort aged 45-49 indicate some "catching-up" phenomenon with older cohorts looking increasingly like prime-age ones, with substantial differences between men and women, pointing to the need to take the gender dimension into account when considering labour market policies (Aliaj, Flawinne, Jousten, Perelman, & Shi, 2016).

Using a sequential logit approach, Livanos and Nuñez (2016) assessed the impacts of level of education and academic field of study on transitions into different labour market outcomes. Their study found that employability of graduates is higher for more specific and technical academic fields, i.e. degrees linked with professions lead to better employment prospects. The pan-European analysis shows that institutional variables (level of stratification and quality of

higher education institutions) have a significant impact on graduates' employment prospects.

When a cyclical downturn hits the economy, the incidence of overeducation of university graduates[2] can be expected to increase (Croce & Ghignoni, 2012). During recovery periods, labour market policies favouring increases in R&D expenditures and in the percentage of employees in high-skilled occupations should be used.

In addition to overeducation, graduates that followed long studies gaining advanced degrees are more likely to be exposed to temporary work (Calmand, Frontini, & Rostan, 2007). Moreover, European higher education systems are helping their graduates to find their way in a more changing environment, and only after five or six years after graduation, almost 70% of European graduates managed to reach a satisfactory or very satisfactory working position (Calmand, Frontini, & Rostan, 2007).

The literature review peformed by Brada and Signorelli (2012) found that young people are the most vulnerable segment in the labour market in many European countries. There is a need for targeted policies involving the design of the educational system and the school-to-work transition institutions in order to shorten the time for transition-to-work and to improve the education-to-job matching (Brada & Signorelli, 2012). Active labour market programs (ALMPs) are used to help boost employment, tackle unemployment, offer upskilling training etc. In over 200 recent studies of ALMPs, Card *et al.* (2018) found that average impacts of ALMPs on employment are close to zero in the short run, but become more positive 2-3 years after completion of the program.

Higher economic growth, a lower share of youth in the population, a higher share of service employment and targeted ALMP lead to lower youth unemployment (Gomez-Salvador & Leiner-Kilinger, 2008). Banerji, Lin and Saksonovs (2015) studied the cyclical and structural explanatory factors on both youth and adult unemployment between 1980 and 2012 using a panel regression model to estimate a version of "Okun's law"[3]. They conclude that the youth unemployment rate is more sensitive to economic growth than the adult unemployment rate. Beside output, labour market features like tax wedge, minimum wage relative to the median, spending on ALMP, unemployment benefits, availability of vocational training and labour market duality also matter for the determination of unemployment.

Workers' participation in education and training is also strongly influenced by their socio-economic background: age and education levels are prominent factors determining formal and informal education attendance (Beblavý, Thum, & Potjagailo, 2013).

The following research questions arise from the literature review.

- If the ET2025 target for recent graduates in employment should be increased compared to the previous target, by how much should it be increased?

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[2] Workers are defined as overeducated if the number of years of schooling corresponding to their school degree is more than one standard deviation above the mean of all individuals in their occupation (Croce & Ghignoni, 2012)

[3] i.e. the existence of a negative relation between unemployment and output.

- What are the drivers behind the increase in the recent graduate employment rate?
- What measures should be the focus of active labour market policy in order to reach and exceed the ET2025 target?

2 Empirical methodology

To answer the research questions, the methodological approach used is a combination of panel data regression analysis and a limited dependent variable model approach. The results of the regression analysis are then analysed in view of current and future policy initiatives, such as the Youth Guarantee Fund and the New Skills Agenda. The two types of analysis allow us to assess the suitability of the current benchmark (82%) and make suggestions for ET2025.

2.1 Panel data regression analysis (the macro-level analysis)

The first step of the analysis investigates the determinants of employment of recent graduates from a macroeconomic perspective. A panel data regression among the EU28 Member States is performed for the period 2007-2017, using the employment rate of recent graduates, broken down by level of education, and of the 35-64 cohort (which will also be called the "older cohort" in the rest of the paper) as dependent variables and various macroeconomic variables as regressors.

Following the literature and economic theory, we control for the effect of the economic cycle through output growth. The observed negative relation between unemployment and output growth is known as Okun's law, named after its proponent Arthur Okun in 1962. Building on this result, the literature (Banerji, Lin, & Saksonovs, 2015) has identified a higher sensitivity of youth unemployment (i.e. unemployment in the 15-24 age band) to the business cycle, compared to unemployment of older cohorts. We include contemporaneous and lagged output growth in the regression to test the sensitivity of employment of recent graduates to the business cycle, and if being a recent graduate makes a difference compared to the older cohort, possibly shielding them from the negative effects of the downturn. We expect the coefficient on recent graduates to be higher than the coefficient on the older cohort.

Hypothesis 1: Recent graduates are more sensitive to the economic cycle than the older cohorts.

The educational attainment of the population is a key variable in determining the productivity of the economy. Usually labour status improves as a function of the level of educational attainment (OECD, 2017). As shown in section 3.1, recent tertiary graduates indeed experience higher employment than upper secondary recent graduates. Therefore, we run separate regressions for recent graduates in ISCED 3-4 and ISCED 5-8, to check if the regressors have a different impact depending on the educational level. We also control for the share of individuals with the corresponding educational attainment within the age cohort, to control for possible supply effects. Theoretically, and if all else remains equal, an increase in the supply of a certain educational level should be accompanied by a decrease in the employment rate for individuals with that attainment.

Hypothesis 2: Estimation results might be different depending on educational attainment.

We control for demographic trends by adding the ratio of population aged 20-34 and population aged 35-64, similar to Gomez-Salvador and Leiner-Killinger

(2008). If all else remains equal, an increase/decrease in the supply of workers of a given age band should reduce/increase the employment rate. This is particularly important, given also the ageing of the population and the expected decrease of the labour force in the age band 20-34, as forecast, for example, in the Cedefop Skills forecast (2018). Thus, we expect the coefficient to be negative.

Hypothesis 3: An increase in the supply of 20-34 year-olds compared to 35-64 year-olds will have a negative impact on the employability of recent graduates.

We control for the inactivity rate of the respective cohorts. In this way, we determine if falling employment rates resulted in increases in inactivity rather than unemployment. Given the increase in the NEET rate and in people returning to education, we expect this relation to be significant, possibly changing magnitude depending on the cohort.

Hypothesis 4: Higher inactivity rates are negatively associated with employment rates.

Member States have in place Active Labour Market Policies (ALMP) to support employment. There are a variety of ALMP, with different targets and focus. Here we control for spending on ALMP that might be relevant for recent graduates, namely expenditure on training, employment incentives, direct job creation and start-up incentives. We thus verify if those measures were helpful in supporting recent graduates during the downturn and subsequent recovery. We also estimate a version of the baseline model augmented with the inclusion of ALMP expenditure per participant allowing for a lag of up to 5 years.

Hypothesis 5: An increase in ALMP spending per participant would lead to higher employment rates of recent graduates.

Finally, we control for the yearly percentage change in employment for the overall 20-64 cohort, to verify how the different groups' employment rates move with variations in total employment.

Therefore, we test the following baseline panel data model:

$$y_{c,t} = GDP_{c,t} + GDP_{c,t-1} + popratio_{c,t} + inactivity_{c,t} + \alpha_c \qquad (1)$$

Where:

- *c* denotes the country;

- *t* the year;

- $y_{c,t}$ in the baseline denotes the employment rate for recent graduates.

- *GDP* denotes the yearly growth rate in GDP.

- *popratio* is the ratio between the 20-34 cohort and the 35-64 cohort, both with ISCED11 3-8.

- *inactivity* denotes the inactivity rate for the 20-34 age band.

- α_c represents the country fixed effects and allows us to control for country-specific characteristics that don't change over time and that might be correlated with the regressors.

Then we estimate two other equations with the employment rate of recent graduates broken down by educational attainment as a dependent variable, i.e. one equation for recent secondary graduates and one equation for recent

tertiary graduates. We include in these equations also the share of secondary educated and tertiary educated within the 20-34 cohort, respectively.

Hypothesis 6: The share of educational attainment of 20-34 year-olds should have a negative impact on recent graduate employability.

The baseline model is estimated also with the employment rate of the 35-64 cohort as a dependent variable, taking into account the appropriate inactivity rate. Finally, we estimate two further equations, with the employment rate for recent graduates and for the 35-64 cohort as the dependent variable and include the yearly percentage change in the employment rate of the 20-64 cohort.

Hypothesis 7: Changes in overall employment should have more impact for recent graduates than for the older cohort.

2.2 The limited dependent variable model (the micro-level analysis)

The second step of the analysis investigates the determinants of employment of recent graduates from a microeconomic perspective. A probit approach[4] and a linear probability model (LPM) are used to identify the determinants of the probability of 20-34-year-olds being employed 1 to 3 years after graduation. We build our approach on that of Garrouste and Rodrigues (2012), enriching it with more recent data and further analyses.

The probability of recent graduates being employed is estimated as a function of observable individual characteristics, country-specific factors and year of the survey as specified in the following probit model:

$$P(y_i = 1|x_i) = \Phi(\alpha_0 + x_i\beta + \alpha_c + \alpha_y + \alpha_c * \alpha_y) \qquad (2)$$

and the following LPM:

$$P(y_i = 1|x_i) = \alpha_0 + x_i\beta + \alpha_c + \alpha_y + \alpha_c * \alpha_y \qquad (3)$$

Where y_i is equal to 1 if the recent graduate is employed at the time of the survey and 0 otherwise;

x_i represent the vector of observed individual characteristics that help us explain the difference between the employed and unemployed recent graduates;

α_c captures the country fixed effects, i.e. the unobserved variation due to institutional factors that does not change within country, but allows for intra-EU differences;

α_y capture the fixed effect of the year of survey to determine if the years are significantly different from each other.

$\alpha_c * \alpha_y$ is the interaction between year and country as a proxy for unobservable labour market characteristics.

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[4] A probit model is preferred to a logit model since we are trying to measure a proportion rather than a binary outcome (Garrouste & Rodrigues, 2012). We are aware that fixed effects probit estimation faces the incidental parameters problem even when using 10 years of data (Greene, 2004). Therefore, a linear probability model is also used.

Equations (2) and (3) depict the general models to estimate. They assume that the probability of the recent graduate *i* to be in employment in year *y* is the expectation of $y_i = 1$ conditional on a transformation of a set of explanatory variables x_i. In the case of the probit model, the transformation function is assumed to be the cumulative standard normal distribution function and the explanatory variables individuals' characteristics. To ensure the representativeness of the estimates, the parameters β are estimated by maximum likelihood with individual weighting factors from the survey. In the case of LPM, the parameters β are estimated by the multiple linear regression model.

The observed individual characteristics include the age (from 20 to 34), the gender, the educational attainment of the highest degree (either ISCED 3-4 or ISCED 5-8), the time since graduation (1, 2 or 3 years before), country of birth, degree of urbanisation where the respondent lives, and field of study of the highest educational level attained. These characteristics were chosen based on the literature and with a view to adding new insight to the ET2025 debate.

We control for gender of young graduates since there is evidence in the literature that males are more likely to find employment than females (Vuorinen-Lampila, 2016; Garrouste & Rodrigues, 2012).

Hypothesis 8: Female recent graduates are less likely to find employment than their male counterparts.

Increasing the education level of the labour supply is at the heart of ET2020. In addition to the employability target for recent graduates, ET2020 aims to reduce early leavers from education and training to below 10% and to reach 40% tertiary educational attainment among 30-34 year olds (European Commission, 2018). The data analysis in section 3.1 shows that recent tertiary graduates experience higher employment rates than upper secondary recent graduates. Therefore, we control for the highest education attainment level (i.e. medium or high[5].

Hypothesis 9: Recent graduates with high educational attainment (ISCED5-8) are more likely is to be in employment than their medium educated (i.e. ISCED 3 or 4) counterparts.

Among medium-educated recent graduates, the data analysis in Section 3.1 shows that recent graduates with a vocational orientation of the upper secondary degree have higher employment rates compared to those with a general orientation of the degree.

Garrouste and Rodrigues (2012) found that the probability of employment increases with the time since graduation. Similarly, we test if the time elapsing since graduating affects the probability of being employed.

Hypothesis 10: Time elapsed since graduation affects the employability of recent graduates.

Other individual characteristics being tested are age, country of birth, the existence of children and degree of urbanisation of the area where the

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[5] We also run the analysis on samples split by education level (ISCED 3-4 and ISCED 5-8), to check if the other regressors have a different impact depending on the educational level, but the results are not reported here.

respondent lives. The latter is a proxy for regional effects on employment opportunities. We expect that recent graduates are more likely to be employed if they live in an area with a higher degree of urbanisation. The country of birth is a broad proxy for migrant background, which we expect to have a negative impact on the employability of recent graduates. Some characteristics related to the quality of employment, i.e. temporary and part-time contracts, and over-qualification in the current occupation, were also tested. We assume that recent graduates are more likely to be employed be employed in less-than-desirable working conditions.

A dummy variable for the field of study of the highest educational attainment level is added to assess whether the field of study affects the employability of recent graduates. We assume that the sectoral breakdown of the EU economy influences the employment rates of graduates from different fields, i.e. employment demand in different sectors will influence the number of employed graduates if the field of study is linked to a specific sector.

3 Data

In this paper, we use data from different sources for different parts of the analysis. For the panel data model, we use Eurostat (2018) data for the period 2007-2017, all EU member states. The micro-level analysis pools together cross-sections from the European Union Labour Force Survey for the period 2007-2016 focusing on 27 EU member states. The authors did not receive access to the German micro-dataset for this analysis.

3.1 Analysis of employment level of recent graduates (macro analysis)

Firstly, an analysis of publicly available data from Eurostat (2018) is performed to identify the historical trends in the share of recent graduates in employment compared to other older cohorts. The data analysis presented below investigates the employment level of recent graduates with different characteristics, for example by educational level (measured using ISCED11 level) and gender, and compares it to other macroeconomic variables such as GDP and the labour status of other age groups.

Figure 1 shows the EU-28 employment rates for different age bands (left axis) and EU-28 GDP growth from 2007 to 2017. When RGDP fell due to the economic crisis in 2009, employment rates of the 20-34 age group, both recent graduates and not, decreased by around 4 pp, while the employment rates of the 35-49 age group stayed broadly constant. Only the employment rate for the 50-64 age band slightly increased. Starting from 2013, the employment rates of all age groups increased, some at a slower pace than others.

Figure 1 Employment rates by age and RGDP growth, EU-28, 2007-2017
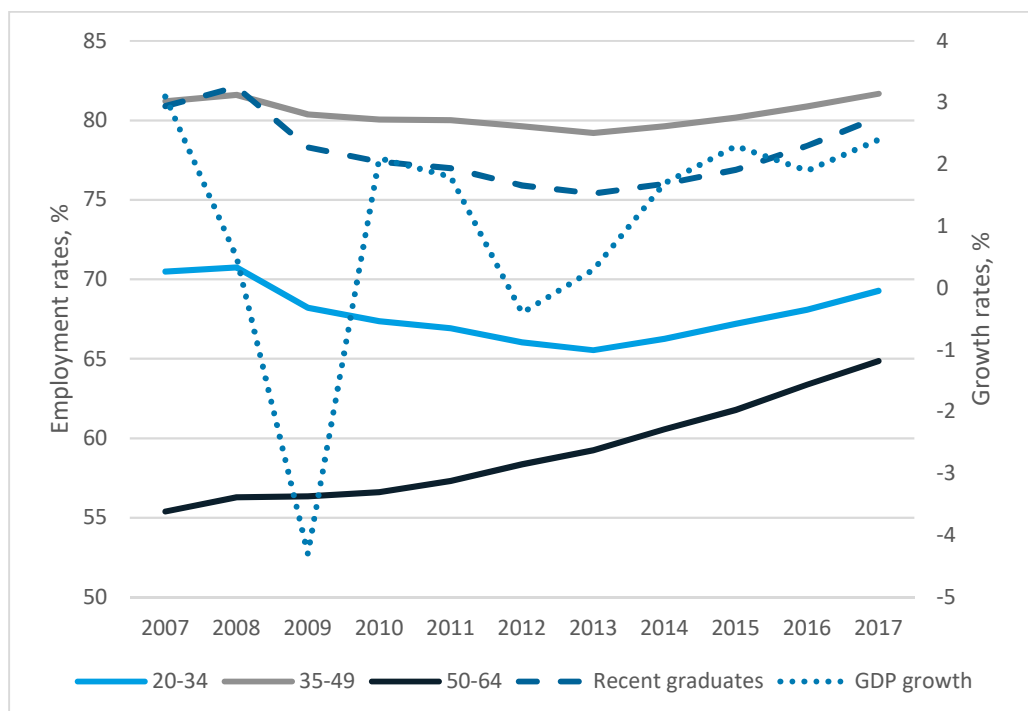
Source: Eurostat (edat_lfse_24, lfsa_egaed, lfsa_pgaed, naida_10_gdp)

Figure 1shows that this higher sensitivity is observed also for the 20-34 age group, which suffered a higher loss in employment compared to older cohorts during the economic crisis. Recent graduates have higher employment rates in levels compared to the overall 20-34 age band, but the evolution (growth) of the employment rates in the 2007-2017 period is the same in both groups.
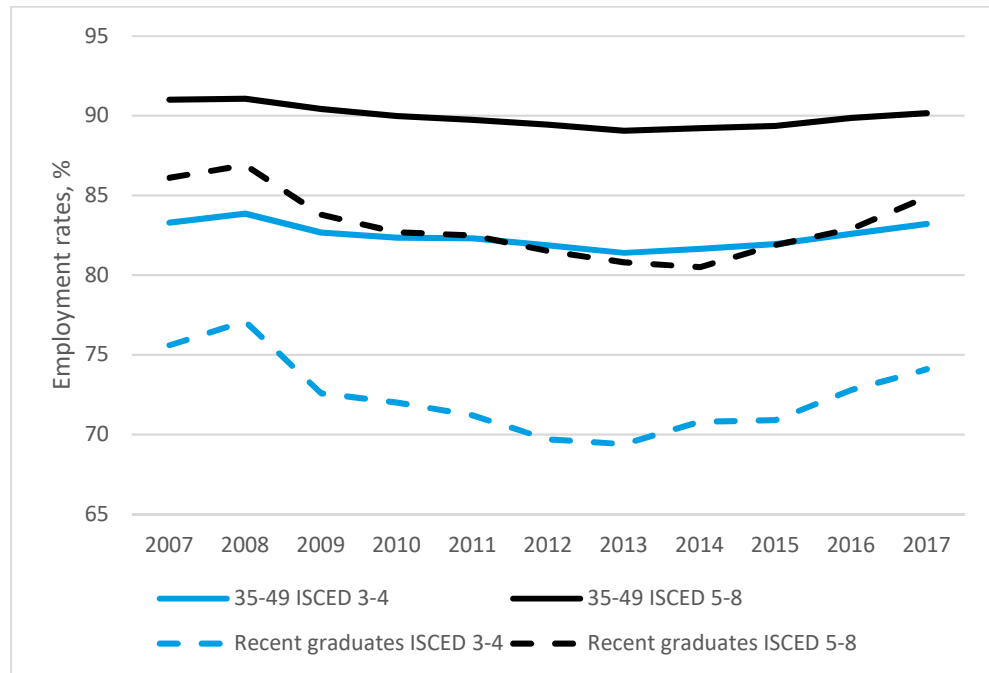
Figure 2 Employment rates by age bands, EU-28, 2007-2017
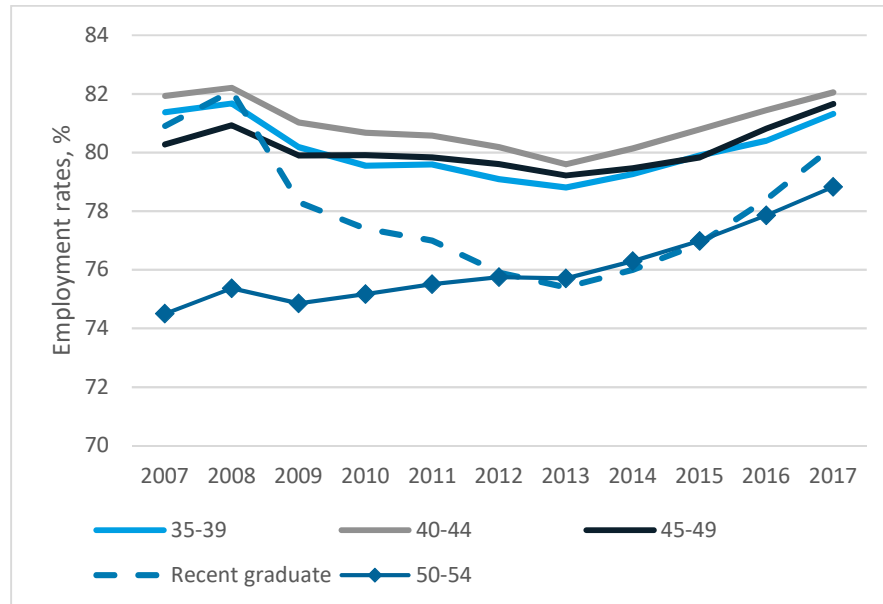
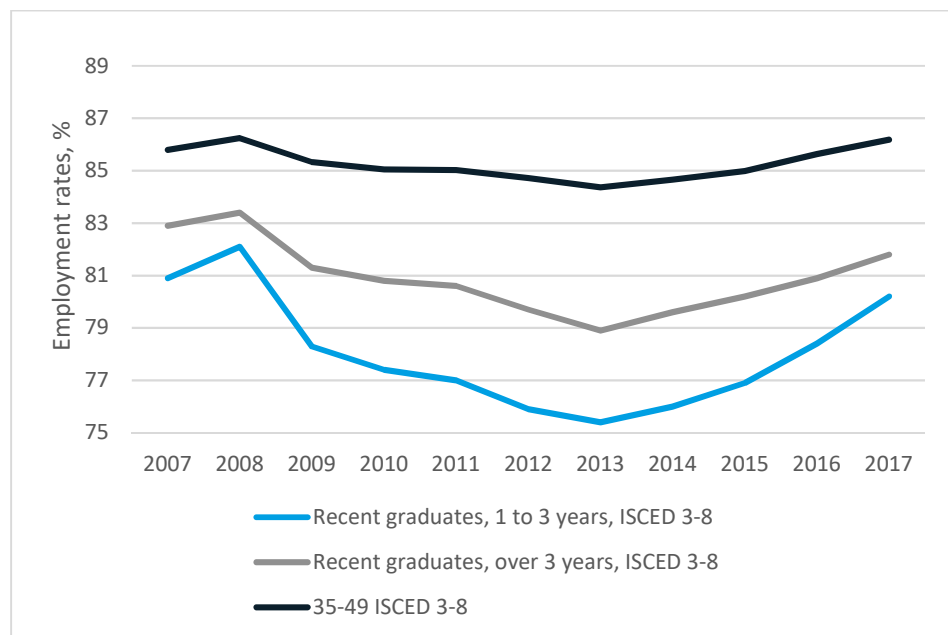Source: Eurostat (edat_lfse_24, lfsa_egaed, lfsa_pgaed)

The question remains how different the employment rates of recent graduates are from the older cohorts. Figure 2 provides a more detailed breakdown of the age bands older than 34. The employment rates within the 35-49 age bands have broadly the same magnitude and the same evolution over the period with both higher and more stable employment rates than recent graduates. The employment rate of the 50-54 age band basically increased throughout the period. Therefore, there is a need to make those 20-34 age groups less vulnerable to economic cycles and the answer might be an increase in educational attainment.

Figure 3 breaks down recent graduates and the 35-49 year-olds by level of education (measured by the ISCED level). In both groups, tertiary educated (ISCED11 5-8) enjoy higher employment compared to secondary educated (ISCED11 3-4). However, recent graduates have lower employment rates and more volatile dynamics compared to 35-49 year-olds with the same educational attainment. Therefore, education alone does not make recent graduates less sensitive to deteriorating economic conditions.

Figure 3 Employment rates of recent graduates and 35-49 age band by education, EU-28, 2007-2017

Source: Eurostat (edat_lfse_24, lfsa_egaed, lfsa_pgaed)

The recent graduates considered are individuals in the 20-34 age bands that graduated 1 to 3 years before the survey. Individuals in the same age band that graduated more than 3 years before the survey might have different outcomes. Figure 4 shows that 20-34 year old individuals that graduated more than 3 years ago enjoy higher employment rates than their peers who graduated less than 3 years ago (still lower than 35-49 year olds with the same education), but the evolution during the period is broadly similar.

Figure 4 Employment rates of recent graduates, by date of graduation, EU-28, 2007-2017

Source: Eurostat (edat_lfse_24, lfsa_egaed, lfsa_pgaed)

The above analysis suggests the existence of vulnerabilities in the employment outcomes of the 20-34 age band that lead to jobs losses during downturns, making the transition from education to work for recent graduates more difficult.

Figure 5 Labour status within the 20-34 age band
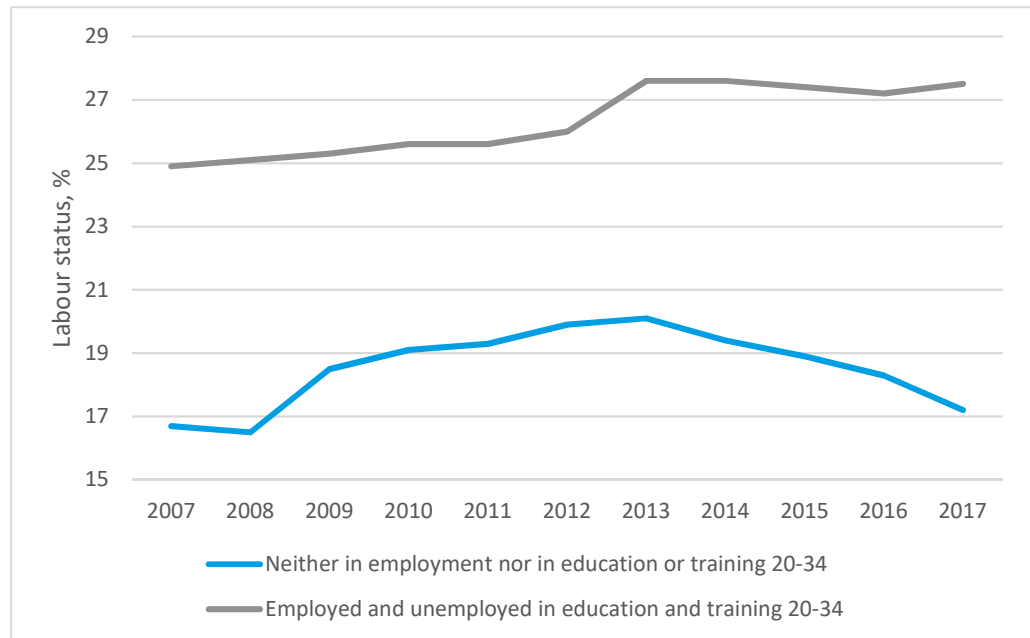
Source: Eurostat (edat_lfse_18)

Figure 5 shows the evolution of activity and inactivity rates of 20-34-year-olds. After 2008, the rate of 20-34 years old not in employment nor in education or training (the so-called NEET rate) increased markedly, reaching a peak in 2013 at 3.6 pp higher than 2008 and declining afterwards, mirroring the trajectory of the employment of recent graduate over the same period. This means that many recent graduates might have been unable to transition smoothly from education to work. On the other hand, the number of employed and unemployed people pursuing an education also increased from 2007 to 2013, by around 2.5 pp, and then staying broadly constant afterwards. These developments signal the difficulties that individuals in the age band 20-34 experienced in the last 10 years in the transition from education to work. Continuing education is beneficial for society and might be the effect of increased competitiveness in the labour market. However, it is likely that many people continued education because of a lack of opportunities in the labour market following the economic downturn.

Figure 6 Recent graduates by education (ISCED11 level), gender and orientation of the degree
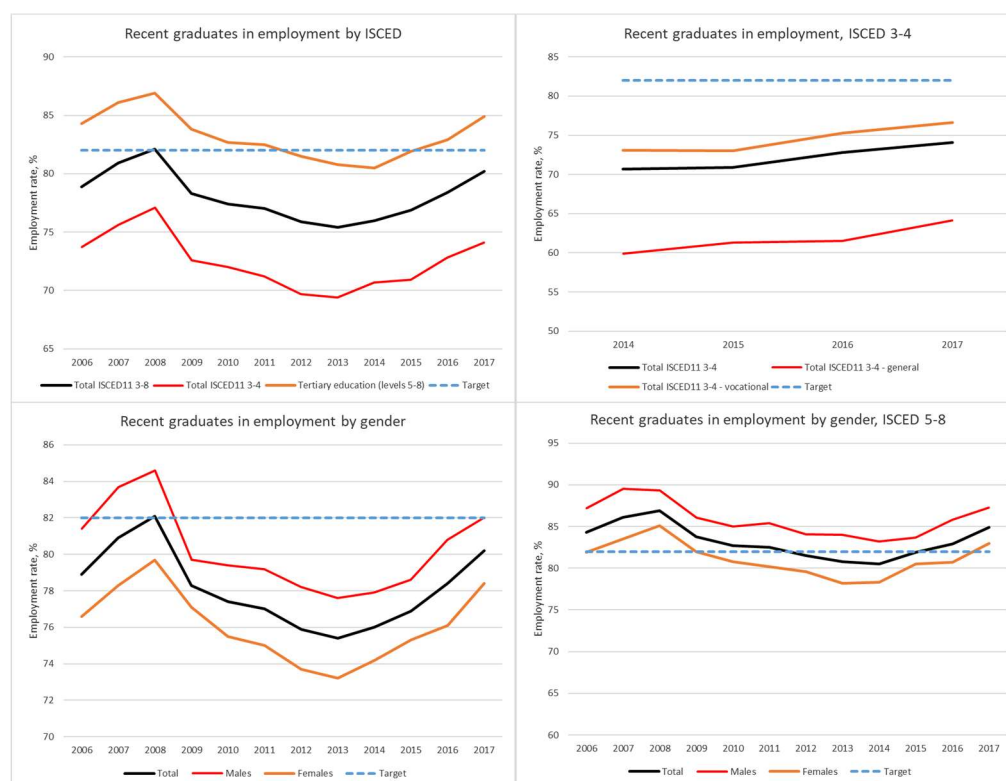
Source: Eurostat (edat_lfse_24)

Figure 6 shows various breakdowns of the recent graduates' employment rate in relation to the 82% target set by ET2020. In the upper left panel (see also Figure 3), it is possible to see that graduates with tertiary education enjoy a 10 pp higher employment rate than graduates with medium education and the first groups have already surpassed the 82% target. Within medium education, graduates in vocational programmes have employment rates that are 13 pp higher than graduates in general programmes. Looking at the gender breakdown, it is seen that males in general have higher employment rates than females and have reached the 82% target in 2017. The same pattern is present within graduates from ISCED11 5-8, although in this case both genders have met the target by 2017. Therefore, to push the overall indicator above the target, policy measures should target the ISCED11 3-4 group, promoting in particular vocational training. It must also be understood what drives the different performances of male and female recent graduates and implement measures that could help in reducing the gap.

3.2 Eurostat Labour Force Survey 2007-2016[6] (micro analysis)

In this paper, we pool together 10 cross-sections (years) of the EU LFS micro-datasets – a quarterly household sample survey of persons aged 15 and older living in private households.[7] Our analysis is restricted to persons aged 20-34 in 27 EU Member States[8] for the period 2007-2016. Furthermore, we identify

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[6] The responsibility for all conclusions drawn from the data coming from Eurostat Labour Force Survey 2007-2017 lies entirely with the authors of the paper.

[7] Eurostat, Labour Force Survey (https://ec.europa.eu/eurostat/web/microdata/labour-force-survey).

[8] The authors did not have access to the German micro-dataset. Micro-dataset from Malta starts in 2009.

the recent graduates in the sample following the definition of the benchmark indicator: individuals aged 20-34, with the highest level of education ISCED 3-6, graduating one to three years before the reference year, and that are not currently engaged in education and training.

Table 1 presents the list of the EU LFS variables included in the empirical analysis. Some of the variables were just used to create the recent graduate and the over-qualification by occupation dummy variables.

Table 1. Variables from EU-LSF used in the empirical analysis

Variable	Description
COUNTRY	Country
COUNTRYB	Country of birth of the respondent
AGE	Age of the responded in the year of the survey
SEX	Gender: 1= Male; 2= Female
COURATT	Attendance to taught learning activities (non-formal education) in the last 4 weeks 1=Yes; 2 = No
EDUCSTAT	Student or apprentice in regular education during the last 4 weeks (formal education)
HAT97LEV / HAT11LEV	Highest educational attainment (before 2014 using ISCED97; after 2014 using ISCED11)
HATYEAR	Year when this level was successfully completed
ILOSTAT	Working status according to ILOSTAT definition
FTPT	Full-time or part-time job distinction
TEMP	Permanency of the job: 1=permanent contract 2=temporary contract
HATVOC	Orientation of the degree in the highest education level: vocational or mainstream
DEGURBA	Degree of urbanisation: 1 = Cities (densely-population area); 2 = Towns and suburbs (intermediate density area); and 3 Rural area (Thinly populated area)
HATFIELD	Field of highest level of education or training successfully completed
HHCHILDR	Presence of the children of the person in the household (1 or 2 means the person has children)
ISCO3D/ IS883D	Occupation (ISCO-08/ ISCO-88, 3 digits)

Source: Eurostat, Labour Force Survey 2017 User Guide

The descriptive statistics of the variables used in Equations (2) and (3) can be found in the Table A.2 of the Appendix.

4 Determinants of employability of recent graduates

4.1 Macro-level determinants

Table 2 shows the results of the panel data regression model (1) performed on publicly available macroeconomic data. Columns 1 to 4 show the baseline model specification for different groups, namely recent graduates ISCED 3-8, recent graduates ISCED 3-4, recent graduates ISCED 5-8 and the 35-64 cohort with ISCED 3-8. As expected, the coefficients of RGDP growth and its lag are positive and significant for all educational groups. By comparing the RGDP coefficient between column 1 and 4 it is clear that the older cohort is less sensitive to output fluctuations than the younger cohort included in recent graduates, as already evidenced by the literature on youth unemployment: a 1% contemporaneous growth in RGDP leads to a 0.24 (0.05) pp increase in employment for recent graduates (older cohort), while a 1% growth in lagged GDP leads to an increase of 0.541 (0.231) pp . It is interesting to note, however, how the educational level of recent graduates impacts their employment outcome in the business cycle: both the contemporaneous and lagged RGDP growth have a higher impact on secondary recent graduates than on tertiary recent graduates. Therefore, a higher attainment seems to provide a partial protection from the state of the business cycle.

The population ratio has a positive sign for all groups, thus not confirming Hypothesis 3. At the EU level, the 20-34 cohort is declining, while the 35-64 cohort is increasing. The positive coefficients on the ratio for all groups means that the employment rate for recent graduates (which belong to the 20-34 cohort) has decreased, on average, together with their relative share, while the opposite holds true for the 35-64 cohort. This result goes in the opposite direction to what might theoretically be expected: a decrease in the supply of a certain cohort, all else equal, should lead to higher demand for the remaining labour of that particular cohort. In this case a decrease in supply was accompanied by a decrease in the employment rate, signalling a shortage of working opportunity throughout the period for the 20-34 cohort. Also, in this case, the coefficients are larger for recent secondary graduates and lower for the older cohort.

As expected in Hypothesis 4, the inactivity rate is negatively correlated with the employment rate for all groups. A 1 pp increase in the inactivity rate is associated with a decrease of 1.47 pp in the employment rate of recent secondary graduates. Interestingly, this time the coefficient is larger for the older cohort than for recent graduates with tertiary education: a 1 pp increase in the inactivity rate leads to a decrease of 0.73 pp in the employment rate of the older cohort compared to a decrease of 0.62 pp for recent tertiary graduates. Hence, the answer to the fall in employment rate for recent tertiary graduates had more to do with unemployment than activity, at least to a greater extent than the other two groups.

Table 2 Panel regression analysis

VARIABLES	(1) Recent graduates, ISCED11 3-8	(2) Recent graduates, ISCED11 3- 4	(3) Recent graduates, ISCED11 5- 8	(4) Employment rate of 35-64 year olds	(5) Recent graduates, ISCED11 3-8	(6) Recent graduates, ISCED11 3-8	(7) Employment rate of 35-64 year olds
RGDP growth	0.238***	0.268***	0.205***	0.0488**	0.240***	0.156***	0.0463*
	(0.0365)	(0.0740)	(0.0453)	(0.0187)	(0.0402)	(0.0433)	(0.0246)
RGDP growth t-1	0.541***	0.720***	0.413***	0.231***	0.453***	0.142**	0.0967**
	(0.0785)	(0.103)	(0.0662)	(0.0371)	(0.0649)	(0.0609)	(0.0378)
Population ratio (20-34/35-64)	0.253***	0.334***	0.183***	0.135**	0.300***	0.263***	0.121**
	(0.0604)	(0.0803)	(0.0579)	(0.0493)	(0.0733)	(0.0591)	(0.0443)
Inactivity rate 20-34	-0.949***	-1.481***	-0.663***		-0.987***	-0.752***	
	(0.204)	(0.248)	(0.183)		(0.275)	(0.198)	
ALMP per capita					0.188***		
					(0.0584)		
ALMP per capita t-1					-0.0232		
					(0.0356)		
ALMP per capita t-2					-0.0765		
					(0.0521)		
ALMP per capita t-3					-0.00680		
					(0.0554)		
ALMP per capita t-4					0.0642		
					(0.111)		
ALMP per capita t-5					0.112**		
					(0.0489)		
Share of population with ISCED11 3-4 within 20-34 cohort		0.0632					
		(0.155)					
Share of population with ISCED11 5-8 within 20-34 cohort			-0.143**				
			(0.0638)				
Inactivity rate 35-64				-0.733***			-0.650***
				(0.125)			(0.121)

Employment rate 20-64 % change						0.216**	0.0189
						(0.0979)	(0.0660)
Employment rate 20-64 % change t-1						0.800***	0.300***
						(0.110)	(0.0451)
Constant	83.12***	79.73***	90.51***	86.21***	80.01***	78.47***	85.10***
	(6.771)	(12.74)	(6.374)	(2.601)	(9.279)	(6.407)	(2.486)
Observations	308	308	308	308	235	308	308
R-squared	0.484	0.481	0.416	0.513	0.567	0.583	0.572
Number of countries	28	28	28	28	27	28	28
Robust standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Each regression controls for year fixed effects, country fixed effects.
Source: Cambridge Econometrics analysis based on Eurostat data

It is interesting to note the different impact that the share of individuals by educational attainment has on recent graduates, depending on their level of education. The coefficient for tertiary graduates is, as expected in Hypothesis 6, negative, meaning that an increase in the supply of tertiary graduates, all else equal, is associated with a reduction in the employment rate. Given the trend toward a more educated population, this finding highlights the need for policies that could smooth the transition from university to work for recent tertiary graduates. On the other hand, this supply effect is insignificant for recent secondary graduates, suggesting the insensitivity of demand for this level of education to its supply.

In column 5 of Table 5, we control for the impact of Active Labour Market Policies (ALMP) spending, per participant, on employment outcomes for recent graduates, up to 5 years in the past. Contemporaneous spending seems to have a positive impact on the employment outcome: a thousand euro more of expenditure per participant is associated with an increase in the employment rate of 0.19 pp. ALMP t-2 to t-4 have no impact, while ALMP t-5 has a positive and significant at the 10% level coefficient. Findings on ALMP at this level are difficult to interpret (Bassanini & Duval, 2006) since our results show that the impact of ALMP on employment of recent graduates become more positive 5 years after completion of the program.

In columns 6 and 7 of Table 5 we control for the percentage change in the total employment rate (20-64 cohort) for recent graduates and for the older cohort. It is interesting to see how the dynamics of total employment are driven by the younger cohort, in this case represented by recent graduates: the coefficient on contemporaneous total employment rate is insignificant for the older cohort, while the one on the lagged employment rate is less than half of the one for recent graduates (0.3 versus 0.8). This result was broadly expected given the discussion in section 3.1. Note that the coefficient on RGDP growth diminishes somewhat, particularly for the older cohort, when taking into account changes in the total employment rate.

4.2   Micro-level determinants

This section presents the results of the analysis of the determinants of the employability of recent graduates as defined in the ET2020 benchmark, based on the Eurostat, LFS 2007-2016 microdata[9].

Table 3 summarises the estimation of results from Equations (2) and (3). The probit model is run both with robust standard errors (Models 1, 3 and 5 below) and with adjusted standard errors for cluster effects at country level[10]. Probit models with fixed effects suffer from overestimation, therefore we also run the model using the linear probability model (Models 1, 3, 6 and 7) and logit regression[11]. The LPM estimate can be biased and inconsistent (Horrace & Oaxaca, 2006). Therefore, when interpreting the results, we do not make inference based on the magnitude of the coefficients, only their sign and significance.

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[9] The responsibility for all the conclusions drawn from the data lies entirely with the authors of the paper.

[10] See Table A5 in the Appendix for probit with adjusted standard errors for cluster effects at country level.

[11] See Table A5 in the Appendix for logit results.

Table 3 Probability of being employed, 2007-2016, EU-27[12]

VARIABLES	(1) Probit with robust SE	(2) LPM with robust SE	(3) Probit with robust SE	(4) LPM with robust SE	(5) Probit with robust SE	(6) LPM with robust SE	(7)[13] LPM with robust SE
Age	0.0241***	0.00699***	0.0227***	0.00652***	0.0227***	0.00651***	0.0101***
	(0.00114)	(0.000308)	(0.00119)	(0.000321)	(0.00119)	(0.000321)	(0.000285)
Female	-0.192***	-0.0544***	-0.174***	-0.0498***	-0.174***	-0.0429***	-0.0739***
	(0.00617)	(0.00175)	(0.00704)	(0.00201)	(0.0148)	(0.00368)	(0.00336)
With children					0.156	0.0401	0.0290
					(0.182)	(0.0518)	(0.0472)
Female with children					-0.000718	-0.00741*	0.0196***
					(0.0160)	(0.00404)	(0.00366)
Part-time job							0.193***
							(0.00195)
Temporary contract							0.299***
							(0.00144)
Over-qualified, if employed							0.330***
							(0.00154)
Different country of birth	-0.221***	-0.0648***	-0.244***	-0.0715***	-0.244***	-0.0715***	-0.0768***
	(0.0145)	(0.00433)	(0.0159)	(0.00484)	(0.0159)	(0.00484)	(0.00411)
Medium education attainment (ISCED 3-4)	-0.415***	-0.122***	-0.424***	-0.122***	-0.424***	-0.122***	-0.00428*
	(0.00771)	(0.00221)	(0.00873)	(0.00250)	(0.00873)	(0.00250)	(0.00239)
Time since graduation: 2 years (Base: 1 year since graduation)	0.185***	0.0540***	0.192***	0.0562***	0.192***	0.0562***	0.0609***
	(0.00750)	(0.00222)	(0.00770)	(0.00229)	(0.00770)	(0.00229)	(0.00197)
Time since graduation: 3 years (Base: 1 year since graduation)	0.264***	0.0759***	0.279***	0.0802***	0.278***	0.0802***	0.0939***
	(0.00753)	(0.00219)	(0.00779)	(0.00226)	(0.00779)	(0.00226)	(0.00198)

[12] The table contains coefficients for all models. The coefficients in the probit models (1, 3 and 5) are not comparable with those in the linear probability models (2, 4, 6 and 7).

[13] We run this specification of the model only with LPM due to the fact that dummies for "Part-time job", "Temporary contract" and "Over-qualified" are not compatible with the probit model since the predictor predicts perfectly, i.e. they have value 1 only if the individual is employed.

VARIABLES	(1) Probit with robust SE	(2) LPM with robust SE	(3) Probit with robust SE	(4) LPM with robust SE	(5) Probit with robust SE	(6) LPM with robust SE	(7)[13] LPM with robust SE
Towns and suburbs (Intermediate density area) (Base: Cities (Densely-populated area))	0.000661	0.000767	-0.0194**	-0.00540**	-0.0194**	-0.00539**	-0.0136***
	(0.00780)	(0.00224)	(0.00815)	(0.00234)	(0.00815)	(0.00234)	(0.00205)
Rural area (Thinly-populated area) (Base: Cities (Densely-populated area))	-0.0424***	-0.0126***	-0.0652***	-0.0197***	-0.0652***	-0.0196***	-0.0310***
	(0.00709)	(0.00210)	(0.00740)	(0.00219)	(0.00740)	(0.00219)	(0.00191)
Field of study: Teacher training and education science			0.146***	0.0582***	0.146***	0.0582***	0.0360***
			(0.0170)	(0.00512)	(0.0170)	(0.00513)	(0.00439)
Field of study: Humanities, languages and arts			-0.0464***	0.00272	-0.0466***	0.00265	-0.0304***
			(0.0161)	(0.00516)	(0.0161)	(0.00516)	(0.00438)
Field of study: Social sciences			0.119***	0.0501***	0.119***	0.0501***	0.0286***
			(0.0126)	(0.00413)	(0.0126)	(0.00413)	(0.00355)
Field of study: Business, administration and law			0.136***	0.0523***	0.135***	0.0523***	0.0463***
			(0.0142)	(0.00491)	(0.0142)	(0.00491)	(0.00401)
Field of study: Natural sciences, mathematics and statistics			0.0491**	0.0293***	0.0490**	0.0292***	0.000848
			(0.0209)	(0.00634)	(0.0209)	(0.00634)	(0.00536)
Field of study: Information and communication technologies			0.175***	0.0619***	0.175***	0.0618***	0.0711***
			(0.0208)	(0.00599)	(0.0208)	(0.00599)	(0.00530)
Field of study: Engineering, manufacturing and construction			0.224***	0.0791***	0.224***	0.0791***	0.0768***
			(0.0117)	(0.00390)	(0.0117)	(0.00390)	(0.00336)
Field of study: Agriculture, forestry, fisheries and veterinary			0.197***	0.0728***	0.196***	0.0727***	0.0499***
			(0.0187)	(0.00583)	(0.0187)	(0.00583)	(0.00511)
Field of study: Health and welfare			0.360***	0.116***	0.360***	0.115***	0.101***

VARIABLES	(1) Probit with robust SE	(2) LPM with robust SE	(3) Probit with robust SE	(4) LPM with robust SE	(5) Probit with robust SE	(6) LPM with robust SE	(7)[13] LPM with robust SE
			(0.0157)	(0.00467)	(0.0157)	(0.00467)	(0.00405)
Field of study: Services			0.162***	0.0605***	0.162***	0.0605***	0.0309***
			(0.0135)	(0.00446)	(0.0135)	(0.00446)	(0.00387)
Constant	0.996***	0.807***	0.875***	0.757***	0.720***	0.718***	0.431***
	(0.0466)	(0.0105)	(0.0489)	(0.0115)	(0.188)	(0.0530)	(0.0482)
Observations	787,861	787,861	714,399	714,418	714,399	714,418	714,418
R-squared		0.093		0.098		0.098	0.331
Country fixed effects	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Country and Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1							

Notes: Base for the field of study variables is "General programmes".
Source: Cambridge Econometrics analysis based on Eurostat, Labour Force Survey, 2007-2017

We interpret the results in Table 3 in relation to the hypotheses derived in Section 2.2[14]. With respect to "Hypothesis 8: Female recent graduates are less likely to find employment than their male counterparts.", we find in all models that ceteris paribus, compared to males, female recent graduates are less likely to be in employment 1 to 3 years after graduation. The coefficient is negative and significant at the 0.1% significance level in all models. It is assumed that the existence of children might explain this coefficient, but when controlling for children in the models (5)-(7) we observe that this variable is not significant. The interaction with gender in model (6) can be interpreted as the gender gap decreasing with children, i.e. the probability of being employed is closer between females and males with children. The change in the sign of the interaction with gender in model (7) compared to model (6) is due to controlling for part-time job, temporary contract and being over-qualified[15] in the current occupation. It is more likely that recent graduate females with children will be employed in less-than-desirable working conditions.

An increase in the age of the individual by one year increases the likelihood of being in employment. One way to consider this result is that older graduates are more likely to have a higher educational attainment or have attended more training. In fact, the confirmation of Hypothesis 9 makes this assumption plausible. The negative coefficient on the dummy controlling for educational attainment confirms that compared to ISCED 5-8 graduates, ISCED 3-4 graduates are less likely to be in employment 1 to 3 years after graduation. For robustness check, models (3) and (4) were run separately for ISCED 5-8 and ISCED 3-4 graduates and the LPM results show that age, gender and time elapsed since graduation are in magnitude higher for ISCED 3-4 graduates than for ISCED 5-8 graduates[16].

The ease of transition from education to employment is measured by the time elapsed since graduation. The length of this period is a proxy for the contribution of the education and training system to finding employment. In Table 3, the results of all models show that it is more likely for a recent graduate to be in employment in the second and third year since graduation than in the first year, thus confirming Hypothesis 10. This finding shows the importance of career guidance in the process of transition from education to employment.

The field of study dummies show that except for "Humanities, languages and arts" in models (3), (5) and (7), graduates from all other fields of study are more likely to be in employment than those graduating from general studies. We have also run model (6) by gender and the results[17] show that female recent graduates in any of the fields of study except "Humanities, languages and arts" are more likely to find employment compared to those females graduating from general studies, with results for "Natural sciences, mathematics and statistics" being insignificant. For their male counterparts, graduates from all other fields

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[14] We also tested the orientation of the degree for recent graduates with ISCED 3-4, however the results were not conclusive: positive effect of vocational orientation of the degree when not controlling for the field of study; and not significant when controlling for the field of study. See the results for models (14) and (15) (no field of study control) in Table A.4 in the Appendix.

[15] A person is considered over-qualified if their education level (ISCED level) is one or two levels above the modal education level of all employees in the 3-digit occupation by country and by year.

[16] See models (12) and (13) in Table A.4 in the Appendix.

[17] See Table A.3 in the Appendix.

of study are more likely to be in employment than those graduating from general studies.

The results in Table 3 show that having a migrant background, i.e. not being born in the country of survey, makes it less likely for the individual to be in employment. Compared to high density areas in the cities, the recent graduates living in rural areas are less likely to be in employment 1 to 3 years after graduation.

5 Conclusions

This paper aims to analyse the determinants of the employment rate of recent graduates as defined in the ET2020 and to add to the debate on the new employability benchmark for this indicator.

At the same time as setting the employability target, the European Commission has put in place a comprehensive set of initiatives to tackle youth unemployment, notably by establishing the Youth Guarantee in April 2013 (European Commission, 2016). Significant EU financial support for the Youth Guarantee (YG) has been provided, notably by the Youth Employment Initiative (YEI), which provides targeted funding to support young people not in employment, education or training in regions struggling most with youth unemployment and inactivity. The YG measures affect the employment level of recent graduates but they are not the only target group. The council recommendation states that Member States should 'ensure that all young people up to the age of 25 years receive a quality offer of employment, continued education, an apprenticeship or a traineeship, within four months of becoming unemployed or leaving formal education' (European Commission, 2016). The last year assessment of the YG and YEI showed diverging effects of these measures across the Member States as they depend on the engagement of local authorities (mostly PES) (European Commission, 2016).

For the next programming period, the European Commission would like to invest even more in education: using the European Semester to support structural reforms to improve education policy; using EU funding and EU investment instruments to fund education; and setting a benchmark for Member States to invest 5% of GDP in education (European Commission, 2017).

The ET2020 target for recent graduates in employment is set at 82%. The data analysis and the regression analysis allow us to draw some conclusions about the suitability of this target for ET2025.

First of all, we have seen that tertiary graduates, following the years of economic crisis, have now reached the target, while secondary education graduates still struggle and are the ones that are bringing the overall indicator down. The panel data regression confirms that declines in GDP have had a stronger impact on secondary education graduates. Similarly, the micro-level regression analysis confirms that graduates with at most upper secondary education are less likely than graduates with tertiary level of education to be in employment 1 to 3 years after graduation. Moreover, inactivity rates are associated with reductions in employment rate to a greater extent for recent upper secondary graduates than for tertiary graduates. Therefore, among recent graduates, those holding ISCED11 3-4 degrees seem to be particularly vulnerable and should be targeted by appropriate policies. Therefore, taking only this part of the analysis we would encourage the continuation of efforts to increase the educational attainment beyond the 30-34 age group[18]. The new target should expand the age band to 25-34.

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[18] ET2020 target: to reach 40% tertiary educational attainment among 30 to 34-year-olds (European Commission, 2018)

Our data analysis has also confirmed that recent tertiary graduates are more vulnerable compared to the 35-64 age cohort, whose employment rate moved far less during the crisis. Moreover, whereas the supply of recent graduates in the respective educational levels did not matter for upper secondary graduates, it had a negative impact, as expected, for tertiary graduates. Therefore, taking into account the trend toward increasing education levels, recent tertiary graduates might find it more difficult to find a job. This is confirmed by the higher likelihood to be employed in the second and third year than in the first year after graduation.

The recovery of the last few years has allowed for an increase in employment rates among recent graduates, thanks also to the higher sensitivity of this group to the economic cycle. The macro-level panel data analysis determined that changes in the employment rate of the 20-64 cohort are associated with bigger changes in the employment rate of recent graduates compared to the 35-64 cohort. Therefore, the dynamics of the overall employment rate are driven mostly by the employment of the younger cohort, here represented by recent graduates.

The trend now is upwards, but, should another downturn arrive, it is not clear whether recent graduates are now better equipped to achieve a better outcome than in the previous crisis. Therefore, besides monitoring of the trend, EU policy makers should assess whether Member States have put in place policies to increase the resilience of recent graduates, particularly those with at least upper secondary education (ISCED 3-4). The micro-level regression analysis has uncovered other vulnerable groups. Females and those living in rural areas require more help in finding a job after graduation. Similarly, recent graduates with a migrant background, broadly defined by the country of birth, are found less likely to find employment compared to those that are born in the country of the survey.

As shown in Figure 7, it is clear that the ET2020 target has been reached and exceeded by certain educational or gender groups. By assuming that the trend for each group established in the period 2012-2017 will continue in the period 2018-2025, Figure 7 shows that only some groups will be lagging behind beyond 2020. These groups are: female recent graduates with all levels of education and all recent graduates with medium education.

Figure 7 Linear forecast of the employability indicator by education and gender, 2007-2025
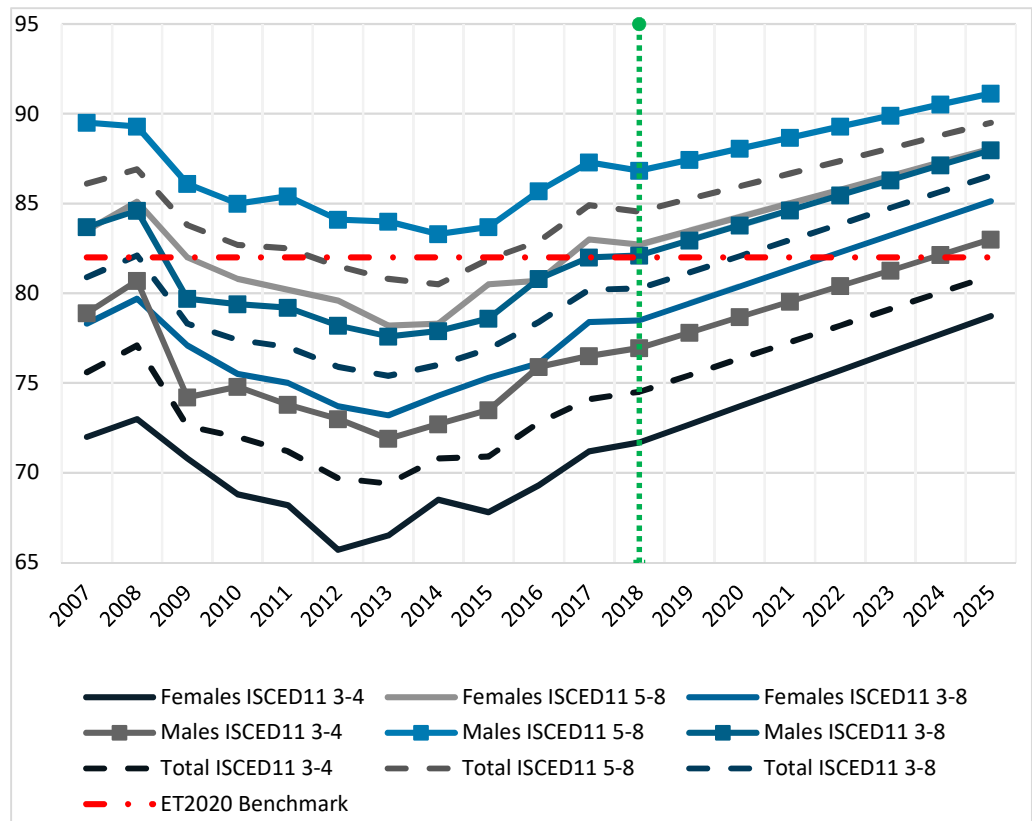
Source: Cambridge Econometrics elaboration using historical data from Eurostat (edat_lfse_24)

The new ET2025 target will have to be determined considering various new elements. New policy targets should expand their purpose to tackle those most vulnerable amongst recent graduates, i.e. those who are still lagging behind in the current target.

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Appendix A   Appendix

Table A.1 Descriptive statistics of the variables used in the Section 4.1

Variable	Observation numbers	Mean	Std. Dev.	Min	Max
Recent graduates, ISCED11 3-8	308	77.76	10.21	40	96.20
Recent graduates, ISCED11 3-4	308	70.93	12.79	29.70	95.90
Recent graduates, ISCED11 5-8	308	83.10	9.342	45.40	97.30
Employment rate of 35 to 64 years old	308	76.52	5.137	61.06	88.48
RGDP growth	308	1.510	3.851	-14.80	25.10
ALMP per capita	267	6.444	4.741	0.610	37.42
Inactivity rate 20-34	308	22.23	4.983	12.24	36.24
Inactivity rate 35-64	308	24.40	5.837	10.97	46.88
Employment rate 20-64 % change	308	0.432	2.642	-13.08	11.00
Share of population with ISCED11 3-4 within 20-34 cohort	308	53.52	11.57	28.65	81.26
Share of population with ISCED11 5-8 within 20-34 cohort	308	29.09	8.282	12.23	50.10
Population ratio (20-34/35-64)	308	57.23	15.26	39.31	131.1
Number of panels	28	28	28	28	28

Source: Eurostat (2018)

Table A.2: Descriptive statistics of the variables used in the Section 4.2

Variable	Obs	Mean	Std.Dev.	Min	Max
Age	865,633	24.69	3.38	22	32
Recent graduates in employment	865,633	.74	.44	0	1
Recent graduates with medium education attainment	865,633	.33	.47	0	1
Recent graduates with high education attainment	865,633	.41	.49	0	1
Medium education attainment	865,633	.49	.5	0	1
	Percent				
Male	48.87				
Female	51.13				
Existence of children					
No children	14.17				
With children	85.83				
Country at birth					
Same country at birth	93.45				

Different country at birth	6.55
Time elapsed since graduation	
1 year	30.02
2 years	34.11
3 years	35.87
Degree of urbanisation	
Cities (Densely-populated area)	38.72
Towns and suburbs (Intermediate density	24.34
Rural area (Thinly-populated area)	36.94
Field of study	
General programmes	9.14
Teacher training and education science	5.98
Humanities, languages and arts	6.86
Social sciences	21.74
Business, administration and law	4.58
Natural sciences, mathematics and statistics	3.05
Information and communication technologies	3.55
Engineering, manufacturing and construction	22.79
Agriculture, forestry, fisheries and veterinary	2.99
Health and welfare	9.64
Services	9.68
Country	
AT Austria	4.23
BE Belgium	2.69
BG Bulgaria	0.75
CY Cyprus	1.30
CZ Czech Republic	2.48
DK Denmark	2.17
EE Estonia	0.63
ES Spain	1.66
FI Finland	0.92
FR France	9.73
GR Greece	4.65
HR Croatia	0.89
HU Hungary	5.85
IE Ireland	7.68
IT Italy	9.96
LT Lithuania	1.60
LU Luxembourg	0.41
LV Latvia	1.04
MT Malta	0.49
NL Netherlands	2.02
PL Poland	10.58
PT Portugal	3.21
RO Romania	7.69
SE Sweden	10.94
SI Slovenia	1.51
SK Slovak Republic	2.90
UK United Kingdom	2.02

Note: This table was created with asdoc program, written by Shah (2018).
Source: European Labour Force Survey, 2007-2016

Table A.3 Probability of being employed by gender, 2007-2016, EU-27

	(8)	(9)
VARIABLES	**Female-LPM with robust SE**	**Male-LPM with robust SE**
Age	0.0106***	0.00381***
	(0.000470)	(0.000439)
With children	0.0462	0.0225
	(0.0663)	(0.0820)
Time since graduation = 2 years	0.0670***	0.0461***
	(0.00330)	(0.00316)

VARIABLES	(8) Female-LPM with robust SE	(9) Male-LPM with robust SE
Time since graduation = 3 years	0.0937***	0.0677***
	(0.00322)	(0.00316)
Different country at birth	-0.0388***	-0.1000***
	(0.00705)	(0.00661)
Towns and suburbs (Intermediate density area)	0.00389	-0.0138***
	(0.00332)	(0.00328)
Rural area (Thinly-populated area)	0.000782	-0.0391***
	(0.00307)	(0.00309)
Medium education attainment (ISCED 3-4)	-0.106***	-0.140***
	(0.00358)	(0.00349)
Field of study: Teacher training and education science	0.0429***	0.0632***
	(0.00901)	(0.00668)
Field of study: Humanities, languages and arts	-0.0351***	0.0211***
	(0.00817)	(0.00682)
Field of study: Social sciences	0.0261***	0.0624***
	(0.00600)	(0.00575)
Field of study: Business, administration and law	0.0284***	0.0669***
	(0.00733)	(0.00671)
Field of study: Natural sciences, mathematics and statistics	0.0128	0.0398***
	(0.00936)	(0.00859)
Field of study: Information and communication technologies	0.0627***	0.0328**
	(0.00721)	(0.0129)
Field of study: Engineering, manufacturing and construction	0.0769***	0.0446***
	(0.00512)	(0.00665)
Field of study: Agriculture, forestry, fisheries and veterinary	0.0838***	0.0400***
	(0.00744)	(0.00950)
Field of study: Health and welfare	0.0916***	0.120***
	(0.00780)	(0.00617)
Field of study: Services	0.0614***	0.0593***
	(0.00640)	(0.00619)
Constant	0.570***	0.797***
	(0.0682)	(0.0834)
Observations	348,179	366,239
R-squared	0.102	0.101
Country fixed effects	YES	YES
Year fixed effects	YES	YES
Country and Year fixed effects	YES	YES
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Notes: The base for the field of study variables is "General programmes".
Source: Cambridge Econometrics analysis based on Eurostat, Labour Force Survey, 2007-2016

Table A.4 Probability of being employed by education level, 2007-2016, EU-27

VARIABLES	(10) RG34-Probit with robust SE	(11) RG58-Probit with robust SE	(12) RG34-LPM with robust SE	(13) RG58-LPM with robust SE	(14) RG34-Probit with robust SE	(15) RG58-LPM with robust SE
Age	0.0306***	0.0188***	0.00964***	0.00482***	0.0215***	0.00700***
	(0.00196)	(0.00163)	(0.000581)	(0.000404)	(0.00361)	(0.00112)
Female	-0.228***	-0.122***	-0.0767***	-0.0306***	-0.227***	-0.0763***

VARIABLES	(10) RG34-Probit with robust SE	(11) RG58-Probit with robust SE	(12) RG34-LPM with robust SE	(13) RG58-LPM with robust SE	(14) RG34-Probit with robust SE	(15) RG58-LPM with robust SE
	(0.00942)	(0.0104)	(0.00318)	(0.00259)	(0.0160)	(0.00539)
Time since graduation: 2 years	0.149***	0.230***	0.0508***	0.0613***	0.152***	0.0522***
	(0.0106)	(0.0112)	(0.00359)	(0.00296)	(0.0203)	(0.00695)
Time since graduation: 3 years	0.233***	0.329***	0.0788***	0.0845***	0.235***	0.0799***
	(0.0106)	(0.0117)	(0.00355)	(0.00294)	(0.0202)	(0.00685)
Different country of birth	-0.165***	-0.324***	-0.0537***	-0.0835***	-0.0686*	-0.0234*
	(0.0216)	(0.0227)	(0.00736)	(0.00641)	(0.0366)	(0.0124)
Towns and suburbs (Intermediate density area)	0.0556***	-0.0808***	0.0174***	-0.0211***	0.112***	0.0362***
	(0.0113)	(0.0117)	(0.00372)	(0.00301)	(0.0211)	(0.00703)
Rural area (Thinly-populated area)	0.0307***	-0.151***	0.00909***	-0.0397***	0.120***	0.0395***
	(0.0100)	(0.0111)	(0.00336)	(0.00294)	(0.0196)	(0.00665)
Vocational degree orientation					0.190***	0.0664***
					(0.0196)	(0.00686)
Constant	0.344***	0.524***	0.598***	0.684***	0.300***	0.594***
	(0.0604)	(0.188)	(0.0160)	(0.0531)	(0.0973)	(0.0290)
Observations	352,244	362,136	352,258	362,160	102,197	102,197
R-squared			0.088	0.078		0.099
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Field of study FE	YES	YES	YES	YES	NO	NO
Country and Year fixed effects	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Cambridge Econometrics analysis based on Eurostat, Labour Force Survey, 2007-2016

Table A.5 Probability of being employed (robustness check), 2007-2016, EU-27[19]

VARIABLES	(16) Probit with cluster SE	(17) Probit with cluster SE	(18) Logit with robust SE	(19) Probit with cluster SE	(20) Probit with cluster SE
Age	0.0249***	0.0241***	0.0419***	0.0227***	0.0227***
	(0.00405)	(0.00359)	(0.00198)	(0.00425)	(0.00425)
Female	-0.192***	-0.192***	-0.330***	-0.174***	-0.174***
	(0.0350)	(0.0352)	(0.0105)	(0.0385)	(0.0492)
With children					0.156***
					(0.0405)
Female with children					-0.000718
					(0.0589)
Different country at birth	-0.219***	-0.221***	-0.371***	-0.244***	-0.244***
	(0.0507)	(0.0512)	(0.0250)	(0.0401)	(0.0401)

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[19] The table contains coefficients for all models. The results of the probit logit models (1, 3 and 5) should not be compared in magnitude with the linear probability model (2, 4, 6 and 7) results.

VARIABLES	(16) Probit with cluster SE	(17) Probit with cluster SE	(18) Logit with robust SE	(19) Probit with cluster SE	(20) Probit with cluster SE
Medium education attainment (ISCED 3-4)	-0.422***	-0.415***	-0.709***	-0.424***	-0.424***
	(0.0244)	(0.0232)	(0.0133)	(0.0352)	(0.0352)
Time since graduation: 2 years	0.186***	0.185***	0.315***	0.192***	0.192***
	(0.0177)	(0.0170)	(0.0127)	(0.0175)	(0.0175)
Time since graduation: 3 years	0.265***	0.264***	0.453***	0.279***	0.278***
	(0.0287)	(0.0285)	(0.0128)	(0.0278)	(0.0278)
Towns and suburbs (Intermediate density area)		0.000661	0.000290	-0.0194	-0.0194
		(0.0319)	(0.0133)	(0.0259)	(0.0259)
Rural area (Thinly-populated area)		-0.0424	-0.0699***	-0.0652*	-0.0652*
		(0.0392)	(0.0120)	(0.0352)	(0.0352)
Field of study: Teacher training and education science				0.146***	0.146***
				(0.0552)	(0.0552)
Field of study: Humanities, languages and arts				-0.0464	-0.0466
				(0.0453)	(0.0452)
Field of study: Social sciences				0.119***	0.119***
				(0.0386)	(0.0386)
Field of study: Business, administration and law				0.136***	0.135***
				(0.0461)	(0.0461)
Field of study: Natural sciences, mathematics and statistics				0.0491	0.0490
				(0.0634)	(0.0634)
Field of study: Information and communication technologies				0.175***	0.175***
				(0.0619)	(0.0621)
Field of study: Engineering, manufacturing and construction				0.224***	0.224***
				(0.0339)	(0.0339)
Field of study: Agriculture, forestry, fisheries and veterinary				0.197***	0.196***
				(0.0455)	(0.0456)
Field of study: Health and welfare				0.360***	0.360***
				(0.0426)	(0.0427)
Field of study: Services				0.162***	0.162***

VARIABLES	(16) Probit with cluster SE	(17) Probit with cluster SE	(18) Logit with robust SE	(19) Probit with cluster SE	(20) Probit with cluster SE
				(0.0356)	(0.0356)
Constant	0.962***	0.996***	1.704***	0.875***	0.720***
	(0.0869)	(0.0722)	(0.0850)	(0.0903)	(0.0996)
Observations	801,505	787,861	787,861	714,399	714,399
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Country*Year FE	YES	YES	YES	YES	YES
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1					

Source: Cambridge Econometrics analysis based on Eurostat, Labour Force Survey, 2007-2016