



RESEARCH PAPER

No 32

Labour market outcomes  
of vocational education  
in Europe

Evidence from  
the European Union  
labour force survey





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Luxembourg: Publications Office of the European Union, 2013

ISBN 978-92-896-1145-9

ISSN 1831-5860

doi: 10.2801/44683

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# Foreword

This comparative European analysis of labour market outcomes for young people with vocational education is based on the EU labour force survey 2009, especially the ad hoc module on the entry of young people into the labour market.

The evidence presented in this report indicates that vocational education is effective in helping the transition from education to work. Relative to medium-level general education, vocational graduates enjoy a faster transition to work, are more likely to have a permanent first job, and are less likely to find themselves in a first job with a qualification mismatch. Over time, as people grow older and gain more experience, differences from medium-level general graduates become smaller.

Substantial country differences exist. Young people in countries with strong VET systems, with a close connection between school- and the work-based components, are much more likely to be employed than their general education counterparts. Young adults in countries where the work-based component of VET is less developed have a lower employment premium and face greater difficulties in labour market integration. This is yet another indication of benefits from a well-developed dual system.

The empirical findings in this report should contribute to understanding labour market outcomes for vocational education graduates and should support policy-makers in responding to the present challenges of high unemployment.

Christian F. Lettmayr  
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## Acknowledgements

This report is the result of a team effort, with contributions from Cedefop colleagues under the supervision of Pascaline Descy (Head of Research and Policy Analysis). Alex Stimpson coordinated the study. Marco Serafini and Konstantinos Pouliakas finalised the report. Giovanni Russo and Nick Sofroniou provided valuable input and suggestions throughout. Cedefop is grateful to Emilio Colombo and Luca Stanca (University of Milano-Bicocca) for the research and drafting.

The work was carried out under Cedefop's service contract No AO/RPA/ALSTI-MSERA/labour market outcomes of VET/008/10.

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## Executive summary

This study provides greater insight into the effect of taking a vocational rather than a general route into the labour market. It contributes to the literature estimating the returns and the labour market outcomes of education attainment by giving specific attention to the type of education that individuals have followed. It is based on the individual anonymised microdata from the core and ad hoc modules of the 2009 European Union labour force survey (EU-LFS), which provides detailed information about the transition from education to work of young individuals and their labour market outcomes.

This is the first study to investigate the individual labour market outcomes of different education orientations for a large number of countries in a comparative perspective. It identifies the main trends in the labour market outcomes of vocational education and training (VET) at European level and the robustness of these findings. It also sheds new light on the prevalence of qualification mismatch across education orientations, which provides an important addition to the information supporting the Europe 2020 agenda on employment and, in particular, the 'New skills for new jobs' initiative, the 'Agenda for new skills and jobs' and the European Commission communication *Moving youth into employment* (European Commission, 2012d), that have among their main objectives the reduction of mismatches in the labour market for young workers.

The study measured labour market outcomes using a wide range of indicators that focus on two main dimensions. The first is the process itself, namely the transition from education to work, which considers the speed and type of transition as well as the duration and features of the first job (full-time versus part-time, temporary versus permanent). The second is the current labour market outcomes as indicated by the characteristics of current employment including employment status, job characteristics, and income. The analysis also focused on the skill content of the job and the occurrence of qualification mismatches, both for the first job and the current job. Most of the statistical analysis was carried out using advanced multivariate techniques with results controlled for individual background variables which can potentially affect the robustness of conclusions based on simpler analytical methods

## Main findings

The results indicate that VET is able to speed up the transition from education to work. Relative to medium-level general education graduates, VET graduates enjoy a faster transition to work, are more likely to have a permanent first job, and are less likely to find a first job with a qualification mismatch. These effects of VET are mostly persistent, as a similar (if slightly weaker) pattern of results applies to an individual's current job.

In interpreting these results, it should be remembered that general education programmes tend to orient their graduates towards further education; they are more likely to continue studying, with lower participation in the labour market, particularly in the younger age groups. In contrast, VET graduates are more likely to participate in the labour market (whether employed or unemployed).

The report also shows that, in terms of labour market outcomes, there are substantial cross-country differences in the returns to VET. Young people in countries with strong VET systems, with a close connection between school and work-based components, are much more likely to be employed than their general education counterparts and to benefit from a faster transition to the labour market. Conversely, young adults in countries where the work-based component of VET is less developed experience a lower, yet generally present, VET employment premium and experience greater difficulties in labour market integration. Factoring in differences in national labour market institutions and policies suggests that success or failure of education programme orientation depends on a complex interaction between policies and institutions that are particular to each national context.

## CHAPTER 1.

# Introduction

One of the key policy issues in advanced economies is the ease with which young people are able to make the transition from school to work. Youth unemployment for those unable to make the transition is one side of the problem, entailing substantial social and economic costs for individuals and society. However, even if young workers do find a job after finishing school, it may not have the characteristics they require. This may result in unmotivated and disengaged workers, as well as a skill mismatch that can lead individuals to multiple changes of employer and occupation.

Several approaches have been pursued by policy-makers to smooth the transition from school to work and to improve the match between the demand and supply sides of the labour market. One approach aims to increase the education level of the labour force under the assumption that unemployment and skill gaps are inversely related to the level of education (i.e. the higher the general level of education, the lower the skill deficiency and the general unemployment rate). An alternative approach focuses more specifically on the orientation of educational programmes, trying to match workers and jobs more effectively through vocational education and training (VET) programmes and apprenticeships within firms (e.g. Ryan, 2001).

Until recently, data constraints have generally led literature on education orientation to focus on specific groups of countries, thus limiting the scope of cross-country comparability. This research report is one of the first to compare the transition from education to work of different education orientations in a comparative perspective for many European countries. Such an approach has been made possible by the availability of the 2009 ad hoc module of the European Union labour force survey (EU-LFS), which focuses on entry of young people into the labour market and allows specific comparison of the labour market outcomes of general and vocational educational programmes.

Building on Cedefop's recent report *From education to working life: the labour market outcomes of vocational education and training* (Cedefop, 2012b), this research aims to increase the evidence base. The report seeks to analyse labour market outcomes using a wide range of indicators: the transition from education to work and the current employment situation. The research also contributes to literature on mismatch by linking incidence of qualification mismatch with a young adult's education pathway. Finally, the report assesses

the role of national labour market institutions in cross-country differences of the labour market outcomes of vocational education graduates.

The empirical analysis aims to characterise the relationship between education orientation and labour market outcomes in Europe overall. It also investigates how this relationship differs across countries and, more specifically, assesses whether cross-country differences can be explained by national labour market conditions and institutions. The definition of labour market outcomes adopted in this report is wide, encompassing several aspects of labour market efficiency, such as the speed of transition from education to work, employment status, characteristics of the current job, income level, and qualification mismatch. These different features provide a comprehensive characterisation of the returns to vocational education throughout Europe.

This report contributes to literature in several respects. First, it provides a set of stylised facts for the effects of VET on the transition from education to work in Europe. Second, the detailed information contained in the EU-LFS and in the 2009 ad hoc module allows several dimensions of the transition from education to work to be investigated. Third, this is the first study that undertakes a large cross-country comparison of the labour market outcomes of different education levels and orientations. This allows an investigation of national institutional features as a possible explanation for cross-country differences in the labour market outcomes of VET.

The report is organised as follows. Chapter 2 provides a brief review of related literature. Chapter 3 presents the theoretical framework. Chapter 4 provides a description of the data set and methods used in the empirical analysis. Chapters 5 and 6 present the empirical results at European level and country level, respectively. Chapter 7 concludes with a discussion of the key findings and implications. Technical aspects regarding the methodology are contained in the Annexes.

## CHAPTER 2.

# Related literature

The research in this report is related to two strands of existing literature: studies that estimate the returns to different education levels and a relatively smaller number of studies that compare labour market outcomes across education orientations <sup>(1)</sup>.

### 2.1. Returns to education

The first body of literature comprises many studies that aim to estimate the returns to education at both individual and social level. The findings generally indicate that, at individual level, higher education levels carry a premium in terms of improved employment opportunities and higher earnings (see, e.g. Hanushek et al., 2011; Dearden et al., 2002; McIntosh, 2006; Blundell et al., 2005; Card, 1999; Harmon and Walker, 1995; 1999 among others). Due to lack of comparative data sets, these studies generally focus on individual countries, with a few exceptions (e.g. Trostel et al., 2002).

In a long-term perspective, and extending the analysis to the social returns to education, it is well known that improved education and schooling plays a key role in economic growth. As documented by Hanushek and Wößmann (2008), there is strong evidence that the cognitive skills of the population – rather than mere school attainment – are closely related to individual earnings, income distribution, and economic growth.

With reference to the EU, Hanushek and Wößmann (2012) estimate the potential economic impact of the achievement of the targets set out in the Lisbon 2020 strategy (measured by international student achievement tests). They show that gains from education reforms for the EU would be substantial. For example,

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<sup>(1)</sup> Due to the nature of the data set, this research focuses on individual returns to education choices. It therefore neglects the returns at corporate or macroeconomic level, which are the subject of vast literature that concentrates particularly on the effects of workplace training on corporate performance (see, among others, Bassanini et. al., 2005; Dearden et al. 2006; Colombo and Stanca, 2008) or the importance of human capital for economic growth (Hanushek and Wößmann, 2008).

reaching the targeted EU benchmark of less than 15% low-achievers in basic skills would generate a long term aggregate gain of EUR 21 trillion <sup>(2)</sup>.

## 2.2. Impact of education orientation

Countries differ substantially not only in the level, but also in the organisation of schooling and educational structures. Several authors emphasise the importance of vocational education in developing job-related skills to help employment in specific occupations (e.g. Wolter and Ryan, 2011; Hanushek and Wößmann, 2008; Ryan, 2012). Others emphasise the importance of basic knowledge (mathematics, communication, literature, etc.) through general education programmes, under the assumption that specific skills may become obsolete quickly and that employability is maximised by strengthening the foundations of basic knowledge (e.g. Hanushek and Wößmann, 2012; Krueger and Kumar, 2004a; 2004b).

The first approach exists in several European countries, the main example being the German dual system, which provides extensive VET at upper-secondary level, often involving firms directly in the development of programmes through apprenticeships. The second approach has been adopted recently by the US, where VET as a separate route in upper-secondary education has been significantly downsized, if not completely eliminated, and the general education route has been strengthened.

Advocates of vocational education emphasise its merits in speeding up the transition from education to work by providing early and effective matches for secondary education graduates. Dual systems, such as those in Austria, Germany and Switzerland, are believed to provide better matching of training to labour market demand (Ryan, 2001, Steedman, 2005). This results in lower turnover and higher employment rates for young workers, although the effects are weaker when considering long-term effects on employment. Some authors, however, suggest that these systems could ultimately result in inefficient outcomes, to the extent that they may tie young people to a particular employer, so hindering mobility (Acemoglu and Pischke, 1998). Such systems also require young people to choose the type of path they will follow before starting upper secondary education, which could be too early for some.

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<sup>(2)</sup> More precisely, this is the cumulated value of future increases in annual GDP volume that the EU could obtain by 2090 (i.e. by the end of the expected lifetime of a child born today), if the 2020 benchmark was met. The value is discounted (i.e. expressed in present value of future gains).

A separate body of literature has developed in recent years, which aims to estimate the economic returns of different orientations of education, focusing in particular on the comparison between general education and VET. Data limitations have generally restricted the possibility of carrying out cross-country comparative analyses and have limited the focus to national case studies (e.g. Dearden et al., 2002; Bonnal et al., 2002; Euwals and Winkelmann, 2002; Neuman and Ziderman, 2003; Ryan, 2002a; 2002b; Hofer and Lietz, 2004; Bishop and Mañe, 2005; McIntosh, 2006; Karmel and Nguyen, 2006; Jenkins et al., 2007; Meer, 2007; Lee and Coelli, 2010; Herault et al., 2011).

In an influential paper, Ryan (2001) summarises the cross-country evidence, indicating that vocational programmes, and in particular apprenticeships, increase the chances of an early working life and carry a modest income premium. Using a natural experiment to adjust for a possible selection bias, Malamud and Pop-Eleches (2010) find that VET graduates in Romania are significantly more likely to be employed as manual workers and craftsmen. However, there is no significant difference between VET and general education in terms of general outcomes, such as participation rates, unemployment rates, periods of non-employment, and family income.

Using a similar approach for Austria, Fersterer et al. find no significant wage premium specifically for apprenticeship when compared to other forms of school-based education, such as those taking place in colleges or vocational schools (Fersterer et al., 2008; Wolter and Ryan, 2011). Dearden et al. (2002) find a significant income premium for academic qualifications over vocational courses in Britain, although the gap is reduced when controlling for the amount of time spent in acquiring different qualifications. Bonnal et al. (2002) find that, in France, apprenticeship appears to have a significant premium (mainly short-term) over alternative forms of VET. In the US, Bishop and Mañe (2005) find that students who take a certain percentage of vocational subjects are more likely to earn higher wages and display higher participation rates compared with general education students. These higher returns are evident both in the short and in the long term. Neuman and Ziderman (2003) show that VET can be effective in raising the wages of individuals from minorities and disadvantaged groups, although this effect varies strongly between groups. Overall, the findings generally differ considerably among studies based on different countries and periods. This study aims at identifying common and idiosyncratic features in the labour market outcomes of VET across European countries.

In addition to data constraints, one of the main limitations of the studies mentioned above is that, by focusing on the transition from education to work, they adopt a short-term perspective, neglecting long-term effects. However,

Hanushek et al. (2011) stress the likely trade-off between the short- and long-term costs and benefits of VET systems. While vocational education may generate skills that support transition to the labour market, these same skills, being job-related, may become obsolete at a faster rate, thus entailing long-term job losses. Further, individuals engaged in general programmes are more likely to continue studying, relative to those following vocational studies, thus improving their long-term outcomes. The authors have found support for this hypothesis, showing that the initial labour market advantage of vocational education relative to general education tends to decrease with age.

The distinction between different education orientations could have important implications for long-term growth. As argued by Krueger and Kumar (2004a, 2004b), vocational (i.e. skills-based) as opposed to general (i.e. concept-based) education could lead to the slower adoption of new technologies. The reason is that vocational education tends to be specialised, and therefore favours learning with current technology. In contrast, general education, while more costly to acquire, allows for a faster and better adaptation to new technologies that may complement or substitute current technology. Using this argument, the authors explain the observed growth differentials between Europe and the US during recent decades. European education policies, which generally favoured specialised, vocational education, were relatively successful during the 1960s and 1970s when the frontier of technology was changing slowly. In those years Europe caught up with the US. However, since the 1980s, when the rate of change in technology accelerated, the growth gap between the US and Europe widened, favouring the higher propensity of the US to use general versus vocational education. However, the argument needs to be further qualified. European VET systems differ significantly across countries, and some appear to be particularly effective. In particular, the German system demonstrates that well-organised VET programmes can provide skills which complement the advanced skills of high-level general education, thus helping to deliver very low youth unemployment rates.

Particular research attention has been given to apprenticeships, which combine formal education with training in the workplace <sup>(3)</sup>. This interest is due to the training conducted on the job and within the firm, which provides a natural setting where it is possible to investigate the role of work organisation, company characteristics, and industrial relations on the labour market effects of educational programmes. For example, Dustmann and Schonberg (2009) find that unionisation increases participation in training and that non-unionised firms

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<sup>(3)</sup> See Ryan (2012) and Wolters and Ryan (2011) for recent surveys.

are less likely to finance worker training <sup>(4)</sup>. Focusing on Germany, using data with information on the costs and benefits of apprenticeship training at firm level, Kriechner et al. (2012) find that firms with works councils make a significantly higher net investment in training than firms without them. Similarly, using data from Germany and Switzerland, Muehlemann et al. (2010) find that where there are strong employment protection laws, firms are more likely to invest in apprenticeship training <sup>(5)</sup>.

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<sup>(4)</sup> Dustmann and Schonberg (2009) conclude from these findings that the recent process of de-unionisation could be responsible for the increase in the skilled-unskilled wage differential.

<sup>(5)</sup> Despite having a positive impact on continuing vocational training intensity and participation, the involvement of employee representatives and of agreements between social partners is limited. As noted by Cedefop (2010), at EU level only 12% of training enterprises are covered by written national or sectoral agreements between social partners that explicitly include continuing vocational training among their subjects.

## CHAPTER 3.

# Theoretical framework

The theoretical framework that provides the foundation for this work is provided by search and matching models pioneered by Pissarides (1979) <sup>(6)</sup>. The underlying idea is that when an individual finishes school and becomes an active job seeker, the probability of finding a job depends on the number of vacancies offered, the number of unemployed (the competitors) and his/her search intensity. The issue of mismatch is not considered here but will be introduced later.

In each period, the number of hirings ( $H$ ) depends on the number of vacancies ( $V$ ) offered and the number of job seekers ( $cU$ ), where  $U$  is the number of unemployed and  $c$  is the average effectiveness of search. The hiring function can be formulated as follows:

$$H = h(V, cU) \tag{1}$$

Dividing both sides by  $U$  gives the probability of finding a job.

$$\frac{H}{U} = h = hc\left(\frac{V}{cU}, 1\right) \tag{2}$$

Individuals differ in several respects, including the level and type of education, ability, etc. All these factors affect the probability of finding a job, summarised by modifying the above equation as follows:

$$h = hc_i\left(\frac{V}{cU}, 1\right) \tag{3}$$

The probability of finding a job thus depends on two sets of factors:

- a common factor  $V/cU$ , reflecting the degree of 'labour market tightness', that measures the degree of competition for vacancies from other job seekers;
- an individual factor captured by  $c_i$ .

Individual factors can be further described as follows:

$$c_i = c(B_i, q_i) \tag{4}$$

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<sup>(6)</sup> The presentation below follows Layard et al. (1991).

where  $B$  represents the income the individual can receive while unemployed and  $q$  captures individual characteristics. Both  $B$  and  $q$  define the reservation wage for each individual, below which he or she is not willing to accept a job should it be available.

Putting all these elements together:

$$h_i = c(B_i, q_i)h\left(\frac{V}{cU}, 1\right) \quad (5)$$

where variables with the subscript  $i$  define individual variables while the others are common variables. The expression above can be interpreted in two ways. In a static framework, it defines the probability of finding a job and therefore can be modelled with standard discrete choice models. In a dynamic framework,  $h(t)$  can be interpreted as the exit rate from unemployment (the hazard function) and can be analysed with duration models. The next chapters of this report will be devoted to estimating alternative specifications of equation (5).

In our empirical framework, individual characteristics such as age, gender, family background and education contribute to the definition of  $q$  and  $B$  and, therefore, to the reservation wage of each individual. More crucially, the main assumption that will be tested is that there is a difference in the effects of education orientations on  $h$  and therefore on the probability of finding a job.

General labour market conditions ( $V/cU$ ) also matter. These will be captured by country dummies, under the assumption that variation in these conditions is mainly country-specific. Chapter 6 considers further the link between the labour market conditions of each country and its institutions and policies.

## CHAPTER 4.

# Data and methods

Individual-level anonymised data from the 2009 European Union labour force survey are used for this study, drawing on both the core and the ad hoc LFS modules. The latter has been designed specifically to provide information about young individuals' transition from education to work <sup>(7)</sup>. The data set provides detailed information about individual characteristics, socio-demographic background, the level and orientation of education, and labour market outcomes.

### 4.1. Definitions of variables

Vocational education and training identifies educational programmes designed to enable participants to develop the practical skills, know-how and understanding necessary to find employment in a particular occupation or trade or in a class of occupations or trades <sup>(8)</sup>. VET often involves a combination of workplace training and traditional formal school activities, differing from other more traditional types of education which, in this study, are classified as general education. Within Europe, national systems differ widely in their practical definition of VET or non-VET programmes <sup>(9)</sup>.

In the 2009 ad-hoc module, VET and general education refer to the orientation of the highest level of education attained and the distinction is applied only to international standard classification of education (ISCED 97) levels 2-4. More specifically <sup>(10)</sup>:

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<sup>(7)</sup> The implementation of the LFS in each Member State is under Council Regulation (EC) No 577/98 (Council of the EU, 1998). The specific variables of the 2009 ad hoc module are defined in the Commission Regulation (EC) No 207/2008 of 5 March 2008 (Council of EU, 2008).

<sup>(8)</sup> See the international standard classification of education (ISCED 97), which was in place at the time of the data collection.

<sup>(9)</sup> Detailed information can be found in the country reports published as part of Cedefop's 'VET in Europe – Country reports' initiative at <http://www.cedefop.europa.eu/EN/about-cedefop/projects/vet-in-europe/index.aspx> [accessed 8.4.2013].

<sup>(10)</sup> The categories proposed conform to the ISCED definitions applied in the Unesco/OECD/Eurostat data collection and the discontinued Eurostat VET data collection as agreed by Member States (Eurostat/E3/2000/VET02, includes a definition for VET).

- (a) general education: less than 25% of the programme content is vocational;
- (b) vocational (and prevocational) education and training: at least 25% of the programme content is vocational (oriented towards a specific category of occupations or trades and leading to a labour market-relevant qualification).

In countries where it is possible to draw such distinctions <sup>(11)</sup>, VET is divided into:

- (a) mainly school-based VET: where at least 75% of the vocational education/training hours are spent in a school, college or training centre, and the remainder in a work environment (enterprise or other);
- (b) mainly workplace-based VET: where at least 75% of the vocational education/training hours are spent in a working environment (enterprise or other), and the remainder in a school, college or training centre;
- (c) combination of school- and workplace-based VET (e.g. dual system, alternate programmes): where less than 75% of the vocational education/training hours are spent in a school, college or a training centre with the rest carried out in a work environment (enterprise or other).

In the 2009 ad hoc module, the question on education orientation is only for respondents whose highest education attainment level is at ISCED 2 (lower secondary level of education), ISCED 3 (upper-secondary) or ISCED 4 (post-secondary non-tertiary level). However, within tertiary education, this report also distinguishes between theoretical programmes (ISCED 5A) and technically oriented (ISCED 5B). Notwithstanding the methodological weaknesses, especially in terms of international comparability, ISCED 5B can be considered as a proxy for tertiary level VET until further improvements have been incorporated into the revised ISCED 2012 <sup>(12)</sup>.

Although the 2009 ad hoc module also distinguishes between VET and general education at ISCED 2 and 3c short, these two levels are not considered in the analysis of education orientations: most education at this level is of a general nature

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<sup>(11)</sup> Estonia, Italy, Netherlands, Norway, Poland, Portugal and the Slovak Republic, did not report the distinction between different VET types. The following tables group these countries under the separate category 'no distinction possible' for purposes of comparison.

<sup>(12)</sup> In the tables below, ISCED 5B will be defined as 'tertiary technical', which reflects the greater emphasis of such courses on practically-oriented, technical or occupationally specific knowledge and ISCED 5A as 'tertiary academic', as the latter category tends to refer to courses that are more theoretically-oriented, research preparatory (history, philosophy, mathematics, etc.) or giving access to professions with high skills requirements (e.g. medicine, dentistry, architecture, etc.). More detailed information on ISCED levels used in this report is available in Annex 1.

(88.4%), given that many countries do not have VET programmes at ISCED 2. <sup>(13)</sup> The inclusion of ISCED 2 or of ISCED 3c short qualifications would increase variability without adding much explanatory power. Therefore, in this report VET will be restricted to upper secondary and post-secondary non-tertiary education, otherwise referred to as medium-level education (ISCED 3 and 4).

Apprenticeships can be defined as systematic, longer-term training in which individuals alternate their training hours between the workplace and the education institution or training centre. The apprentice is contractually linked to the employer and is remunerated (wage or allowance). The employer is responsible for providing the trainees with occupational training designed to equip them with the skills needed to carry out a specific occupation (Cedefop, 2008, p. 29). There are still substantial differences between European countries in the definition of apprenticeship. Some countries (such as Austria, Germany and Switzerland) have a long standing tradition which has incorporated apprenticeship as part of a VET system building block into their dual education system. This is not the case in other countries (e.g. Italy) where programmes combining work- and school-based components are less developed or where a simple contractual relationship between the firm and the apprentice (mostly outside formal education) has been traditionally adopted <sup>(14)</sup>.

For the purposes of this report, work-based medium-level VET is defined as two categories: 'combination of school and workplace' and 'VET mainly workplace' <sup>(15)</sup>. The definition includes apprenticeships as long as they have directly led to formal medium-level qualifications or to qualifications validated and recognised as equivalent to them. Therefore, this report tends to exclude the apprenticeship-related qualifications obtained outside the formal context and not formally recognised; it also tends to exclude those countries where apprenticeship exists, but for which the EU-LFS makes no distinction by type of VET.

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<sup>(13)</sup> Austria, Cyprus, Czech Republic, Finland, Hungary, Italy, Norway, Poland, Romania, Slovakia, Slovenia, Spain and Switzerland provided data only on ISCED 2 – General orientation.

<sup>(14)</sup> Recent legal or factual developments that may have taken place in these countries may not be captured by the 2009 ad hoc module due to constraints linked to timing, sample sizes or practical implementation of the module itself.

<sup>(15)</sup> It is possible to make this distinction using the variable *hatvoc* of the 2009 ad hoc module data source.

## 4.2. Limitations of the data set

Despite providing a unique opportunity for comparing the labour market outcomes of education internationally, the LFS data set has significant limitations. The first is that the data are available on a cross-sectional basis, thus not allowing the use of panel estimation methods. This limits the possibility of fully tackling the endogeneity of education choices (see below). The second limitation is that the 2009 ad hoc module is focused on young adults, i.e. 15 to 34 years old, and therefore does not allow assessment of the long-term effects of education choices.

Additional data limitations refer to specific countries and variables, as detailed below:

- (a) no breakdown by orientation is available for Norway, which has been excluded from the analysis;
- (b) Germany and Switzerland reported difficulties in extracting precise and reliable information from the variable JOBSTART (year or month of start of the first job held for more than three months after quitting formal education). In turn, JOBSTART is used to construct some derived variables related to the school-to-work transition, such as first job search duration. Germany and Switzerland are therefore excluded from the analysis when these variables are used;
- (c) income data are not available for the following countries: Czech Republic, Ireland, Iceland, Malta, the Netherlands, Norway and Sweden;
- (d) the distinction between different types of VET (e.g. school-based, workplace-based) is not available for the following countries: Estonia, Italy, the Netherlands, Poland, Portugal, and Slovakia. These countries have therefore been excluded when VET types are used in the analysis.

Estimation of the returns to education requires dealing with the endogeneity of education choices. More able individuals are more likely to have better labour market outcomes and are also more likely to study longer than those who are less able. This makes it difficult to disentangle the effect of education from that of unobservable ability. A similar issue arises in comparing VET with general education programmes. Students with stronger practical and manual abilities are more likely to enrol in VET-oriented education programmes (and benefit more from them) than in more academically oriented programmes (Meer, 2007).

Several approaches have been proposed in literature to deal with the endogeneity problem, ranging from instrumental variable estimation to control function and matching techniques. In the absence of an experimental or quasi-

experimental setting <sup>(16)</sup>, the endogeneity of education choices is generally addressed by exploiting the time series dimension of the data set. As shown by Arellano and Bond (1991) and Blundell and Bond (1998), lags in the level and/or difference of the variables that are suspected to be endogenous can, under specific conditions, be used as valid instruments in dynamic panel data models. Unfortunately, the availability of a single cross-section (year 2009) precludes this approach. However, the availability in the LFS microdata of detailed information on individual characteristics and family background helps to attenuate the possible bias associated with a failure to properly account for ability and other relevant unobserved individual characteristics.

### 4.3. Empirical methodology and descriptive statistics

The empirical analysis adopted in this report is based on the following general specification:

$$OUT_{ij} = \alpha + \beta_1 VET34_{ij} + \beta_2 GED34_{ij} + \beta_3 VET56_{ij} + \beta_4 GED56_{ij} + \beta_5 X_{ij} + \beta_5 CD_j + \varepsilon_{ij} \quad (6)$$

where subscript  $i$  identifies the individual,  $j$  the country, and the variable  $OUT$  denotes a given labour market outcome of an individual.  $VET34$ ,  $GED34$ ,  $VET56$ ,  $GED56$  define a set of key dummy explanatory variables, capturing different levels <sup>(17)</sup> and orientations (VET and general education) of education. To obtain a more precise assessment of the labour market outcomes of different education orientations, students and individuals in the 15 to 19 age group are excluded from the sample. Nevertheless, all the results presented below are qualitatively robust to the inclusion of these groups, for whom it is not possible to clearly separate education from working life.

Table 1 presents descriptive statistics for the key labour market outcomes examined in the analysis as follows:

- (a) first job search duration and first and current job tenure are measured in months;

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<sup>(16)</sup> For instance, this is the approach followed by Malamud and Pop-Eleches (2010) who exploit the 1973 reform of the Romanian education system that required students who entered vocational schools to receive an additional two years of general education. Therefore, following this reform, secondary school cohorts born after 1959 received more general education and less vocational training than earlier cohorts.

<sup>(17)</sup> '34' identifies upper-secondary and post-secondary level of education, '56' identifies different tertiary levels.

- (b) first and current job characteristics (permanent versus temporary and full-time versus part-time) are dummy variables;
- (c) first and current job skill level is a categorical variable with four possible outcomes (unskilled, skilled manual, skilled non-manual and high-skill) based on the occupational classification of the individual respondent;
- (d) job finding method is a categorical variable identifying five different outcomes (formal, informal, previous experience, private and other);
- (e) current job search duration has three possible ordered outcomes (less than six months, 6-11 months, one year or more);
- (f) qualification mismatch is a categorical variable with three possible outcomes (0=no mismatch, -1=underqualified, +1=overqualified).

Table 1. **Descriptive statistics, labour market outcomes**

Variable	Mean	Std. dev.	Min.	Max.	N
First job, search duration	28.96	41.26	0	297	107 602
First job, tenure	29.03	31.40	3	240	80 781
First job, permanent	0.61	0.49	0	1	79 402
First job, full-time	0.86	0.35	0	1	79 402
First job, skill level	1.68	0.96	0	3	79 368
First job, finding method	1.82	1.09	1	5	137 813
First job, mismatch	-0.06	0.60	-1	1	78 680
Current employment status	1.53	1.05	1	4	183 792
Current job, permanent	0.83	0.37	0	1	122 728
Current job, full-time	0.86	0.35	0	1	138 664
Current job, search duration	1.79	0.87	1	3	26 571
Current job, tenure	56.81	49.26	0	240	137 979
Current job, skill level	1.94	0.98	0	3	137 027
Current job, income decile	5.05	2.60	1	10	72 615
Current job, mismatch	-0.06	0.58	-1	1	129 484

Source: EU-LFS 2009. See Chapters 4 and 5 for details on the definition and construction of variables. Individual observations available for 29 European countries.

Table 2 provides descriptive statistics for the key explanatory variables used in this report, namely the different education levels by orientation. The analysis focuses on the variables VET34, GED34, VET56 and GED56: these are dummy variables denoting respectively whether an individual has either a VET or general medium-level education or possesses a tertiary qualification that is of a technical or academic nature. The coefficients associated with each of these variables measures the premium (in terms of a given outcome) for reaching a medium or tertiary level of education of given orientation (VET or general), compared with lower-secondary education or below. This specification allows identification of the effects of both education level and orientation. The former is captured by the

difference in the size of the coefficients for medium- and tertiary-level education, compared with the reference group (not having completed upper-secondary education). The latter is captured by the difference between the VET and general education coefficients within each level of education. Both the value of the coefficients  $\beta_1$  to  $\beta_4$  and the value of the differences  $\beta_1 - \beta_2$  (for medium-level education) and  $\beta_3 - \beta_4$  (for tertiary level education) (where these differences are referred to as ‘VET premiums’ in the remainder of this report) are reported in the tables below, along with the associated tests of statistical significance.

Table 2. **Descriptive statistics, education level and orientation**

Variable	Mean	Std. dev.	Min.	Max.	N
Medium	0.50	0.50	0	1	18 3076
Tertiary	0.27	0.44	0	1	18 3076
Medium, VET	0.38	0.49	0	1	17 1210
Medium, general	0.14	0.35	0	1	17 1210
Tertiary, technical	0.07	0.25	0	1	17 1210
Tertiary, academic	0.22	0.41	0	1	17 1210
Medium VET, school-based	0.18	0.39	0	1	12 1807
Medium VET, work-based	0.17	0.37	0	1	12 1807
Medium VET, no distinction	0.19	0.39	0	1	12 1807

Source: EU-LFS 2009. See Chapters 4 and 5 for details on the definition and construction of variables. Individual observations available for 29 European countries.

Individual controls included in equation (6), such as age, gender, marital status, parents’ education and household characteristics, are described in Table 3. With the exception of the number of children, all other controls are dummy variables identifying the presence of a given characteristic. The empirical specification also includes a full set of country dummy variables.

The analysis is conducted for the overall sample and by gender and age group. The econometric model used for estimating equation (6) depends on the nature of the dependent (i.e. outcome) variable <sup>(18)</sup>:

- (a) dichotomous dependent variables (e.g. permanent versus temporary and full-time versus part-time job) estimates are obtained with a logit model;
- (b) multiple categorical outcomes (e.g. employment status, job skill level) are analysed with a multinomial logit model;
- (c) multiple ordered outcomes (e.g. income deciles) are investigated with the use of an ordered logit estimator;

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<sup>(18)</sup> A brief description of these models is contained in Annex 2.

(d) finally, for duration data (e.g. job search duration, in months) estimates are based on survival models.

Table 3. **Descriptive statistics, individual control variables**

<b>Variable</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>N</b>
Male dummy	0.51	0.50	0	1	183 974
Aged 20-24	0.24	0.43	0	1	183 974
Aged 25-29	0.35	0.48	0	1	183 974
Aged 30-34	0.42	0.49	0	1	183 974
Separated	0.02	0.15	0	1	183 521
Single	0.64	0.48	0	1	183 521
Married	0.34	0.47	0	1	183 521
Foreigner	0.10	0.30	0	1	183 754
Parents with degree	0.16	0.37	0	1	183 974
Children in the household	0.35	0.48	0	1	162 583
Number of children	0.64	0.93	0	11	162 583

*Source:* EU-LFS 2009. See Chapters 4 and 5 for details on the definition and construction of variables. Individual observations available for 29 European countries.

Within each model, the level and orientation of education has an average effect on the dependent variable (or on a function of it). Direction and relative magnitude of these effects is systematically reported in the tables (Chapter 5) and in terms of model-related regression (beta) coefficients. To aid interpretation of beta coefficients, direct marginal effects are also estimated for most important models <sup>(19)</sup>. However expressed (beta coefficients or direct marginal effects), estimates of the effect of the level and orientation of education are calculated relative to the reference category, which is those individuals that have not attained an upper secondary education (at most ISCED 0-2). At the same level of education, differences between the effects of academic orientations are also calculated and presented in the tables of Chapter 5.

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<sup>(19)</sup> This is done for most important models and as far as reasonably feasible, given the high demanding computational resources that were required in some instances to this end. Marginal effects are mentioned in the text, but they are not shown in tables.

## CHAPTER 5.

# Labour market outcomes of VET at European level

This chapter concentrates on individuals' labour market outcomes, by education attainment and orientation, for Europe. Section 5.1 examines the transition from education to work (first significant job with a duration of more than three months), with the aim of assessing initial steps by young adults when leaving formal education. Section 5.2 examines longer-term outcomes, focusing on the characteristics of workers' current employment. Qualification mismatch for both the first and current job is examined in Section 5.3. Parameter estimates are given for the effects of education levels and orientations on the relevant labour market outcome. Further details and the estimators used for different dependent variables are discussed in Annex 2.

## 5.1. Transition to work

### 5.1.1. Search duration for first job

The 2009 ad hoc module contains several variables that provide valuable information on the transition from school to work. This section examines the characteristics of the transition to the first job lasting more than three months, focusing on search duration, job tenure, job characteristics (full-time versus part-time and temporary versus permanent) and skill level. Starting with the effects of medium-level education on search duration for the first job, the mean and median search duration in the sample is 26 and 10 months, respectively. Note that the sample also includes workers who never found a job.

Given the nature of search duration, the effects of VET and general education are estimated with a survival model, assuming a Weibull distribution function for the hazard rate. The model takes the censoring in job search duration explicitly into account, due to the presence of workers currently searching for their first job. Log hazard ratios are reported, so that parameter estimates can be interpreted as the (log of the) probability of finding a job in the next period for an individual with a given orientation (of either medium-level or tertiary education), conditional on being unemployed, relative to the same probability for an individual with lower secondary education or below (the reference group).

Table 4 presents the results for different education orientations in medium and tertiary education level in the overall sample and by gender and age group. Overall, the transition to the first job is observed to be faster for individuals with higher education levels. Both medium-level and, to a larger extent, tertiary education, lead to significantly higher probabilities of finding the first job relative to the low-educated; in a consequence, there is also shorter search duration.

Focusing on medium-level education, the transition to work is significantly faster for VET graduates than for general education graduates. The VET premium is positive (indicating a shorter search duration for VET graduates) and statistically significant, relative to general education both overall and by subsample. Marginal effects indicate that search duration for the first job is expected to be 10.1 months shorter for a VET medium-level graduate and 6.7 months shorter for those graduating from a general education medium-level stream, relative to lower-secondary education or below. The VET premium of about three and half months (10.1-6.7) is not only statistically significant, but also quantitatively relevant when compared with the median search duration in the sample of 10 months. The pattern described above for the overall sample is virtually unchanged in gender and age group subsamples.

Table 4. **VET and first job search duration**

	<b>Overall</b>	<b>Male</b>	<b>Female</b>	<b>20-24</b>	<b>25-29</b>	<b>30-34</b>
Medium VET	0.54** (34.64)	0.52** (25.89)	0.57** (23.63)	0.66** (20.02)	0.56** (19.93)	0.48** (21.53)
Medium general	0.41** (21.11)	0.39** (14.99)	0.43** (15.43)	0.53** (13.72)	0.47** (14.57)	0.33** (11.14)
Difference (VET/general)	0.13** (7.08)	0.13** (5.02)	0.13** (5.17)	0.13** (3.59)	0.09** (2.95)	0.15** (5.26)
Tertiary technical	0.80** (25.83)	0.78** (17.87)	0.84** (18.72)	0.92** (14.38)	0.84** (16.84)	0.75** (15.78)
Tertiary academic	0.90** (47.02)	0.89** (32.24)	0.92** (33.44)	1.04** (21.71)	0.97** (31.64)	0.82** (29.26)
Difference (technical/academic)	-0.10** (-3.25)	-0.11* (-2.52)	-0.09 (-1.95)	-0.12 (-1.80)	-0.14** (-2.83)	-0.07 (-1.44)
Observations	90 923	48 152	42 771	21 525	31 302	38 096

NB: Dependent variable: first job search duration, in months. Estimation sample in column heading. Survival model estimates (log hazard ratios), Weibull hazard function. z-statistics in brackets, heteroskedasticity-robust standard errors. Higher positive coefficients indicate a faster transition to work (shorter first job search duration). Reference (omitted) group: ISCED 0-2. Marginal effects on job search duration in the overall sample are -10.1 and -6.7 months for medium-level VET and general education respectively; -10.8 and -13.3 months for technical and academic tertiary education, respectively. The set of regressors also includes country dummy variables and individual-level controls (shown in Table 3). \* p<0.05, \*\* p<0.01.

The transition to work is generally even faster for tertiary education graduates, but the pattern for education orientation is reversed: search duration for the first job is relatively shorter for academic programme graduates than technical programme graduates. Marginal effects are -10.8 and -13.3 months, for technical and academic tertiary education, respectively. At tertiary level, the search duration premium for practical, relative to academic education, is negative and statistically significant. The premium to academic tertiary education is substantially larger for males, and largest in the 25 to 29 age group.

Table 5 compares the effects of work-based and school-based medium-level VET on job search duration. As above, estimates are based on a duration model with a Weibull hazard function, taking explicitly into account censoring in job search duration. Overall, work-based VET leads to a faster transition to work than school-based VET (log hazard ratios are 0.63 and 0.50, respectively). The premium for work-based VET is strongly statistically significant and quantitatively relevant: the corresponding marginal effects indicate that job search duration is 8.4 and 7.4 months shorter for work-based and school-based medium-level VET, respectively.

Table 5. **VET type (medium-level education) and first job search duration**

	<b>Overall</b>	<b>Male</b>	<b>Female</b>	<b>20-24</b>	<b>25-29</b>	<b>30-34</b>
Medium VET, work	0.63** (21.77)	0.68** (17.68)	0.60** (12.86)	0.82** (13.54)	0.67** (12.91)	0.54** (12.09)
Medium VET, school	0.50** (21.65)	0.48** (15.30)	0.54** (15.90)	0.59** (12.59)	0.56** (13.37)	0.43** (12.41)
Difference (work/school)	0.14** (4.66)	0.20** (5.15)	0.05 (1.17)	0.23** (3.87)	0.10* (2.01)	0.11** (2.59)
Observations	63 531	33 233	30 298	15 021	21 985	26 525

NB: Dependent variable: first job search duration, in months. Estimation sample in column heading. Survival model estimates (log hazard ratios), Weibull hazard function. z-statistics in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. Marginal effects on job search duration in the overall sample are -8.4 and -7.4 months for work-based and school-based medium-level VET, respectively. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

Overall at EU level, these results highlight the key role played by VET medium-level education programmes in speeding up the transition to work. All other things being equal, search duration for the first job is significantly shorter for VET than for general education graduates, and the difference is quantitatively relevant (about 30% of median search duration). The opposite pattern is found at tertiary education level: job search duration is significantly longer for technical than for academic graduates.

### 5.1.2. Characteristics of first job

This section looks at the effects of education orientation on the characteristics of the first job. It examines first job tenure and the probability of finding a permanent versus a temporary first job (where 61% of the whole sample have the former contract as opposed to 39% that have the latter), or of finding a full-time versus a part-time first job (86% and 14%, respectively). It also examines the type of occupation found during the transition from school to work and the method used to find the job in relation to an individual's education level and orientation.

#### 5.1.2.1. Duration of first job

Table 6 presents the effects of VET on first job tenure. For reference, the mean and median first job duration are 29 and 18 months, respectively. Estimates are obtained with a parametric duration model based on a Weibull distribution for the hazard rate, which takes into account censoring due to the presence of workers who are currently still in their first job. Parameter estimates (log hazard ratios) can be interpreted as the (log of the) probability of quitting the first job for an individual with a given orientation of medium-level or tertiary education, relative to the same probability for an individual with lower-secondary education or below.

The returns to medium-level education are small and not statistically significant. The difference between the returns to medium-level VET and general education is also very small and not statistically significant (marginal effects are -0.3 and -0.2 months for medium-level VET and general education, respectively).

Focusing on tertiary level education, the duration of the first job is significantly shorter for academic education, relative to technical education, irrespective of gender and age. This result complements the findings for first job search duration. A potential explanation for these patterns is that tertiary technical programmes tend to develop more specific skills that result in a relatively longer search for the correct match (Table 4)<sup>(20)</sup>. However, once a match is found, the probability of separation is lower for graduates from technically-oriented tertiary programmes relative to those from an academically-oriented tertiary education. In contrast, tertiary general education programmes tend to develop less specific skills that increase the probability of finding a suboptimal initial match and thus may result in relatively higher subsequent job mobility.

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<sup>(20)</sup> Unlike secondary VET programmes, tertiary technical programmes do not often have features such as apprenticeship, which could facilitate a fast transition to work.

Table 6. **VET and first job duration**

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.01 (0.45)	0.03 (0.99)	-0.02 (-0.70)	0.07 (1.71)	0.01 (0.30)	-0.02 (-0.86)
Medium general	0.01 (0.58)	0.03 (0.84)	-0.01 (-0.27)	0.16** (3.26)	0.02 (0.44)	-0.05 (-1.52)
Difference (VET/general)	-0.00 (-0.25)	-0.00 (-0.02)	-0.01 (-0.37)	-0.09* (-2.29)	-0.01 (-0.23)	0.03 (0.95)
Tertiary technical	0.04 (1.33)	0.10* (2.29)	-0.03 (-0.77)	0.11 (0.96)	0.06 (1.14)	-0.01 (-0.34)
Tertiary academic	0.15** (5.56)	0.20** (6.48)	0.09* (2.18)	0.40** (5.96)	0.20** (3.51)	0.05 (1.77)
Difference (technical/academic)	-0.11** (-3.17)	-0.10* (-2.16)	-0.12* (-2.52)	-0.29* (-2.38)	-0.14* (-2.08)	-0.07 (-1.73)
Observations	75 609	38 433	37 176	13 727	26 284	35 598

NB: Dependent variable: duration of first job, in months. Estimation sample in column heading. Survival model estimates (log hazard ratios), Weibull hazard function. z-statistics in brackets, heteroskedasticity-robust standard errors. Higher positive estimates indicate a greater probability of quitting the first job (shorter job duration). Reference (omitted) group: ISCED 0-2. Marginal effects on first job duration in the overall sample are -0.3 and -0.2 months for medium-level VET and general education respectively; -0.8 and -2.7 months for technical and academic tertiary education, respectively. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

#### 5.1.2.2. *Contractual status of first job*

Tables 7 and 8 examine the relationship between education level and orientation and the probability of finding a permanent versus a temporary first job or of finding a full-time versus a part-time first job. Given the binary nature of these labour market outcomes, the specification in equation (6) is now estimated using a discrete choice logit model. Parameter estimates are therefore expressed in log-odds units.

Table 7 shows the results for the probability of finding a permanent first job. All other things being equal, individuals with a medium-level education are relatively more likely to find a permanent first job than individuals without medium-level education (marginal effects for VET and general education, not reported in the table, are 0.051 and 0.025 respectively). The VET premium for medium-level education is statistically significant and large relative to the average probability of having a permanent first job (0.61, as reported in Table 1). Tertiary education also carries a positive and significant permanent-job return, relative to the ISCED 0-2 reference group. Marginal effects for VET and general education, not reported in the table, are 0.055 and 0.033 respectively, without any significant differences between orientations (i.e. technical versus academic).

Table 7. VET and permanent versus temporary first job

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.22** (5.42)	0.16** (3.00)	0.15** (2.58)	0.01 (0.11)	0.25** (3.54)	0.16** (2.81)
Medium general	0.11* (2.16)	0.02 (0.34)	0.11 (1.56)	-0.13 (-1.18)	0.11 (1.26)	0.12 (1.54)
Difference (VET/general)	0.11* (2.46)	0.14* (2.09)	0.04 (0.70)	0.14 (1.45)	0.14 (1.78)	0.04 (0.63)
Tertiary technical	0.24** (3.62)	0.25* (2.49)	0.13 (1.44)	-0.08 (-0.38)	0.12 (1.03)	0.33** (3.70)
Tertiary academic	0.14** (2.85)	0.24** (3.33)	0.06 (0.92)	-0.32* (-2.11)	0.11 (1.28)	0.26** (3.91)
Difference (technical/academic)	0.10 (1.48)	0.02 (0.15)	0.07 (0.75)	0.24 (1.08)	0.02 (0.13)	0.07 (0.79)
Observations	75 705	38 146	36 608	13 552	26 025	35 177

NB: Dependent variable: first job, permanent versus temporary contract. Logit estimates (log odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

Table 8 shows logit estimation results for the probability of finding a full-time first job. Individuals with medium-level education are relatively more likely to find a full-time first job than individuals without medium-level education. Marginal effects for VET and general education, not reported in the table, are 0.023 and 0.008 respectively. The VET premium is statistically significant, although it is small (0.015) relative to the average probability of having a full-time first job (0.86, shown in Table 1). It is also higher for males and for the 25 to 29 age group. Tertiary education carries a positive and significant full-time job return relative to the reference group (ISCED 0-2). Marginal effects, not reported in the table, are 0.032 and 0.020 respectively. The positive VET premium is statistically significant in the overall sample, for males and for the 30 to 34 age group.

Table 8. **VET and full-time versus part-time first job**

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.24** (4.56)	0.33** (3.42)	0.20** (3.17)	0.39** (3.94)	0.30** (3.00)	0.10 (1.28)
Medium general	0.09 (1.52)	-0.08 (-0.79)	0.17* (2.33)	0.29* (2.53)	0.01 (0.11)	0.04 (0.47)
Difference (VET/general)	0.15** (2.66)	0.42** (4.12)	0.03 (0.46)	0.10 (0.98)	0.29** (2.89)	0.06 (0.66)
Tertiary technical	0.38** (5.03)	0.17 (1.23)	0.50** (5.42)	0.54** (2.75)	0.31* (2.36)	0.34** (3.16)
Tertiary academic	0.23** (3.82)	-0.20 (-1.91)	0.40** (5.60)	0.35* (2.40)	0.25* (2.48)	0.11 (1.33)
Difference (technical/academic)	0.16* (2.09)	0.37** (2.72)	0.10 (1.08)	0.19 (0.92)	0.06 (0.46)	0.23* (2.11)
Observations	75 705	38 621	37 084	13 693	26 371	35 641

Notes: Dependent variable: first job, full-time versus part-time (binary). Logit estimates (log odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

Overall, these results indicate that vocational medium-level education plays a significant role in increasing the probability of finding a permanent first job. Vocational education, at both medium and tertiary levels, also has a positive and significant, albeit small, premium relative to general education regarding the probability of finding a full-time first job.

#### 5.1.2.3. *Broad occupation of first job*

To consider the effects of education level and orientation on the type of occupation individuals undertake as their first job, occupations at one-digit ISCO <sup>(21)</sup> levels have been grouped into four categories, based on typical skill requirements: high-skill, skilled manual, skilled non-manual, and low-skill (elementary) occupations <sup>(22)</sup>. Table 9 reports multinomial logit estimates of equation (6) using low-skill as the reference group. Overall, higher education tends to lead to more skill-intensive jobs (returns are large and significant). Comparing education orientations, there is a positive and significant VET

<sup>(21)</sup> International standard classification of occupations.

<sup>(22)</sup> High-skill (22% of the sample) includes legislators, senior officials and managers, professionals, technicians and associate professionals. Skilled non-manual (37%) includes clerks, service workers and shop and market sales workers. Skilled manual (28%) includes skilled agricultural and fishery workers, craft and related trades workers, plant and machine operators and assemblers. Low-skill (13%) includes elementary occupations.

premium, at both medium and tertiary levels, for skilled manual jobs (VET graduates are more likely to perform such jobs). This premium disappears when considering non-manual skilled occupations, as the difference in the effects of VET and general education streams is insignificant. For high-skill jobs there is no difference between the effects of VET and general education at medium level. At tertiary level, the probability of having a high-skill first job is instead significantly higher for general education graduates.

#### 5.1.2.4. *Method of finding first job*

Table 10 examines the effects of education orientation on the method used to find the first job, focusing on medium-level education. The dependent variable comprises five different categories: formal, informal, previous experience, private and other (reference group). Multinomial logit estimates (log-odds) indicate that VET graduates are more likely to use formal than informal methods for finding their first job. The use of previous job experience is also more widespread among VET graduates, indicating that VET degrees are more successful as a possible job entry route. General education programmes, in contrast, do not have a close connection with the labour market, so informal methods are more likely to be used to compensate for this deficiency.

Table 9. VET and type of occupation performed, first job

	Overall	Male	Female	20-24	25-29	30-34
<b>Skilled manual</b>						
Medium VET	0.99** (18.93)	1.01** (16.16)	0.50** (5.61)	0.80** (7.58)	0.78** (8.81)	1.05** (13.90)
Medium general	0.06 (0.92)	0.08 (0.92)	-0.09 (-0.75)	-0.15 (-1.03)	-0.00 (-0.02)	0.13 (1.32)
Difference (VET/general)	0.93** (13.94)	0.94** (11.60)	0.59** (5.00)	0.95** (6.92)	0.78** (6.83)	0.92** (9.35)
Tertiary technical	0.90** (8.24)	0.74** (5.54)	0.74** (3.69)	0.78** (2.66)	0.71** (3.60)	0.89** (6.19)
Tertiary academic	-0.04 (-0.41)	-0.03 (-0.23)	-0.20 (-1.18)	-0.40 (-1.27)	-0.13 (-0.80)	0.07 (0.49)
Difference (technical/academic)	0.94** (6.79)	0.77** (4.50)	0.94** (3.79)	1.18** (2.84)	0.84** (3.52)	0.83** (4.45)
<b>Skilled non-manual</b>						
Medium VET	1.13** (21.30)	0.98** (13.04)	1.09** (14.75)	0.66** (6.25)	1.06** (11.83)	1.30** (16.57)
Medium general	1.10** (17.68)	1.20** (13.38)	0.99** (11.72)	0.74** (6.16)	1.02** (9.42)	1.33** (14.18)
Difference (VET/general)	0.03 (0.48)	-0.22** (-2.60)	0.10 (1.15)	-0.08 (-0.69)	0.04 (0.39)	-0.03 (-0.36)
Tertiary technical	1.71** (17.30)	1.43** (9.97)	1.95** (13.78)	1.38** (5.36)	1.73** (9.85)	1.78** (13.30)
Tertiary academic	1.84** (21.39)	2.00** (16.86)	1.73** (13.64)	0.89** (3.66)	1.82** (13.06)	2.05** (16.85)
Difference (technical/academic)	-0.14 (-1.14)	-0.57** (-3.44)	0.22 (1.23)	0.49 (1.45)	-0.09 (-0.45)	-0.27 (-1.66)
<b>High-skilled</b>						
Medium VET	1.69** (19.62)	1.61** (15.49)	1.81** (12.73)	1.25** (7.54)	1.59** (10.07)	2.00** (16.53)
Medium general	1.76** (18.19)	1.73** (13.96)	1.86** (11.94)	1.35** (7.16)	1.76** (9.78)	2.03** (14.55)
Difference (VET/general)	-0.07 (-0.91)	-0.12 (-1.23)	-0.05 (-0.47)	-0.10 (-0.63)	-0.16 (-1.26)	-0.03 (-0.26)
Tertiary technical	3.68** (30.25)	3.45** (21.84)	4.07** (21.13)	3.17** (10.81)	3.74** (16.67)	3.87** (23.03)
Tertiary academic	4.61** (42.88)	4.50** (32.63)	4.77** (27.21)	3.28** (12.44)	4.62** (24.48)	4.95** (32.46)
Difference (technical/academic)	-0.93** (-7.82)	-1.05** (-6.63)	-0.70** (-3.96)	-0.11 (-0.33)	-0.88** (-4.37)	-1.08** (-6.63)
Observations	75 317	37 820	36 594	12 842	25 906	35 666

NB: Dependent variable: broad occupation of first job. Multinomial logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2 for the independent variables, low-skill (elementary) occupations for the dependent variable. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

Table 10. VET (medium-level education) and job finding method

	Overall	Male	Female	20-24	25-29	30-34
<b>Formal</b>						
Medium VET	0.28** (4.51)	0.32** (3.87)	0.21* (2.24)	0.22 (1.92)	0.30** (2.80)	0.32** (3.11)
Medium general	-0.03 (-0.35)	0.03 (0.27)	-0.19 (-1.69)	-0.02 (-0.15)	0.03 (0.19)	-0.08 (-0.71)
Difference (VET/general)	0.30** (4.69)	0.29** (3.40)	0.39** (4.00)	0.24 (1.77)	0.27* (2.39)	0.40** (4.10)
<b>Informal</b>						
Medium VET	-0.30** (-4.88)	-0.22** (-2.74)	-0.36** (-3.90)	-0.29* (-2.53)	-0.19 (-1.82)	-0.32** (-3.15)
Medium general	-0.42** (-5.65)	-0.34** (-3.49)	-0.58** (-5.34)	-0.41** (-2.82)	-0.32* (-2.47)	-0.52** (-4.56)
Difference (VET/general)	0.12 (1.80)	0.12 (1.40)	0.22* (2.24)	0.12 (0.89)	0.13 (1.12)	0.20* (2.05)
<b>Previous job</b>						
Medium VET	0.92** (10.75)	0.93** (8.29)	0.68** (5.34)	1.09** (7.08)	0.89** (6.03)	0.68** (4.93)
Medium general	-0.02 (-0.17)	-0.04 (-0.25)	-0.23 (-1.46)	0.21 (1.08)	0.02 (0.11)	-0.34* (-1.97)
Difference (VET/general)	0.94** (10.26)	0.97** (7.57)	0.92** (7.06)	0.88** (4.99)	0.87** (5.36)	1.02** (7.30)
<b>Private</b>						
Medium VET	-0.17 (-1.78)	-0.10 (-0.84)	-0.18 (-1.07)	-0.32 (-1.52)	0.05 (0.26)	-0.18 (-1.36)
Medium general	-0.07 (-0.61)	0.11 (0.76)	-0.43* (-2.21)	-0.30 (-1.03)	0.00 (0.02)	-0.14 (-0.88)
Difference (VET/general)	-0.10 (-0.93)	-0.21 (-1.57)	0.25 (1.51)	-0.02 (-0.10)	0.04 (0.23)	-0.04 (-0.28)
Observations	131 811	67 046	62 326	27 878	45 843	55 651

NB: Dependent variable: job finding method. Multinomial logit estimates (log odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group is 'other method'. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

### 5.1.3. Key findings at European level

The main findings on transition to work at European level can be summarised as follows:

- (a) VET medium-level education results in faster transitions to the first job than general medium-level education. Among medium-level VET programmes, the transition to work is 14% faster for work-based programmes than for school-based programmes;
- (b) the transition to work is generally even faster for tertiary level graduates with both academic and technical qualifications. Graduates from tertiary level

- academic education tend to find a job more quickly than tertiary graduates from technical programmes;
- (c) at tertiary level, VET results in relatively higher job stability, as measured by the duration of the first job;
  - (d) VET medium-level graduates are more likely to obtain a permanent first job than general education graduates;
  - (e) VET graduates are more likely to obtain a full-time first job, at both medium and tertiary levels;
  - (f) VET programmes appear to deliver efficient matches between qualifications held and occupations, starting from the first job. VET graduates, at both medium and tertiary levels, are more likely to perform skilled manual jobs. Academic graduates at tertiary level are more likely to perform high-skill jobs;
  - (g) VET graduates are more likely to use formal job search methods while general education graduates are more likely to find their first job using informal channels. This suggests that employment agencies should consider the provision of specific services for different education orientations.

## 5.2. Current employment

This section focuses on the effects of vocational education on workers' current employment. It starts by considering the relationship between education orientation and current employment status before examining the impact on the characteristics of the current job and then the income returns to vocational education.

### 5.2.1. Employment status

Table 11 reports estimation results for the effects of vocational education on current employment status (employed, unemployed, inactive non-student)<sup>(23)</sup>. Equation (6) is estimated using a multinomial logit model, with inactive non-student as the reference group. Overall, medium and tertiary education levels are associated with a higher probability of being active, relative to lower-secondary education or below, with a much stronger effect on the probability of being employed than unemployed.

Focusing on medium-level education, the probability of being employed is higher for VET graduates than for general education graduates, and the

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<sup>(23)</sup> Students and individuals aged 15 to 19 are not included in the sample throughout the analysis (Chapter 4).

difference is strongly significant. The corresponding marginal effects are 0.16 and 0.08 for VET and general education, respectively. For tertiary education graduates, there is no significant difference between orientations. Marginal effects are 0.14 and 0.16 for technical and academic education, respectively.

Medium-level education also increases the likelihood of being unemployed, relative to being inactive, even though the size of the coefficients is less than half that for employment. This reflects the fact that the estimates are relative to a double benchmark, as there are two separate reference groups. The reference category for the explanatory variables is the group of individuals who have not completed upper-secondary education; for the categorical dependent variable, the reference group is the inactive non-student population. The estimates suggest that, compared with individuals who have not completed upper-secondary education, those who have completed medium-level education are less likely to be inactive. Being less likely to be inactive, they are relatively more likely to be engaged in the labour market and, as a consequence, to be either in work or unemployment, though predominantly the former as shown above. VET graduates appear more likely to be unemployed compared to the reference group than general education graduates, as they are generally more likely to be engaged in the labour market, whereas general education graduates are more likely to be inactive instead. Compared to low education attainment, the marginal effects of medium and tertiary level education on the probability of being unemployed are indeed negative (-0.04 and -0.03 for VET and general medium-level education, -0.06 and -0.07 for technical and academic tertiary education, respectively).

Table 12 compares the effects of work-based and school-based medium-level VET programmes on current employment status. The sample size is substantially reduced, since the information on different types of VET is not available for Estonia, Italy, the Netherlands, Poland, Portugal, and Slovakia. The results indicate that the probability of being employed, relative to the reference group, is significantly higher for work-based VET programmes, relative to school-based programmes. The work-based VET premium is stronger for males and negatively related to age. There are no significant differences, instead, in the effects of work-based and school-based VET programmes on the probability of being unemployed. These results, and the pattern across age groups, are likely to reflect the effects of apprenticeship, which provides a direct link between education and the labour market. This is particularly evident for the 20 to 24 age group, for which the current job is more likely to be the first job; a work-based learning programme supports transition to the first job. The fact that the work-based premium is negatively related to age can be explained by the presence of

frictions in the labour market that make matching workers and jobs more difficult, as workers do not know where vacancies are and firms do not know where job seekers can be found. When workers want to move from their initial occupation, they cannot exploit the information advantage provided by apprenticeships in reducing frictions related to selection.

Table 11. **VET premium, employment status**

	Overall	Male	Female	20-24	25-29	30-34
<b>Employed</b>						
Medium VET	0.99** (29.83)	0.97** (15.25)	1.02** (24.89)	1.14** (17.57)	0.96** (16.13)	0.95** (18.65)
Medium general	0.72** (18.11)	0.47** (6.25)	0.83** (17.07)	0.56** (7.49)	0.81** (11.36)	0.79** (12.59)
Difference (VET/general)	0.27** (6.81)	0.50** (6.37)	0.20** (4.27)	0.58** (7.67)	0.15* (2.19)	0.17** (2.71)
Tertiary technical	1.68** (22.20)	1.47** (7.46)	1.78** (21.75)	1.76** (12.35)	1.73** (11.94)	1.66** (15.71)
Tertiary academic	1.63** (35.53)	1.12** (10.93)	1.78** (34.81)	1.27** (12.72)	1.70** (20.59)	1.68** (25.48)
Difference (technical/academic)	0.05 (0.68)	0.36 (1.72)	0.00 (0.06)	0.49** (3.06)	0.03 (0.17)	-0.02 (-0.20)
<b>Unemployed</b>						
Medium VET	0.34** (7.47)	0.30** (3.94)	0.38** (6.04)	0.46** (5.80)	0.28** (3.42)	0.34** (4.49)
Medium general	0.17** (3.00)	-0.08 (-0.82)	0.21** (2.90)	0.04 (0.40)	0.25** (2.62)	0.18 (1.83)
Difference (VET/general)	0.17** (3.11)	0.37** (3.90)	0.16* (2.28)	0.43** (4.52)	0.03 (0.27)	0.16 (1.57)
Tertiary technical	0.54** (5.79)	0.31 (1.47)	0.64** (5.71)	0.83** (4.97)	0.44* (2.48)	0.48** (3.38)
Tertiary academic	0.52** (8.45)	0.02 (0.20)	0.62** (8.12)	0.61** (4.99)	0.61** (5.78)	0.26** (2.69)
Difference (technical/academic)	0.03 (0.28)	0.29 (1.27)	0.02 (0.19)	0.23 (1.21)	-0.17 (-0.93)	0.21 (1.43)
Observations	170 495	85 727	84 768	40 223	59 295	70 977

NB: Dependent variable: current employment status. Multinomial logit estimates (log-odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group is inactive non-student individuals. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01. In the overall sample, marginal effects of VET and general education on the probability of being employed are 0.16 and 0.08, respectively, at medium level and 0.14 and 0.16, respectively, at tertiary level; marginal effects of VET and general education on the probability of being unemployed are -0.04 and -0.03, respectively, at medium level and -0.06 and -0.07, respectively, at tertiary level.

Table 12. VET type and employment status

	Overall	Male	Female	20-24	25-29	30-34
<b>Employed</b>						
Medium VET, work	1.17** (20.66)	1.33** (10.57)	1.12** (16.92)	1.60** (13.42)	1.08** (10.92)	1.00** (11.58)
Medium VET, school	0.96** (20.84)	1.00** (9.77)	0.98** (17.88)	1.01** (11.20)	0.90** (10.71)	0.98** (14.24)
Difference (work/school)	0.21** (3.45)	0.33* (2.38)	0.15* (2.10)	0.59** (4.56)	0.18 (1.69)	0.02 (0.20)
<b>Unemployed</b>						
Medium VET, work	0.37** (4.74)	0.49** (3.41)	0.36** (3.33)	0.61** (4.19)	0.29* (2.12)	0.42** (3.29)
Medium VET, school	0.36** (5.82)	0.34** (2.99)	0.41** (4.96)	0.50** (4.64)	0.23* (2.06)	0.34** (3.25)
Difference (work/school)	0.01 (0.14)	0.14 (0.92)	-0.05 (-0.40)	0.11 (0.73)	0.07 (0.45)	0.08 (0.59)
Observations	121 827	60 740	61 087	28 751	42 289	50 787

NB: Dependent variable: current employment status. Multinomial logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group is 'inactive individuals' for the dependent variable and ISCED 0-2 for education levels. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

### 5.2.2. Characteristics of current job

In this section the relationship between education orientation and the characteristics of the current job are examined. Some key features of the current job are investigated, including job stability (tenure), contract type (part-time versus full-time and temporary versus permanent) and type of occupation.

#### 5.2.2.1. Duration of current job

Table 13 reports the effects of education orientation on current job duration. Since all workers considered are currently in employment, and the distribution of current job tenure, ranging between 0 and 240 months, is approximately normal, the effects of VET and general education are estimated by OLS (Mumford and Smith, 2004) <sup>(24)</sup>. VET programmes, at both medium and tertiary levels, are associated with significantly longer job tenure compared with general education programmes. The effects of VET and general education are 0.4 and -1.8 months, respectively, at the medium level of education, resulting in a VET premium of 2.1

<sup>(24)</sup> The results in Table 13 and the associated VET premium are based on current employment periods and not on completed ones, therefore they should be treated with caution. In addition, to the extent that employment periods for current jobs include many first jobs, the positive effect of VET on tenure also reflects the shorter duration of unemployment (linked to the shorter job search and faster transitions into employment) of VET graduates compared to graduates from general education.

months. At tertiary level the effects of VET and general education are -5.6 and -16.2 months respectively, resulting in a VET premium of 10.7 months. These differences, particularly marked for the 20 to 24 age group, are highly statistically significant and quantitatively relevant. Results indicate that overall VET programmes, which are specifically tailored to the labour market, increase the likelihood of finding a more stable job relative to general education, where job stability may also be linked to a good match between the qualifications of the individual and the requirements of the job.

Table 13. **VET and duration of current job**

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.35 (-0.82)	-0.36 (-0.66)	2.07** (-2.94)	-2.18** (-4.34)	0.29 (-0.44)	2.12* (-2.57)
Medium general	-1.75** (-3.59)	-2.43** (-3.78)	0.23 (-0.31)	-4.72** (-8.34)	-1.71* (-2.19)	-0.03 (-0.03)
Difference (VET/general)	2.10** (-5.28)	2.08** (-3.79)	1.84** (-3.18)	2.54** (-5.68)	2.00** (-3.18)	2.14** (-2.72)
Tertiary technical	-5.56** (-9.55)	-7.13** (-8.79)	-3.01** (-3.50)	-8.09** (-10.66)	-7.26** (-8.51)	-2.19* (-2.07)
Tertiary academic	-16.23** (-36.63)	-19.33** (-32.75)	-12.42** (-17.97)	-16.13** (-27.91)	-18.53** (-27.99)	-12.80** (-15.83)
Difference (technical/academic)	10.67** (-21.57)	12.20** (-16.44)	9.40** (-14.14)	8.04** (-11.33)	11.27** (-16.75)	10.61** (-12.35)
Observations	131 144	70 975	60 169	28 022	46 261	56 861

NB: Dependent variable: time in current employment (months) for relevant group, as described in column heading. OLS estimates, t-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls.

\* p<0.05, \*\* p<0.01.

#### 5.2.2.2. *Contractual status of current job*

Table 14 reports logit estimates of the effects of education orientation on the probability that the current job entails a permanent contract, as opposed to a temporary one. The differences between the returns to VET and general education are striking. For both medium and tertiary education levels, individuals with VET degrees are significantly more likely to have permanent contracts compared with general education graduates. Focusing on medium-level education, marginal effects are 0.02 and -0.002 for VET and general education, respectively. The VET premium is robust with respect to gender. However, it is higher for younger age groups and substantially smaller for older age groups. This corroborates the argument put forward above that VET carries an advantage in reducing frictions and information asymmetries in the search for the first job, but this advantage is substantially reduced for subsequent jobs. The VET

premium is even greater in the case of tertiary education (marginal effects are 0.031 and -0.017 for technical and academic education, respectively) and is robust with respect to both gender and age.

Table 14. **VET and current employment: permanent versus temporary contract**

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.18** (4.22)	0.19** (3.36)	0.17* (2.51)	0.05 (0.61)	0.10 (1.38)	0.43** (6.13)
Medium general	-0.02 (-0.35)	-0.01 (-0.08)	-0.04 (-0.54)	-0.35** (-3.87)	-0.05 (-0.60)	0.37** (3.98)
Difference (VET/general)	0.20** (4.12)	0.19** (2.76)	0.21** (3.13)	0.39** (4.85)	0.15 (1.87)	0.06 (0.63)
Tertiary technical	0.30** (4.81)	0.45** (5.09)	0.17 (1.89)	-0.07 (-0.57)	0.31** (3.09)	0.65** (6.29)
Tertiary academic	-0.14** (-3.18)	-0.04 (-0.55)	-0.25** (-3.75)	-0.54** (-5.54)	-0.28** (-3.71)	0.26** (3.67)
Difference (technical/academic.)	0.45** (7.47)	0.48** (5.51)	0.42** (5.14)	0.47** (3.45)	0.59** (6.31)	0.38** (3.96)
Observations	116 932	61 318	55 614	26 076	41 693	49 163

NB: Dependent variable: current employment, permanent- versus temporary for relevant group, as described in column heading. Logit estimates (log-odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01. In the overall sample, marginal effects of VET and general education are 0.02 and -0.002, respectively, at medium level and 0.031 and -0.017 respectively, at tertiary level.

Table 15 displays logit estimates of the effects of education orientation on the probability that the current job is full-time. Higher education levels result in a higher probability that the current job is full-time. Focusing on medium-level education, individuals with VET degrees are significantly more likely to have full-time contracts compared with general education graduates (marginal effects are 0.037 and 0.026 for VET and general education, respectively). This pattern is reversed in the case of tertiary education, for which the marginal effects are 0.047 and 0.063 for VET and general education, respectively.

These results indicate that, all other things being equal, individuals with medium-level VET degrees are significantly more likely to have permanent and full-time contracts in their current job compared with general education graduates. The results are stronger than those obtained for the characteristics of the first job. This may reflect the fact that several VET programmes, particularly those with apprenticeships, result in employment contracts that are, by definition, temporary: after the end of the apprenticeship period these contracts are often transformed into more stable contractual forms. In addition, the fact that VET premiums are inversely related to worker age provides a clear analogy with the

previous results about tenure. Job stability is generally associated with longer tenure. Therefore, to the extent that VET programmes are more efficient in getting people into work and in providing them with better job matches, they result in early achievement of job stability. However, over time, the difference between VET and general education tends to shrink.

Table 15. **VET and current employment, full-time versus part-time**

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.46** (10.27)	0.71** (8.40)	0.39** (7.16)	0.54** (6.73)	0.54** (6.53)	0.32** (4.58)
Medium general	0.35** (6.68)	0.21* (2.26)	0.42** (6.58)	0.23* (2.46)	0.40** (4.19)	0.40** (4.94)
Difference (VET/general)	0.11* (2.44)	0.50** (5.72)	-0.02 (-0.44)	0.31** (3.49)	0.15 (1.74)	-0.08 (-1.17)
Tertiary technical	0.72** (10.78)	0.74** (5.25)	0.75** (9.56)	0.91** (6.13)	0.79** (6.49)	0.61** (6.20)
Tertiary academic	0.90** (18.11)	0.55** (5.63)	1.01** (17.18)	0.74** (7.00)	0.89** (10.01)	0.93** (12.41)
Difference (technical/academic)	-0.18** (-2.79)	0.19 (1.38)	-0.26** (-3.54)	0.17 (1.08)	-0.11 (-0.95)	-0.32** (-3.48)
Observations	131 738	71 218	60 520	28 180	46 466	57 092

NB: Dependent variable: current employment, full-time versus part-time for relevant group, as described in column heading. Logit estimates (log-odds), z-statistics reported in brackets, heteroskedasticity-robust standard errors. Reference (omitted) group: ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01. In the overall sample, marginal effects of VET and general education are 0.037 and 0.026 respectively, at medium level and 0.047 and 0.063 respectively, at tertiary level.

### 5.2.2.3. *Broad occupation of current job*

For occupation outcomes (type of current job performed), analysed in Table 16, higher education, irrespective of orientation, tends to lead to more skill-intensive jobs. More important, there appears to be a precise distinction in terms of occupation outcomes across graduates from different orientations. Medium-level education graduates holding a VET degree are more likely to be employed in a skilled manual occupation, whereas those holding a general education degree are more likely to be employed in a skilled non-manual occupation. A similar pattern applies for tertiary education. High-skill occupations are more likely to be held by general education graduates, irrespective of the level of education. The results indicate that more education produces substantial returns for both types of programmes. Even if the premium for tertiary VET is lower than for tertiary general education, the likelihood of being employed in high-skill jobs is still higher than for medium-level education.

Table 16. VET and type of occupation, current job

	Overall	Male	Female	20-24	25-29	30-34
<b>Skilled manual</b>						
Medium VET	0.66** (13.79)	0.77** (13.03)	0.20* (2.30)	0.86** (9.32)	0.64** (7.57)	0.56** (7.31)
Medium general	-0.08 (-1.32)	-0.04 (-0.57)	-0.10 (-0.94)	-0.05 (-0.41)	-0.16 (-1.48)	0.01 (0.07)
Difference (VET/general)	0.74** (12.27)	0.82** (10.56)	0.29** (2.92)	0.91** (7.70)	0.79** (7.62)	0.55** (5.86)
Tertiary technical	1.03** (9.46)	0.97** (7.07)	0.68** (3.25)	0.83** (3.32)	1.11** (5.81)	1.06** (6.87)
Tertiary academic	0.11 (1.10)	0.14 (1.08)	-0.08 (-0.52)	-0.14 (-0.63)	0.19 (1.26)	0.13 (0.85)
Difference (technical/academic)	0.92** (6.73)	0.83** (4.66)	0.76** (3.11)	0.97** (3.03)	0.92** (4.02)	0.93** (4.63)
<b>Skilled non-manual</b>						
Medium VET	0.94** (18.52)	0.88** (12.14)	0.96** (12.99)	0.92** (9.50)	0.90** (10.01)	1.00** (12.46)
Medium general	1.03** (17.35)	1.11** (12.90)	1.00** (12.02)	0.99** (8.81)	0.90** (8.64)	1.20** (12.85)
Difference (VET/general)	-0.09 (-1.54)	-0.22** (-2.73)	-0.03 (-0.39)	-0.07 (-0.61)	-0.01 (-0.06)	-0.20* (-2.18)
Tertiary technical	1.84** (17.42)	1.68** (11.46)	2.01** (12.79)	1.38** (5.74)	2.10** (11.30)	1.88** (12.42)
Tertiary academic	1.95** (22.52)	2.15** (17.32)	1.79** (15.47)	1.54** (8.46)	2.03** (14.32)	2.03** (15.13)
Difference (technical/academic)	-0.11 (-0.88)	-0.47** (-2.67)	0.22 (1.27)	-0.17 (-0.59)	0.07 (0.34)	-0.14 (-0.79)
<b>High-skilled</b>						
Medium VET	1.48** (23.70)	1.38** (17.16)	1.67** (16.41)	1.60** (13.10)	1.36** (12.30)	1.52** (16.01)
Medium general	1.76** (24.84)	1.72** (18.56)	1.92** (17.32)	1.87** (13.03)	1.58** (12.78)	1.92** (18.11)
Difference (VET/general)	-0.27** (-4.54)	-0.35** (-4.26)	-0.25** (-2.82)	-0.28* (-2.18)	-0.22* (-2.16)	-0.40** (-4.47)
Tertiary technical	3.60** (32.67)	3.28** (22.62)	4.05** (23.72)	3.56** (14.44)	3.72** (19.12)	3.59** (22.87)
Tertiary academic	4.69** (51.25)	4.61** (36.96)	4.84** (36.55)	4.23** (21.90)	4.69** (30.91)	4.83** (34.69)
Difference (technical/academic)	-1.09** (-9.01)	-1.33** (-8.04)	-0.79** (-4.58)	-0.67* (-2.43)	-0.96** (-4.61)	-1.24** (-7.06)
Observations	130 172	69 917	60 255	27 756	45 916	56 500

NB: Dependent variable: current employment, occupation level. Multinomial logit estimates (odd ratios), t-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group is employed in low-skill (elementary) occupations for the dependent variable and ISCED 0-2 for education levels. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

### 5.2.3. Income

The previous section showed that VET education delivers an employment premium compared with general education at the medium level. Data on relative income levels contained in the LFS can further help to assess whether there is also a corresponding earnings premium associated with VET.

#### Box 1. The use of income data in the LFS

The LFS does not contain information about wages, the most frequently used measure of labour market outcome in literature. However, since 2009 the LFS has included a variable that is used as a proxy for the wage, although it should be noted that it suffers from several limitations.

Since 2009 the LFS incorporated information about incomes on a compulsory basis. The information provided is not absolute income, but the corresponding decile in national income distribution. This is because comparing income levels across countries is a difficult task, due to differences in gross/net salary, irregular payments, and payments in kind. For the same reason, the variable is only available for employees, while the self-employed and family workers are excluded.

As emphasised by Eurostat <sup>(a)</sup> the income variable is subject to a delay of 21 months in the case of administrative data. As a result, seven countries have not yet delivered data on income (Czech Republic, Iceland, Ireland, Malta, the Netherlands, Norway and Sweden). In some countries (Lithuania, Portugal, Slovak Republic and the UK) there are a high number of non-responses.

A major reason for difficulties in measuring income data in the LFS is that the survey is not designed for measuring differences in living conditions across countries <sup>(b)</sup>, but rather focuses on employment status and the characteristics of the job. For these reasons, the results presented in this study based on the variable INCDECIL should be treated with caution.

<sup>(a)</sup> For details see European Commission, 2011, p. 62.

<sup>(b)</sup> More reliable income data comparable across countries can be obtained from EU statistics on income and living conditions (EU-SILC), designed for measuring income and living conditions in Europe.

Table 17 presents estimation results for equation (6) using the individual's income decile as the dependent variable. Given the ordinal nature of the dependent variable, the model is estimated using an ordered logit model. The results indicate a clear positive association between education level and income. Focusing on medium-level education, there is no significant premium for VET, relative to general education. However, the income VET premium is positive and significant for the 20 to 24 age group, while negative and significant for the 30 to 34 age group. The negative relationship between the income premium and the age profile could reflect a trade-off between the short-term benefits and long-term costs of vocational education (Hanushek and Wößmann, 2008). The return to tertiary technical education is positive but smaller than for academic education, indicating that more general streams of tertiary degrees carry an income premium over vocational ones. This finding complements the results of a negative VET premium for tertiary education when related to high-skill occupations.

Table 17. VET premium, income deciles

	Overall	Male	Female	20-24	25-29	30-34
Medium VET	0.52** (15.92)	0.50** (11.23)	0.62** (12.41)	0.61** (9.71)	0.53** (9.01)	0.48** (9.53)
Medium general	0.58** (13.49)	0.56** (9.04)	0.69** (11.09)	0.32** (3.16)	0.64** (8.86)	0.66** (10.64)
Difference (VET/general)	-0.05 (-1.38)	-0.06 (-1.02)	-0.07 (-1.31)	0.30** (3.14)	-0.11 (-1.79)	-0.18** (-3.21)
Tertiary technical	1.27** (25.87)	1.22** (18.02)	1.39** (19.61)	1.35** (11.11)	1.25** (15.90)	1.25** (16.79)
Tertiary academic	2.16** (51.52)	2.04** (33.76)	2.33** (39.21)	2.11** (16.43)	2.02** (29.13)	2.26** (37.20)
Difference (technical/academic)	-0.89** (-18.80)	-0.82** (-12.00)	-0.93** (-14.20)	-0.75** (-4.80)	-0.77** (-10.51)	-1.01** (-14.53)
Observations	69 637	37 336	32 301	15 025	24 210	30 402

NB: Dependent variable: monthly pay from main job (deciles) for relevant group, as described in column heading. Ordered logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. The (omitted) reference group is ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

Table 18 examines the income premium associated with work-based and school-based VET types. Confirming the results on employment status, the results indicate that the income premium of a work-based VET system relative to school-based systems is particularly strong for females and in the 20 to 24 age group. Apprenticeship, a major element of work-based systems, is very effective in delivering faster and smoother transitions to the first job. This is reflected in the relatively higher incomes for younger age groups. As shown in Tables 17 and 18, differences in the effects of education orientation tend to disappear in older age groups.

Table 18. VET (medium-education) types and income

	Overall	Male	Female	20-24	25-29	30-34
Medium VET, work	0.53** (11.86)	0.50** (8.15)	0.64** (9.64)	0.78** (9.17)	0.55** (7.09)	0.37** (5.16)
Medium VET, school	0.46** (11.44)	0.51** (8.80)	0.48** (8.30)	0.53** (6.67)	0.39** (5.45)	0.47** (7.50)
Difference (work/school)	0.07 (1.65)	-0.01 (-0.12)	0.16** (2.58)	0.25** (3.00)	0.16* (2.21)	-0.09 (-1.47)
Observations	69 637	37 336	32 301	15 025	24 210	30 402

NB: Dependent variable: monthly pay from main job (deciles) for relevant group, as described in column heading. Ordered logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. The (omitted) reference group is ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

*Key findings at European level*

- (a) individuals that have completed medium-level education are more likely to be engaged in the labour market compared with those that have not;
- (b) at medium-level education level, different orientation results in different outcomes:
  - (i) individuals with general education are more likely to continue studying rather than participate in the labour market; if they do participate in the labour market, they tend to do so while studying;
  - (ii) individuals with VET are more likely to choose to participate in the labour market overall, resulting in a higher likelihood of being employed as well as unemployed, and a lower likelihood of continuing studying. Overall the employment effect is stronger than the unemployment effect;
  - (iii) focusing on specific types of VET programmes, the probability of being employed is significantly higher for work-based programmes, relative to school-based programmes. There are no significant differences in the probability of being unemployed for graduates of work-based and school-based VET programmes.
- (c) graduates of VET programmes at both medium and tertiary levels of education have significantly longer current job tenure compared with general education programmes;
- (d) to the extent that VET programmes are more efficient in getting people into work, and in providing them with better job matches, they result in early achievement of job stability. However, over time, the difference between VET and general education tends to shrink;
- (e) job stability is higher for VET graduates, who are more likely to hold full-time and permanent current jobs compared with general education graduates;
- (f) VET programmes, which prepare for specific occupations, increase the likelihood of finding a good match between the qualification of the individual and the requirements of the job. Medium-level VET graduates are more likely to be currently employed in a skilled manual occupation, whereas those holding a general education degree are more likely to be employed in a skilled non-manual occupation;
- (g) results support the view that VET carries an advantage in reducing frictions and information asymmetries in the search for the first job, while this advantage is substantially reduced for subsequent jobs;
- (h) more education produces substantial returns. The premium for tertiary VET is lower than for tertiary general education;

- (i) VET programmes lead to a positive and significant income premium relative to general education for 20 to 24 year-olds but this disappears or is negative for older age groups and at tertiary level.

### 5.3. Education mismatch

The problem of skill and qualification mismatch is at the forefront of the economic debate in Europe, particularly so given the employment contraction that is currently affecting European labour markets. Mismatch has several causes including business cycle effects, heterogeneity among individuals and jobs, information asymmetry between employers and employees, labour market frictions, the responsiveness of education and training systems, rapid technological change, or skills obsolescence resulting from ageing or atrophy<sup>(25)</sup>.

Mismatch can explain the coexistence of high unemployment rates and many vacancies for several occupations. The theoretical framework in Chapter 3 shows that the hiring function may reflect the possibility that the vacancies posted by firms may not or may be inappropriately filled by job seekers because they do not have the necessary skills, resulting in skill shortages or skill gaps. When there are slack labour markets, the phenomenon of individuals accepting jobs that require lower qualifications than their own (i.e. overqualification) may also ensue<sup>(26)</sup>.

There are several reasons why skill and qualification mismatches are relevant. At individual level, overqualified workers have been found to earn less than workers who are correctly matched with their jobs. They also tend to have a lower degree of job satisfaction, with associated long-term consequences for productivity. At the same time, underqualified workers are characterised by lower productivity than matched colleagues in their jobs. Empirical evidence also shows that any positive consequences of the excess skills of overqualified or overskilled individuals on firm productivity may be cancelled out by the higher turnover and absenteeism if they are dissatisfied workers. At macro level, skill mismatch is also costly as it can lead to high structural unemployment, more income

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<sup>(25)</sup> Literature on skill mismatch and overeducation is large; see, e.g. Cedefop (2012a, 2012c); McGuinness (2006); Green et al. (1999; 2002); Sloane (2003) for recent contributions.

<sup>(26)</sup> Technically the relationship between vacancy and the unemployment rates is called the Beveridge curve which generally has a negative slope. However, in the presence of severe mismatches the Beveridge curve may shift outward (higher number of job vacancies for a given level of unemployment), as documented by the European experience in 2010-11 (Cedefop, 2012a).

inequality, lower economic growth and a waste of public resources devoted to education and training. The consequences of mismatch depend on whether it is a temporary or a permanent phenomenon, though recent empirical evidence based on longitudinal data sources has confirmed that skill mismatch exhibits significant persistence over time.

Literature usually distinguishes between vertical and horizontal mismatch. The former, also known as qualification mismatch, refers to a situation where the level of skills that a worker has, as proxied by his/her level of education, is higher or lower than that required by the job (resulting in over- or underqualification, respectively). Horizontal mismatch refers to a situation where the worker has an adequate qualification level, but in a different field of study from that required by the job. The following analysis concentrates on vertical/qualification mismatch.

There are several approaches to measuring skill mismatch: one approach is subjective, as it is based on asking the worker directly whether he/she feels over- or underqualified or what is the qualification level that is typically required to be hired in his/her job. Alternatively, the worker is asked to provide a description of the tasks and activities he/she performs, and then these are compared with the level and type of education received. Another methodology uses objective measures such as a detailed classification of tasks and activities for each occupation (such as the O\*NET classification), which is then compared to the level of education of the individual.

A third approach calculates the mean (or modal) education level for each occupation and defines as over- or underqualified an individual who has a level of education greater (or lower) than his/her occupation's average education level. This is commonly known as the empirical method.

This last approach is followed in this report. For each country and for each occupation at two-digit ISCO, the modal <sup>(27)</sup> level of education of individuals aged 24 to 34 was calculated <sup>(28)</sup>. Individuals who have the modal level of education within the given country-occupation are defined as matched, and overqualified (underqualified) are those who have a level of education above (below) the modal level.

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<sup>(27)</sup> There is a debate in the literature on the use of the mean vs. the mode in the level of education. This follows the modal approach since it is less sensitive to the presence of outliers yet it may also provide a distorted estimate of the education requirement in those occupations which have similar frequencies of individuals at different education levels.

<sup>(28)</sup> Five education levels are considered since ISCED 1997 level 6 is grouped together with ISCED 5.

The analysis of mismatch considers the outcome of being correctly matched versus the alternative of being mismatched (either under- or overqualified). The dependent variable is categorical (overqualification, underqualification, and correctly matched), and parameter estimates are obtained with a multinomial logit estimator.

The relationship between education orientation and qualification mismatch for the first job and for the current job is considered in Tables 19 and 20. Table 19 displays multinomial logit estimates for over- and underqualification, respectively, in the first job (relative to the reference group i.e. matched individuals). Focusing on underqualification (upper panel), both medium and tertiary education VET graduates have a significantly lower probability of being underqualified in their first job relative to general education. For overqualification (lower panel), the pattern is slightly different. At medium level, VET graduates are significantly less likely to be overqualified than general education graduates. However, at tertiary level, graduates from technically-oriented programmes are more likely to be overqualified relative to those from academic programmes. This is likely to reflect the greater propensity of the former (latter) to be employed in skilled manual (high-skilled) occupations (Table 9).

Table 20 presents the results for qualification mismatch in the current job. The pattern is consistent with that for the first job. VET graduates have a significantly lower likelihood than general education graduates of underqualification in their current job, both at medium and tertiary education levels. For overqualification, there is no significant difference between VET and general education at medium level; at tertiary level, VET is associated with a higher likelihood of being overqualified in the current job. These results are generally robust by gender and age group.

These findings indicate that medium-level VET, being more often directly oriented to the requirements of skilled manual jobs, is associated with a lower likelihood of qualification mismatch. This effect is present both in the short term (first job) and in the longer term (current job), indicating that the effects of education orientation on the probability of being mismatched are persistent. The effect of VET on qualification mismatch appears to be driven mainly by a lower probability of underqualification for medium-educated graduates, yet among tertiary education graduates a technically-oriented programme is more likely to result in overqualification <sup>(29)</sup>.

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<sup>(29)</sup> This may also reflect regulatory changes concerning possible increases in qualification requirements for specific occupations. For instance, changes may have occurred requiring a 5b qualification to become a nurse, while this was not the case in the past: recent 5b graduates in nursing would be classified as overqualified under the empirical approach used in the study.

Table 19. VET and relative qualification mismatch, first job

	Overall	Male	Female	20-24	25-29	30-34
<b>Underqualified</b>						
Medium VET	-4.01** (-66.60)	-4.48** (-49.31)	-3.59** (-47.13)	-4.82** (-34.49)	-4.09** (-38.60)	-3.67** (-43.93)
Medium general	-3.17** (-42.77)	-3.41** (-28.99)	-2.96** (-33.93)	-4.19** (-27.00)	-3.17** (-25.51)	-2.79** (-25.95)
Difference (VET/general)	-0.83** (-13.92)	-1.07** (-11.96)	-0.63** (-7.99)	-0.62** (-4.87)	-0.91** (-8.87)	-0.88** (-9.98)
Tertiary technical	-6.89** (-98.49)	-7.05** (-66.63)	-6.70** (-79.05)	-8.20** (-47.32)	-6.95** (-57.05)	-6.63** (-68.36)
Tertiary academic	-6.68** (-105.76)	-6.84** (-73.74)	-6.45** (-80.17)	-7.75** (-51.77)	-6.72** (-62.11)	-6.52** (-72.83)
Difference (technical/academic)	-0.21** (-4.60)	-0.21** (-2.86)	-0.25** (-4.45)	-0.45** (-3.09)	-0.22** (-2.91)	-0.12 (-1.83)
<b>Overqualified</b>						
Medium VET	1.80** (25.44)	2.38** (24.01)	1.24** (10.93)	2.54** (16.12)	1.68** (14.65)	1.69** (15.46)
Medium general	2.07** (26.97)	2.70** (24.56)	1.46** (12.14)	2.37** (13.74)	1.87** (15.12)	2.18** (18.11)
Difference (VET general)	-0.27** (-5.05)	-0.32** (-4.08)	-0.22** (-2.87)	0.17 (1.48)	-0.18* (-2.06)	-0.49** (-6.11)
Tertiary technical	4.19** (47.86)	5.00** (37.47)	3.48** (27.02)	5.16** (20.74)	4.06** (27.54)	4.07** (32.29)
Tertiary academic	3.36** (43.82)	3.91** (33.65)	2.87** (24.58)	4.92** (22.07)	3.31** (26.43)	3.14** (27.96)
Difference (technical/academic)	0.83** (12.27)	1.09** (9.96)	0.62** (7.21)	0.23 (0.96)	0.75** (6.31)	0.93** (10.88)
Observations	73 983	37 608	36 375	12 736	25 750	35 497

NB: Dependent variable: qualification mismatch in first job (categorical, reference group: no mismatch). Multinomial logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group for education levels is ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

As shown in Table 10, VET graduates are more likely to use formal job finding methods; general education graduates tend to compensate for lack of a direct link between their education and the labour market with informal job finding methods. Literature emphasises that, although informal methods accelerate the job finding process, the resulting quality of the match can be suboptimal. Jobs found through personal contacts tend to be associated with lower wages and higher quit rates than jobs found through formal channels<sup>(30)</sup>.

<sup>(30)</sup> See Pellizzari (2010) and Bentolila et al. (2010) for recent analyses.

Table 20. VET and relative qualification mismatch, current job

	Overall	Male	Female	20-24	25-29	30-34
<b>Underqualified</b>						
Medium VET	-3.69** (-89.82)	-3.83** (-66.65)	-3.60** (-59.56)	-4.32** (-45.22)	-3.65** (-53.75)	-3.38** (-55.28)
Medium general	-2.71** (-55.69)	-2.61** (-36.84)	-2.90** (-42.51)	-3.51** (-33.18)	-2.65** (-32.85)	-2.28** (-31.18)
Difference (VET/general)	-0.98** (-22.33)	-1.22** (-20.09)	-0.69** (-11.25)	-0.81** (-8.51)	-0.99** (-13.37)	-1.10** (-16.55)
Tertiary technical	-7.02** (-135.14)	-6.97** (-96.34)	-7.20** (-97.35)	-7.59** (-62.42)	-6.94** (-80.75)	-6.86** (-89.66)
Tertiary academic	-6.69** (-148.24)	-6.55** (-107.02)	-6.84** (-102.66)	-7.14** (-68.52)	-6.67** (-89.90)	-6.56** (-96.97)
Difference (technical/academic)	-0.33** (-9.70)	-0.42** (-8.32)	-0.35** (-7.66)	-0.45** (-5.10)	-0.28** (-4.90)	-0.31** (-6.01)
<b>Overqualified</b>						
Medium VET	1.73** (25.98)	1.85** (24.17)	1.74** (13.32)	2.03** (15.88)	1.45** (14.62)	1.89** (15.05)
Medium general	1.74** (23.23)	1.98** (22.18)	1.60** (11.44)	1.63** (11.43)	1.57** (14.00)	2.00** (14.31)
Difference (VET/general)	-0.01 (-0.23)	-0.13* (-1.97)	0.14 (1.89)	0.40** (4.34)	-0.13 (-1.60)	-0.11 (-1.38)
Tertiary technical	3.98** (51.57)	4.28** (44.56)	3.84** (27.47)	4.43** (26.89)	3.68** (31.51)	4.09** (29.77)
Tertiary academic	2.82** (40.51)	3.02** (36.09)	2.80** (21.29)	3.73** (24.75)	2.58** (25.32)	2.79** (21.75)
Difference (technical/academic)	1.15** (24.57)	1.25** (17.87)	1.04** (16.04)	0.70** (5.82)	1.09** (14.27)	1.31** (19.08)
Observations	123 438	66 431	57 007	26 529	43 755	53 154

NB: Dependent variable: qualification mismatch in current job (categorical, reference group: no mismatch). Multinomial logit estimates, z-statistics reported in brackets, heteroskedasticity-robust standard errors. The reference group for education levels is ISCED 0-2. The set of regressors also includes country dummy variables and individual-level controls. \* p<0.05, \*\* p<0.01.

### *Key findings at European level*

- Medium-level VET, being more often directly oriented towards the requirements of skilled manual jobs, is associated with a lower likelihood of qualification mismatch.
- This effect is present both in the short term (first job) and in the longer term (current job), indicating that the effects of VET on the reduced probability of mismatch is persistent.
- Graduates from tertiary technical education are more likely to be overqualified than graduates from tertiary academic education.

## CHAPTER 6.

# Comparative country evidence

The results presented in the previous section refer to representative European individuals. This section assesses the degree and nature of heterogeneity of VET labour market outcomes across European countries. Particular attention is given to three key labour market outcomes: the speed of transition from school to work, as measured by search duration for the first job; the effectiveness of the transition process in the longer term, as measured by the probability of being employed at the time of the survey interview; and the efficiency of the transition to work, as measured by qualification mismatch in the first and current job.

### 6.1. Country differences in VET labour market outcomes

Table 21 presents country-specific estimates of equation (6) for the three labour market outcomes mentioned above. Column (1) reports country-specific VET premiums, as estimated from log hazard rates in a duration model for first job search duration, column (2) presents VET premiums for the probability of being currently employed while columns (3) and (4) display country-specific VET premiums for underqualification and overqualification, respectively. Detailed estimates of the effect of VET and general education on labour market outcomes, from which the VET premiums of Table 21 are deduced, are available in Table A2 in Annex 4.

Main findings can be summarised as follows:

(a) first job search duration:

completing medium-level education increases the probability of finding a job relative to those who have not, thus reducing search duration in all countries, with the only exception of Iceland for VET (Table A2 in Annex 4). VET medium-level education leads to faster transition to the labour market relative to general education in 14 countries, though there are some notable exceptions where the reverse is true (Cyprus, Iceland, Ireland, the UK). Although the VET premium is positive, there is no significant difference between the various education orientations in several countries (e.g. Bulgaria, Denmark, France, Luxembourg, Malta, the Netherlands, Poland, Slovakia, Sweden);

(b) probability of current employment:

column (2) of Table 21 also presents VET premiums for the probability of being currently employed<sup>(31)</sup>. In all countries, medium-level education increases the probability of being employed (Table A2 in Annex 4). The difference between VET and general education returns is generally positive (VET graduates enjoy an employment premium) and it is typically greatest in countries with a strong tradition of VET, such as Czech Republic, Germany, the Netherlands, Slovenia, and Switzerland. Negative VET premiums (though not necessarily statistically significant) are present only in Estonia, France, Malta and the UK;

(c) education mismatch:

the results generally indicate that, for most European countries, VET reduces the likelihood of underqualification relative to general education, though it is associated with a higher probability of overqualification in several cases. Greece is a notable exception as VET graduates have a positive chance of being underqualified, which implies that many medium-level graduates in that country are employed in occupations typically requiring higher qualifications. A positive VET premium on underqualification is also observed in other countries, such as Estonia, Italy, Latvia and Romania.

In countries where VET is associated with a positive probability of employment, in many cases there is also a negative probability of overqualification in the first job (e.g. Bulgaria, Czech Republic, Germany, Lithuania, the Netherlands, Slovenia); this is presumably because VET graduates can more easily find jobs that match their qualifications. Ireland, Greece, and Italy are notable exceptions.

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<sup>(31)</sup> The figures reported in the table are multinomial logit estimates, as described in Section 5.2. The reference group is inactive non-student.

Table 21. VET premiums and labour market outcomes, by country

	First job search duration (1)	Probability of being employed (2)	Probability of underqualification in first job (3)	Probability of overqualification in first job (4)
AT	0.28**	0.03	-1.08**	1.00**
BE	0.36**	0.39	-0.46*	-0.46*
BG	0.06	0.39**	-0.21	-0.12
CY	-0.07	0.45	-0.77**	1.76**
CZ	0.29**	0.44**	-0.83**	-0.83**
DK	0.10	0.62	-0.41	-0.41
EE	0.37**	-0.16	0.08	2.25**
FI	0.15*	0.29	-1.39**	0.02
FR	0.04	-0.14	-0.85**	-0.85**
DE	na	1.84**	-1.20	-0.20
EL	0.27**	0.53**	2.14**	2.27**
HU	0.15**	0.12	-1.18**	-1.18**
IS	-0.79**	0.09	-2.05	-2.05
IE	-0.14**	0.28**	-0.22**	1.28**
IT	0.11**	0.20*	0.12	1.02**
LV	0.34**	0.36	1.06*	1.06*
LT	0.37**	0.55*	-0.26	-0.26
LU	0.14	0.41	-0.03	0.29
MT	0.02	-1.30*	na	na
NL	0.02	0.52**	-0.56**	-0.56**
PL	0.04	0.07	-0.43*	2.17**
PT	0.27**	0.30	-0.01	-0.01
RO	0.21**	0.12	0.23	1.51**
SK	0.05	0.18	na	na
SL	0.48**	1.26**	-1.12	-0.05
ES	0.19**	0.15	-0.07	-0.07
SE	0.10	0.26	-0.21	-0.21
CH	na	0.55**	na	na
UK	-0.16	-0.09	-0.73*	-0.44

Source: LFS. \* p<0.05, \*\* p<0.01. The figures reported in column (1) are country-specific estimates of equation (6) for first job finding rates (log hazard ratios of duration model with Weibull distribution for first job search duration). Column (2): country-specific multinomial logit estimates of the probability of being currently employed (as opposed to inactive). Columns (3) and (4): country-specific multinomial logit estimates of under (over)-qualification (reference group: matched and ISCED 0-2 for education orientation). na: not available.

## 6.2. Influence of labour market institutions

National institutions, labour market policies and legislations have important implications for youth employment and the transition from education to work in different countries. Cross-country differences in the labour market outcomes of VET, as depicted in Table 21 above, may be explained according to how different

education systems interact with institutional settings in delivering labour market outcomes for young adults.

To explain these variations, the LFS data have been merged with indicators from various labour market institutions. However, analysis of this type is limited, given the fact that data on the education orientation of individuals and their labour market outcomes are only available for one year, as collected by the 2009 ad hoc module. Further, such analysis is restricted by the fact that ideal summary indicators (either quantitative or categorical in nature) are not yet properly available in several relevant aspects. Some examples include an internationally agreed taxonomy of IVET systems, their degree of alignment with actual skill needs, a classification of models of industrial relations, or a measure of the impact of regulated occupations in the labour market.

Under this proviso, Table 22 investigates the bivariate correlation between the observed VET premiums of the EU Member States, as reported in Table 21, and available indicators of labour market institutions, such as the restrictiveness of employment legislation (mostly in terms of hiring and firing regulations), the extent of trade unionisation and of wage bargaining within countries and public expenditure on education and training.

Each cell of Table 22 reports the OLS estimate of the slope of a bivariate regression of the VET premium for each labour market outcome on the relevant labour market indicator, providing information about the (negative or positive) sign and significance of the cross-country relationship. The results indicate that there is a positive relationship between the strictness of labour market regulations (for all types of contracts) and the VET job-finding premium. As a consequence, countries with tighter labour market regulations are also found to have significantly shorter job search duration for VET medium-level education relative to general education. On expenditure, Table 22 indicates further that higher investment in education is associated with smaller VET premiums. This might reflect the fact that most of the increasing education spending in recent years has been mainly aimed at promoting access to tertiary education via general education courses, resulting in a comparative reduction of the advantage of VET over general programmes. In contrast, the effects of wage centralisation and of trade unionisation are not statistically significant, though the signs are in accordance with theoretical expectations (Annex 3).

Only the strictness of labour market regulations is significantly correlated with the VET premium on job mismatch, and in particular the likelihood of underqualification. This effect is mainly driven by Mediterranean countries (Greece, Spain, Portugal), characterised by high employment protection and also by high mismatch (mainly underqualification). The consequences of this association

could be problematic, particularly if underqualified workers are less productive and lack the necessary skills for their jobs: in the presence of limited job opportunities and strong labour market rigidities, job mobility may be compromised by strict employment protection regulation and initial mismatches could become permanent, leading to higher welfare losses.

Table 22. **Institutions and VET premiums for selected outcomes**

	First job search duration (1)	Current employment status (2)	Under-qualification (3)	Over-qualification (4)
<b>Labour market regulations</b>				
Strictness of regulation, overall	0.20**	0.08	0.44*	0.27
Strictness of regulation on temporary contracts	0.11*	-0.06	0.2	0.24
Strictness of regulation on collective dismissals	-0.02	0.08	0.16	0.27
Strictness of regulation on regular contracts	0.18**	0.19	0.11	-0.02
<b>Union power, wage setting</b>				
Union density	-0.00	-0.00	0.01	0.00
Union coverage	-0.00	0.00	-0.01	-0.01
Government intervention in wage setting	0.06	0.01	-0.01	-0.33
Centralisation of wage bargaining	0.22	0.60	-0.46	0.79
<b>Education expenditure</b>				
Expenditure for education (% of GDP)	-0.10*	-0.07	-0.14	-0.03
Expenditure for secondary education (% of GDP)	-0.11	-0.45**	-0.15	0.16
Expenditure for tertiary education (% of GDP)	-0.11	0.25	-0.55	-0.09

NB: OLS estimates of the cross-country bivariate relationship between each of the institutional indicators and VET premiums for job search duration (job finding rates) (column 1); current employed status (column 2), and skill mismatch (columns 3 and 4). The number of observations ranges between 24 and 27 depending on the specification and the availability of the institutional variables. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Source: EU-LFS.

Overall, the contribution of the institutional variables to explaining the cross-country variability in VET premiums is limited, but the positive coefficients found call for further evidence over a longer data time series. National contexts of the school-to-work transition vary considerably and are influenced by complex interaction between the education system, the labour market and the structure of the welfare system, which are in turn complex systems themselves. This would suggest, for further research, that analysis of VET labour market outcomes should be complemented by comparative case studies of national systems that would provide a full account of the combination between policies and institutions

in each country, their strengths and weaknesses, and the lessons that can be learned from them.

### 6.3. Key findings

The main findings at country level can be summarised as follows:

- (a) the effect that VET has on young people's labour market outcomes compared to general education varies significantly across European countries;
- (b) VET medium-level graduates tend to enjoy a faster transition to the labour market and enjoy a positive employment premium relative to general education graduates in countries with a stronger tradition of VET systems, particularly if characterised by close connection between school and the work based components;
- (c) as VET graduates tend to be employed in specific occupations more closely related to their studies, the likelihood of underqualification is lower for them than for graduates from general education;
- (d) tighter labour market regulations are associated with significantly shorter job search duration for VET medium-level education relative to general education and to a higher likelihood of being underqualified.

## CHAPTER 7.

# Concluding remarks and key findings

This report provides first comparative analysis of the effects of different education orientations on the transition from education to work across European countries. This analysis has been made possible by the availability of the ad hoc module of the 2009 labour force survey, which allowed comparison of the labour market outcomes of general and vocational educational programmes.

The results indicate that VET is successful in getting young adults into work, both in the short and the medium term. Relative to general education graduates, medium-level VET graduates enjoy a faster and smoother transition from education to work, generally into more stable jobs. They are also more likely to participate in the labour market and to obtain an initially positive income premium (which is reduced or may even become negative over time). The effects on the first job are generally stronger than those for the current job, indicating that VET is particularly effective during the initial period of transition from education to work, especially for graduates at medium level.

The results for current employment status and income level also indicate positive VET premiums, albeit less evidently than for the first job. This suggests that caution is required during the assessment of the premiums for VET over general education. The analysis also shows that the effects of VET on the transition process and current labour market outcomes are characterised by substantial cross-country heterogeneity. This reflects the fact that national institutions and policies affect the speed and effectiveness of the transition from education to work.

The comparative analysis of the labour market outcomes presented in this report should be considered as a starting point of a process aimed at estimating the return to different levels and patterns of education, focusing in particular on VET and apprenticeship. Future research should shed light on some of the aspects that have not been addressed due to data constraints. One important issue that calls for further analysis is the long-term effects of education choices of individuals. A second relevant issue is the effects of work-based VET at enterprise level, which could not only have an impact on companies' performance, but also affect their internal organisation, training and recruitment policies. The availability of matched employer-employee data will represent a key factor for investigating these issues.

*Key findings on school-to-work transitions*

- (a) VET medium-level education results in faster transitions to the first job than general medium-level education. Among medium-level VET programmes, the transition to work is 14% faster for work-based programmes than for school-based programmes.
- (b) The transition to work is generally even faster at tertiary level for graduates of both academic and technical streams. Academic graduates tend to find a job more quickly than technical graduates.

*Key findings on employment effects*

- (a) VET graduates are more likely to obtain a full-time first job, at both medium and tertiary levels.
- (b) VET medium-level graduates are more likely to obtain a permanent first job than general graduates.
- (c) At tertiary level, VET results in relatively higher job stability, as measured by the duration of the first job.
- (d) Individuals who have completed medium-level education are more likely to be engaged in the labour market compared with those who have not, either in work or unemployed, although predominantly the former.
- (e) Individuals with general education are more likely to continue studying rather than participate in the labour market, or if they do participate in the labour market they tend to do so while studying.
- (f) Among VET programmes, the probability of being employed is significantly higher for work-based programmes, relative to school-based programmes.
- (g) Graduates of VET programmes at both medium and tertiary levels of education have significantly longer current job tenure compared with general education programmes.
- (h) Current job stability is higher for VET graduates, who are more likely to hold full-time and permanent current jobs compared with general education graduates.
- (i) To the extent that VET programmes are more efficient in getting people to work and in providing them with better job matches, they result in early achievement of job stability. However, over time, the difference between VET and general education tends to shrink.
- (j) The results indicate that more education produces substantial returns for both types of programme. Even if the premium for tertiary VET is lower than for tertiary general education, the likelihood of being employed in high-skill jobs is still higher than for medium-level education.

- (k) VET programmes lead to a positive and significant income premium relative to general education for 20 to 24 year olds but this disappears or is negative for older age groups and at the tertiary level.
- (l) The effect that VET has on young people's labour market outcomes compared to general education varies significantly across European countries. The difference between VET and general education returns is generally positive (VET graduates enjoy an employment premium). It is typically the largest in countries with a strong tradition of VET, such as Czech Republic, Germany, the Netherlands, Slovenia and Switzerland, particularly when the work-based component is closely connected with VET.

*Key findings on qualification mismatch*

- (a) VET programmes appear to deliver efficient matches in terms of skill profiles starting from the first job. In particular, VET graduates, at both medium and tertiary levels, are more likely to perform skilled manual jobs. General education graduates at tertiary level are more likely to perform high-skill jobs.
- (b) VET graduates are more likely to use formal job search methods while general education graduates are more likely to find their first job using informal channels. This suggests that employment agencies should consider the provision of specific services for different education orientations.
- (c) VET programmes, which are specifically tailored to the labour market, increase the likelihood of finding a good match between an individual's qualification and job requirements. Medium-level education VET graduates are more likely to be currently employed in a skilled manual occupation, whereas those holding a general education degree are more likely to be employed in a skilled non-manual occupation.
- (d) Results support the view that VET carries an advantage in reducing frictions and informational asymmetries in the search for the first job, while this advantage is substantially reduced for subsequent jobs.
- (e) Tertiary graduates from technical programmes are more likely to be overqualified for their jobs than graduates from academic tertiary education.
- (f) Tighter overall labour market regulations are associated with significantly shorter job search duration for VET medium-level education relative to general education and to a higher likelihood of being underqualified.

## List of abbreviations

EU-LFS	European Union labour force survey <a href="http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/index.htm">http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/index.htm</a>
ISCED	international standard classification of education
ISCO	international standard classification of occupations
ICTWSS	database on institutional characteristics of trade unions, wage setting, State intervention and social pacts
OLS	ordinary least squares
VET	vocational education and training

## Country code

BE	Belgium
BG	Bulgaria
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg

HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom

IS	Iceland
CH	Switzerland

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## Annex 1

# ISCED definitions

ISCED – International standard classification of education

The definitions used for levels of education are those agreed by ISCED in 1997.

ISCED level 0	pre-primary education
ISCED level 1	primary education
ISCED level 2	lower secondary education
ISCED level 3	upper secondary education
ISCED level 4	post-secondary non- tertiary education
ISCED level 5	first stage of tertiary education
ISCED level 6	second stage of tertiary education (leading to an advanced research qualification)

In this report ISCED 0, 1 and 2 are grouped together (ISCED 0-2) to identify the young with a low level of education (at most, lower secondary education). ISCED 3 and 4 are grouped together to identify the young with, at most, a medium level of education. The young with, at most, a 3c short qualification (upper secondary qualification not granting direct access to tertiary education and corresponding to programmes shorter than two years) are considered as having a lower secondary education attainment. ISCED 5 is further distinguished in ISCED 5a (labelled as tertiary academic) and ISCED 5b (labelled as tertiary technical): ISCED 5a corresponds to tertiary education which is theoretically based or research preparatory (history, maths, etc.) or giving access to professions with high skills requirements (medicine, architecture, etc.); ISCED 5b corresponds to the first stage of tertiary education which is typically shorter than 5a and practical/technical/occupationally specific, i.e. providing practical skills and know-how for employment in a particular occupation or trade or class of occupations or trades (although some theoretical foundations may be covered).

## Annex 2

# Empirical models used in analysis

As described in Chapter 3 the general specification used is:

$$OUT_{ij} = \alpha + \beta_1 VET_{34_{ij}} + \beta_2 GED_{34_{ij}} + \beta_3 VET_{56_{ij}} + \beta_4 GED_{56_{ij}} + \beta_5 X_{ij} + \beta_5 CD_j + \varepsilon_{ij}$$

Where the variable *OUT* identifies the outcome analysed. The type of variable used as dependent variable guides the choice of the modelling procedure.

Most models used in this report are models of categorical dependent variables. In the presence of a binary dependent variables the use of a linear model has the major drawback that predicted probabilities can be less than zero or greater than one. This limitation can be overcome by means of binary response models, which assume that the response probability is a non-linear function of the explanatory variables.

$$\Pr(y = 1) = \Phi(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots) = \Phi(\beta_0 + x\beta)$$

Where the function  $\Phi$  is chosen to be constrained between 0 and 1. In the Logit model  $\Phi$  is the cumulative logistic distribution

$$\Phi = \frac{\exp(z)}{1 + \exp(z)}$$

Discrete choice models have a useful latent variable interpretation. The function  $\Phi$  can be derived from an underlying latent variable model. Let  $y^*$  be an unobserved or latent variable determined by:

$$y^* = x\beta + \varepsilon$$

where

$$y = 1 \quad \text{if} \quad y^* > 0$$

Often the dependent variable can assume more than two values which can be ordered. This is the case of the wage equation described above, where income is defined in terms of deciles in national income distribution. In such cases an ordered logit model is estimated. In terms of the latent variable model, assume that  $y^*$  is determined by

$$y^* = x\beta + \varepsilon$$

and let  $\alpha_1 < \alpha_2 < \dots < \alpha_j$  be unknown cut points and define

$$y = 0 \text{ if } y^* \leq \alpha_1, y = 1 \text{ if } y^* \leq \alpha_2, \dots, y = J \text{ if } y^* > \alpha_j$$

Given the assumptions for  $\varepsilon_i$ , it is possible to obtain the conditional distributions of  $y$  given  $x$  which sum to 1. The parameters  $\beta$  can then be estimated by maximum likelihood

Several labour market outcomes, despite being mutually exclusive, are not ordered. Consider a young person who is approaching the end of compulsory schooling. She faces several outcomes: continue studying, try and combine study with work, enter the labour market with or without success (employed or unemployed), or remain inactive. These choices can be modelled as separate categories in a multinomial logit. In particular, in Section 4.2 the following categories are considered

- employed ( $y=1$ )
- unemployed ( $y=2$ )
- inactive ( $y=3$ )

In both cases the reference group chosen is the last, i.e. inactive students in the first case and inactive non-students in the second case.

In the case of a multinomial logit, denoting by  $y_i$  the observed outcome for the  $i$ th individual,  $X_i$  a vector of explanatory variables, and  $\beta_j$  the estimated coefficients (with maximum likelihood), the probability of belonging to each category can be obtained as

$$\Pr(y_i = j) = \frac{\exp(X_i \beta_j)}{1 + \sum_{j=1}^J \exp(X_i \beta_j)},$$

and the probability of belonging to the reference group as

$$\Pr(y_i = 0) = \frac{1}{1 + \sum_{j=1}^J \exp(X_i \beta_j)}$$

In the analysis, individual observations have been weighted to reflect their relative size in national and European populations.

When dealing with duration variables (such as job search duration) a survival model is used which is designed to estimate the length of time spent in a given state before transition to another state. In this framework, duration in a state is a non-negative random variable  $T$  with a given cumulative distribution function  $F(t)$  and density function  $f(t)$ . Then the probability that the duration of staying in a given state is less than  $t$  is

$$F(t) = \Pr[T \leq t] = \int_0^t f(s) ds$$

The survival function is

$$S(t) = \Pr[T > t] = 1 - F(t)$$

The hazard function defines the probability of experiencing an event at time  $t$ , conditional on having survived to time  $t$ :

$$h(t) = \frac{f(t)}{S(t)}$$

The approach adopted in this report is a parametric one, assuming a Weibull distribution for the hazard rate, which is assumed to be non-constant but monotonic. The hazard rate is therefore characterised as:

$$h(t, X) = \lambda p(\lambda t)^{p-1}$$

where

$$\lambda_i = e^{X_i \beta}$$

The log-hazard for the Weibull specification depends linearly on the explanatory variables in  $X$ , as in equation (6). The log hazard related parameters  $\beta_1$  to  $\beta_5$  can be estimated and marginal effects on average durations can be consequently determined.

## Annex 3

# Labour market institutions and VET premiums: theoretical links

To explain cross-country variations in the labour market outcomes of VET, data from the labour force survey (LFS) have been merged with various conventional indicators of labour market institutions. Indicators have been obtained from the OECD employment database and the database on institutional characteristics of trade unions, wage setting, state intervention and social pacts (ICTWSS). Data for the year 2009 have been used, where available, otherwise the data refer to the year 2008. The analysis focuses on three main areas.

The first is the restrictiveness of employment legislation<sup>(32)</sup>. Employment protection laws are widely adopted in Europe, and generally require employers to give prior notice, consult employee representatives, and make redundancy payments when implementing layoffs. By discouraging layoffs, these rules increase job security for incumbent employees, but they could also have a negative effect on employment by raising labour costs and discouraging future hiring. The empirical evidence on the overall effects is mixed (Lazear, 1990, Bentolila and Bertola, 1990, Elmeskov et al., 1998, Nickell and Layard, 1999).

The second is labour market involvement and intervention by the State and the unions<sup>(33)</sup>. Literature identifies different channels through which these

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<sup>(32)</sup> The OECD codifies three indices for employment legislation: (a) the index for regular employment refers to individual dismissals and incorporates notification procedures, delays before the notice period can start, the length of the notice period and size of severance payments (both by duration of employment), the circumstances in which a dismissal is considered unfair, and compensation and extent of reinstatement following unfair dismissal; (b) the index for temporary contracts incorporates restrictions on the number of contract renewals and maximum cumulated duration of fixed-term and temporary work agency contracts, as well as the circumstances under which temporary contracts can be used; (c) the index on additional legislation concerning collective dismissals (referred to herein as EPLC) incorporates the definition of, and additional notification requirements for, collective dismissals, delays before the notice period for collective dismissal can start and other costs to employers, such as additional severance payments, retraining or redeployment of redundant workers. The overall index is a weighted average of the three subindices.

<sup>(33)</sup> Several indicators were considered: the usual union density and coverage indicators and the indicators on the degree of centralisation of the wage bargaining process, the degree of involvement of the State in the wage setting mechanism and the coordination between unions and government in the wage setting process; all these indicators were obtained from the ICTWSS database by Jelle Visser.

features can affect labour market outcomes. On the one hand, there is some evidence that trade union power in wage setting has a significant impact on unemployment (Nickell and Layard, 1999; Booth et al., 2001). Given that the adverse effect of unionisation derives essentially from the inability of single unions to internalise the aggregate adverse effects caused by their behaviour, a possible tempering factor is wage coordination (Nickell and Layard, 1999) <sup>(34)</sup>.

The third is expenditure on education, as a fraction of GDP, to consider the complementarity between labour market and education policies <sup>(35)</sup>.

Even if institutions are important determinants of labour market outcomes, it is not obvious that they have different effects for VET and general education graduates. VET graduates, either through apprenticeship programmes, or through other periods of training undertaken within firms, can be considered as closer to insiders than outsiders in the labour market. Therefore, the presence of labour market frictions or rigidities, such as the bargaining power of unions, hiring and/or firing costs and strong employment regulations, is expected to favour insiders versus outsiders and to increase the gap in the labour market outcomes of VET and general education graduates. Young VET graduates tend to make a faster transition into the labour market mainly through their links with firms. This also results in a higher likelihood of correct job/worker matches. However, the fact that VET is more effective than general education in speeding up transition does not necessarily mean that VET programmes are effective in absolute terms. For example, as suggested by Bougheas and Georgellis (2004), in Germany 40% of apprentices do not stay in the firm where they received their training. Given the fact that training is costly for the firm, to the extent that the skills provided during training are generally applicable, it is puzzling that firms are willing to cover part of the cost of general training when there is the risk that the worker is subsequently hired elsewhere once the skills are acquired. The German example highlights how institutions may provide an explanation. Through their influence over plant-level works councils, unions can partially insulate the internal labour market from the external labour market, thus creating a wedge between the

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<sup>(34)</sup> As emphasised by Jackman et al. (2005) 'Coordination refers to mechanisms whereby the aggregate employment implications of wage determination are taken into account when wage bargains are struck. This may be achieved if wage bargaining is highly centralised, as in Austria, or if there are institutions, such as employers' federations, which can assist bargainers to act in concert even when bargaining itself ostensibly occurs at the level of the firm or industry, as in Germany or Japan'.

<sup>(35)</sup> *Source:* Eurostat. Using data in per capita/per student terms does not change the main results. Education expenditures broken down by education orientation are not available for a consistent set of countries.

productivity and wages of insiders (who include apprentices remaining with the training firm) and outsiders. This creates an incentive for firms to provide training and for trainees to stay with the training firm.

Unions can also affect the training decisions of firms or require that apprentices are offered a stable employment contract at the end of the training period. Therefore, in highly unionised sectors or firms, a higher premium on apprenticeship and VET can be expected relative to general education. Another argument is advanced by Busemeyer and Iversen (2011), and is related to the degree of centralisation of wage bargaining. In countries where wage bargaining is centralised there is more pressure towards wage equalisation: 'when firms are strongly involved in the provision, administration, and reform of workplace-based training in the form of apprenticeship and dual training schemes, the institutions of collective wage bargaining act as beneficial constraints, forcing firms to invest in the training of low-skilled employees, as they have to be paid wages similar to those of workers with higher levels of skills' (Busemeyer and Iversen, 2011, p. 209). The authors suggest that in highly centralised systems, a higher involvement of firms in training can be expected, resulting in a faster and smoother transition from education to the labour market.

The second explanation is based on workers' heterogeneity: in the presence of asymmetric information about the actual productivity of workers, the existence of hiring and firing costs may induce firms to prefer graduates from VET programmes, since these provide a more direct and clear signal about the competences and skills of individuals. The strictness of employment legislation is, therefore, also expected to affect the VET premium positively.

The emphasis placed in recent years by the European Union on increasing investment in education has induced several countries to implement policies aimed at increasing the general level of education (see for example the 2020 targets of the Lisbon strategy). To the extent that these policies are oriented at promoting tertiary education, they are likely to result in a premium for medium-level general education over VET. This is particularly important for investment in medium-level education: if biased towards the promotion of tertiary education, it can be expected to have a negative effect on the returns to VET relative to general education.

Table A1. Institutional variables, by country

Country	Strictness regulation		Government intervention	Union density	Coverage	Centralisation of wage bargaining	Strictness regulation		Expenditure for (% GDP):		
	temporary contracts	collective dismissals					regular contracts	overall	education	medium education	tertiary education
AT	1.50	3.25	2	29.08	99.00	0.93	2.37	1.93	5.46	2.55	1.49
BE	2.63	4.13	5	51.87	96.00	0.46	1.73	2.18	6.46	2.79	1.38
BG			3	20.09	30.00	0.30			4.61	1.96	0.89
CH	1.13	3.88	1	18.19	48.00	0.28	1.16	1.14	5.37	2.44	1.29
CY			2	54.30	52.00				7.41	3.15	1.85
CZ	0.88	2.13	3	17.42	43.20	0.25	3.05	1.96	4.08	2.00	0.97
DE	1.25	3.75	2	19.12	62.50	0.48	3.00	2.12	4.55	2.23	1.21
DK	1.38	3.13	2	67.61	80.00	0.44	1.63	1.50	7.75	2.78	2.19
EE	3.13	3.25	2	7.27	21.00	0.37	2.46	2.10	5.67	2.54	1.13
ES	3.50	3.13	3	15.01	84.45	0.38	2.46	2.98	4.62	1.74	1.07
FI	1.75	2.38	3	67.52	90.00	0.40	2.17	1.96	6.13	2.62	1.90
FR	3.63	2.13	3	7.63	90.00	0.21	2.47	3.05	5.58	2.55	1.24
EL			3	23.97	65.00	0.33	2.33	2.73			
HU	1.38	2.88	3	16.81	35.90	0.24	1.92	1.65	5.10	2.25	1.02
IE	0.63	2.38	4	35.20	44.00	0.53	1.60	1.11	5.62	2.29	1.31
IS	0.63	3.50		79.44	88.00		1.73	1.18	7.57	2.42	1.49
IT	2.00	4.88	2	33.43	80.00	0.34	1.77	1.89	4.58	2.09	0.84
LT			3	8.47	15.00	0.36			4.91	2.61	1.04
LU	3.75	3.88	3	37.33	58.00	0.30	2.75	3.25		1.74	
LV			2	14.80	25.00	0.51			5.71	2.35	0.99
MT			3	51.22	55.00	0.34			6.01	3.17	1.06
NL	1.19	3.00	3	19.04	82.30	0.57	2.72	1.95	5.46	2.22	1.52
NO	3.13	2.88	3	53.33	74.00	0.51	2.25	2.69	6.51	2.27	2.08
PL	1.75	3.63	2	15.60	38.00	0.26	2.06	1.90	5.09	1.90	1.05
PT	2.13	1.88	4	20.49	65.00	0.35	4.17	3.15	4.89	2.06	0.95
RO			3	32.83	70.00	0.28					
SE	0.88	3.75	2	68.77	91.00	0.51	2.86	1.87	6.74	2.60	1.82
SI	1.88	2.88	4	29.66	92.00	0.45	3.15	2.51	5.22	1.15	1.22
SK	0.38	3.75	3	17.17	40.00	0.49	2.50	1.44	3.59	1.64	0.77
UK	0.38	2.88	1.5	27.63	33.60	0.12	1.12	0.75	5.36	2.53	0.84

Source: OECD employment database and database on institutional characteristics of trade unions, wage setting, State intervention and social pacts (ICTWSS). Year 2009 (or 2008 when data not available for 2009).

## Annex 4

# Robustness of institutional analysis

Given the relatively low number of observations available across countries, it is important to assess the robustness of the results to the potential effects of individual outlying observations. Figure 1 reports the estimated coefficient for the relationship between strictness of labour market regulations and first job search duration, obtained by eliminating from the sample each of the 29 countries individually. The results indicate that the positive and significant relationship found in the overall sample (+0.20) is robust to the effect of outliers. The estimated coefficient is positive in all cases, ranging between 0.13 and 0.24. More important, the estimated coefficient is strongly significant in all specifications, as the p-value ranges between 0.003 and 0.012. Qualitatively similar results generally apply to the cross-country relationships presented in Section 6.2.

Figure 1. **Robustness check, overall strictness of regulation and job search duration**

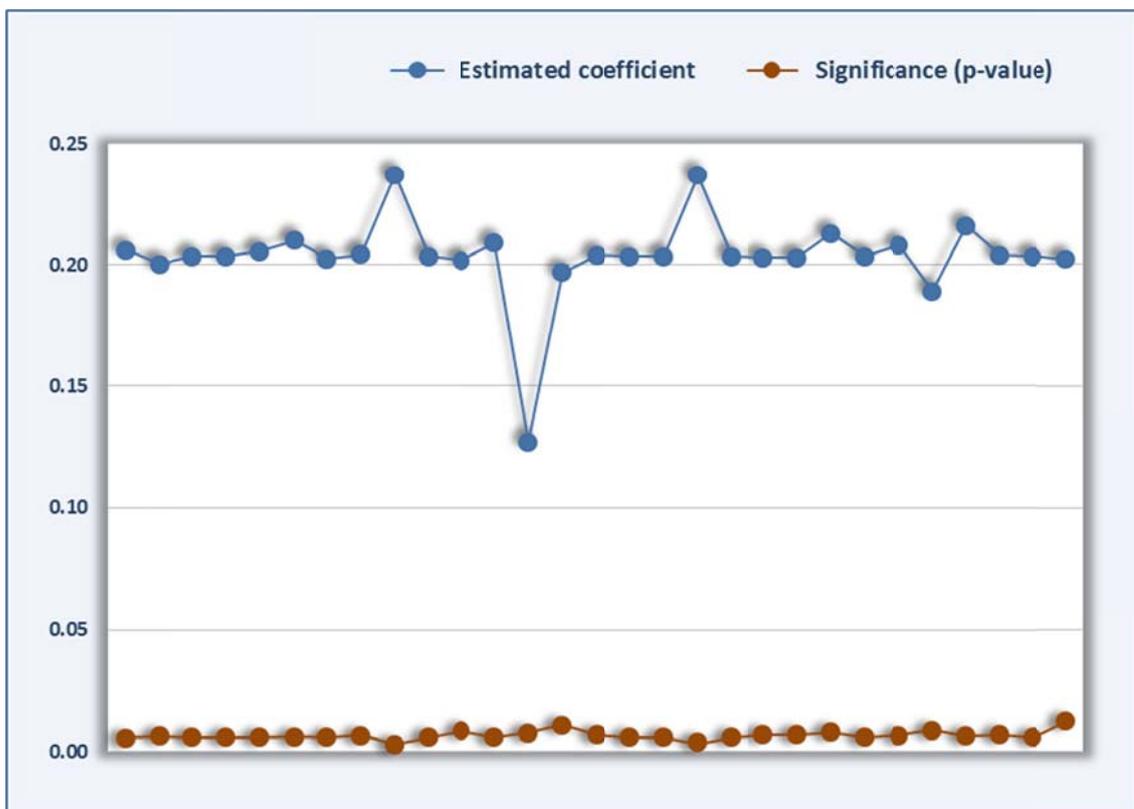


Table A2 presents detailed estimates of the effect of VET and general education on labour market outcomes, from which the VET premiums of Table 21 are deduced.

Table A2. VET premiums and labour market outcomes, by country

Country	Qualification mismatch							
	First job search duration		Probability of being employed		Probability of underqualification in first job		Probability of overqualification in first job	
	VET	GED	VET	GED	VET	GED	VET	GED
AU	0.84**	0.56**	1.21**	1.18**	-3.71**	-2.63**	4.68**	3.67**
BE	0.44**	0.08	1.52**	1.13**	-6.65**	-6.19**	-6.65**	-6.19**
BG	0.83**	0.77**	1.32**	0.93**	-4.68**	-4.47**	3.62**	3.74**
CY	0.25*	0.32**	1.08**	0.63*	-7.34**	-6.57**	-1.21**	-2.97**
CZ	1.16**	0.87**	1.63**	1.19**	-3.68**	-2.85**	-3.68**	-2.85**
DK	0.53**	0.43**	1.05**	0.43	-2.47**	-2.06**	-2.47**	-2.06**
EE	0.86**	0.49**	0.61*	0.78*	-5.02**	-5.1**	1.87**	-0.38
FI	0.47**	0.32**	1.33**	1.04**	-8.01**	-6.61**	-1.53	-1.55
FR	0.53**	0.48**	0.85**	0.99**	-7.27**	-6.43**	-7.27**	-6.43**
DE			1.51**	-0.34	-3.41**	-2.21*	3.37**	3.57**
EL	0.49**	0.22**	0.68**	0.14	-2.74**	-4.88**	2.41**	0.14
HU	0.94**	0.79**	1.46**	1.34**	-3.61**	-2.43**	-3.61**	-2.43**
IS	-0.38	0.41*	0.86	0.77	-0.63	1.42*	-0.63	1.42*
IE	0.10	0.24**	1.28**	1.00**	-3.37**	-3.14**	1.93**	0.65**
IT	0.53**	0.42**	0.88**	0.68**	-4.21**	-4.34**	3.60**	2.58**
LV	0.72**	0.38**	1.30**	0.94**	-6.25**	-7.31**	-6.25**	-7.31**
LT	0.69**	0.32*	1.23**	0.67*	-3.64	-3.38**	-3.64**	-3.38**
LU	0.48**	0.34**	0.86**	0.46	-5.99**	-5.96**	-2.00**	-2.29**
MT	0.27	0.25	1.18*	2.48**				
NL	0.32**	0.30**	1.32**	0.80**	-6.81**	-6.24**	-6.81**	-6.24**
PL	0.83**	0.79**	1.19**	1.11**	-10.02**	-9.59**	-0.90**	-3.07**
PT	0.45**	0.18**	1.08*	0.78**	-0.13	-0.12	-0.13	-0.12
RO	0.66**	0.46**	0.86**	0.74**	-10.27	-10.5	-0.60**	-2.11**
SK	1.55**	1.50**	2.01**	1.83**				
SI	0.86**	0.38**	0.90*	-0.36	-15.22**	-14.1**	-2.3**	-2.25**
ES	0.51**	0.32**	0.56**	0.41**	0.72**	0.79**	0.72**	0.79**
SE	0.60**	0.50**	1.51**	1.25**	-10.07**	-9.86**	-10.07	-9.86
CH			0.64**	0.09				
UK	0.05	0.22*	0.75	0.84	-6.08**	-5.35**	-2.2**	-1.76**

Source: LFS. \* p<0.05, \*\* p<0.01. The figures reported in column (1, 2) are country-specific estimates of equation (6) for first job finding rates (log hazard ratios of duration model with Weibull distribution for first job search duration). Column (3, 4): country-specific multinomial logit estimates of the probability of being currently employed (as opposed to inactive). Columns (5, 6, 7, 8): country-specific multinomial logit estimates of under (over)-qualification (reference group: matched and ISCED 0-2 for education orientation). na: not available.



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of Vocational Training

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Evidence from the European Union  
labour force survey

Luxembourg:  
Publications Office of the European Union

2013 – VI, 76 p. – 21 x 29.7 cm

ISBN 978-92-896-1145-9

ISSN 1831-5860

doi: 10.2801/44683

Cat. No: TI-BC-13-002-EN-N

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This report focuses on the outcomes of vocational education and, in particular, on the transition from education to work in the current employment situation for young adults in the European Union. Using anonymised microdata from the EU labour force survey 2009 ad hoc module, this is one of the first studies to undertake a large cross-country comparison of the labour market outcomes of different education orientations and levels. The report underlines that vocational education graduates experience initially positive labour-market outcomes relative to graduates of medium-level general education. Vocational graduates enjoy a faster transition to work, are more likely to have a permanent first job, and are less likely to find a first job with a qualification mismatch. Additional country level analysis is complemented by an investigation of national institutional features as a possible explanation for cross-country differences in VET labour market outcomes.

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