

Does vocational education and training improve market integration and job quality for young people?

Dr. Thomas Bolli, Maria Esther Egg and Ladina Rageth*

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Abstract

A comparison of youth unemployment rates shows that some countries are better off than others. To explain this variation across countries, this paper analyses how the education system affects the labour market situation of the 15-24 years old. We thereby extend the broad literature regarding the effect of education on youth unemployment by examining whether the results hold for different labour market integration measures as well as job quality measures, which together provide a comprehensive picture on the youth labour market situation. Importantly, using panel data on the country-level for 42 countries allows us to address unobserved heterogeneity across countries and to elaborate on the identification of causal effects. Our results show considerable variation... .

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Keywords: Education System, Vocational Education, Youth Labour Market, Unemployment

* ETH Zurich, KOF Swiss Economic Institute, bolli@kof.ethz.ch, egg@kof.ethz.ch and rageth@kof.ethz.ch. Address for correspondence: KOF Swiss Economic Institute, Leonhardstrasse 21, CH-8092 Zurich. Phone: +41 44 633 87 89. The authors gratefully acknowledge the financial support of the Gebert R uf Foundation.

1 Introduction

Reports on the difficult situation for young people on the labour market regularly appear in the news. Nonetheless, large variation in the youth labour market situation across countries exists, which appears to depend on institutional differences in national education systems. On the one side, German-speaking countries, for example, show comparably low youth unemployment rates and have at the same time education systems with extensive dual vocational education and training (VET) programmes on the upper secondary level. These combined school- and work-based VET programmes aim at directly preparing young people for an occupation and thus their entry into to the labour market. For that purpose, these programmes are based on a co-existence of different learning and training locations, namely the company and the vocational school, and thus ensure the labour market orientation of the acquired skills (Wolter and Ryan, 2011). On the other side, high unemployment rates lead to great indignation in some countries with more than half of the youth cohort being left without a job, for instance in Greece or Spain. In these southern European countries, VET plays a marginal role and mostly takes place in vocational schools only. Overall, VET is a prominent part of upper secondary education only in a few countries, mostly continental European and Scandinavian ones (Eichhorst et al., 2012). In many countries, general education programmes, which represent alternative education tracks on the upper secondary level and prepare for further (academic) education, are prevalent, most notably in the United States, Canada and Mexico with enrolment rates of over 90 percent. However, the youth unemployment rate captures simply one aspect of the situation of young people on the labour market (Freeman and Wise, 1982; O'Higgins, 2003; Dewan and Peek, 2007; Renold et al., 2014). Therefore, one needs to consider a more comprehensive picture based on different indicators, which cover not only the labour market integration but also the quality of jobs for young people. Behind this background, this paper analyses whether an education system with an extensive VET programme, measured by the enrolment rate of students in these programmes, increases the labour market integration and the quality of jobs for young people.

The literature suggests that education systems are more successful in integrating young people into the labour market if they account for the demand of the labour market and if they have the ability to signal the acquired human capital of young people to employers (e.g. Breen, 2005; Bol and Van de Werfhorst, 2013). VET programmes thereby have the following advantages: Compared to general education, VET programmes provide more occupation-specific than general skills, which align closely to tasks demanded by the labour market. In addition, the specificity of the acquired skills allows for a better signalling of young peoples' job-suitability. Dual VET programmes enable young people to gain and apply occupation-specific knowledge directly on-the-job (Wolter and Ryan, 2011; Eichhorst et al., 2012).

The interest on the question whether the level and orientation of educational achievements have an impact on labour market outcomes has led to various empirical studies. These studies found evidence for the impact of institutional differences in the education system on labour market out-

comes on the individual and national level (e.g. OECD, 1998; Gangl, 2000; Scherer, 2005; Wolbers, 2007; Hanushek et al., 2011; de Lange et al., 2014; Levels et al., 2014). However, the results of these studies are ambiguous with regard to the size and direction of the effect, and depend on the used data, methods and outcome measurements. Most studies agree that in countries with a higher rate of students enrolled in VET programmes, youth labour market integration tends to be better compared to education systems that offer more general education (Bol and Van de Werfhorst (2013); Hanushek et al. (2011); Gangl (2000)). Especially with regard to dual VET programmes, previous research has shown a mostly positive impact on youth labour market integration (citebol2013educational; Wolbers (2007); Breen (2005); Breen and Buchmann (2002); OECD (1998)). The results are less clear if we look at the impact of VET programmes on the labour market entrants' job quality, which is measured by various indicators (Levels et al. (2014); citebol2013educational; Gangl (2000)). We find the same inconsistency when we look at the results of previous research focusing on dual VET programmes (de Lange et al. (2014); (Levels et al. (2014); citebol2013educational; Wolbers (2007)). However, none of the existing studies analyses the single effect of the enrolment rate of students in school-based VET programmes on the labour market situation. They either investigate the impact of VET programmes in general, including both school-based VET and dual VET, or focus on the impact of only dual VET in comparison to general education.

This overview shows that previous research has only tentatively explored the impact of the extent of VET in an education system on a country's situation on the youth labour market, in contrast to the wide coverage of individual labour market outcomes. First, we extend this literature by investigating the impact of the extent of school-based and dual VET programmes separately and by comparing these two effects. We thereby operationalise the extent of the different upper secondary education programmes using the national enrolment rates of students in general programmes, school-based VET programmes, and dual VET programmes. Second, we contribute to the existing literature by applying a broad set of outcome indicators to capture the integration of the 15-24 years old into the labour market and young people's job quality. This is especially important because previous evidence varies depending on how the youth labour market situation is measured and because many studies focus on youth unemployment. Therefore, we look at a broad set of outcome indicators to capture the integration of young people into the labour market, e.g. relaxed unemployment rate or the portion of young people not in education, employment or training (NEET). Most importantly, we also apply different indicators to measure young people's job quality, e.g. the rate of temporary contracts and involuntary part-time work. Third, our dataset provides an opportunity to complement the existing literature methodically as most existing studies cannot rule out reversed causality or unobserved heterogeneity, and are thus unable to make causal claims. Some studies apply random effects models and can therefore provide causal evidence, but only under strong assumptions. We rely on unbalanced panel data for up to 42 countries between 1998 and 2012. This dataset allows us to explore on its time-variation and thus to provide a thorough analysis of whether observed correlations between the education system and the youth labour market situation represent a causal effect or whether reverse causality

and unobserved heterogeneity across countries might bias these estimates. For that purpose, we test whether conditional correlations change if we control for the adult labour market situation. Furthermore, the comparison of random and fixed effects models, which account for unobserved heterogeneity, suggests that unobserved heterogeneity is correlated with the error term in a number of estimations. Finally, we address reverse causality by lagging the explanatory variable, namely the enrolment rate of students in upper secondary educational programmes.

Our results reveal a causal impact of the extent of VET in an education system on the integration of young people into the labour market and the quality of their jobs. In line with previous studies, we find that countries with a higher share of students enrolled in dual VET programmes show a better labour market integration, namely they have lower unemployment and relaxed unemployment rates, compared to countries with a high share of general education programmes. In addition, the jobs of young people in these countries are of better quality, insofar as the in-work at-risk of poverty rate is lower. However, we are not able to find evidence for the hypothesis that countries with a higher share of students enrolled in school-based VET programmes have a positive influence on the youth labour market situation compared to countries with a larger share of general education programmes. Consequently, we are first to prove that dual VET programmes are more effective in increasing the labour market integration and in improving the job quality than school-based VET programmes.

This article proceeds as follows: Chapter 2 presents the current state of research and the theoretical background from which we derive our hypotheses on whether an education system with an extensive VET programme increases labour market integration and job quality for young people. Chapter 3 exposes our empirical design including the dataset and methodology, which we will apply to test our hypotheses. Lastly, chapter 4 and 5 contain the presentation as well as discussion of our empirical findings.

2 Theoretical Background, Hypotheses and Literature Review

2.1 Differences in Upper Secondary Education Systems

Countries around the world show considerable variation with regard to their upper secondary education system. Commonly, educational programmes on the upper secondary level are divided into *general programmes* and *formal vocational education and training (VET) programmes* that are part of the education system. Typically, VET programmes are designed for and directly lead to a particular occupation or type of occupation (Staff, 2004). These programmes usually combine practical training at either workplace or school with learning of occupation-specific theory and some degree of general skills. In contrast, general education programmes take place only in the school environment and impart mainly general skills. According to Field et al. (2009: 18), “It [VET] is distinct from (academic) education - for example in mathematics, which is relevant to a very wide range of jobs”. *Occupation-specific skills* immediately increase productivity in the particular occupation but have no effect on the future productivity in other occupations. *General skills* do not affect productivity in the short run but might affect future productivity in a wide range of occupations. However, this definition of VET unavoidably leaves some blurred edges as the nature of VET programmes differs greatly from country to country (analysed for example by Biavaschi et al., 2012).

In addition, VET programmes can be further divided into *school-based programmes* and *combined school-and work-based programmes* (Staff, 2004). The combined school- and work-based programmes are also called dual VET or apprenticeship programmes and build on a co-existence of different learning and training locations, namely the company and the vocational school (Wolter and Ryan, 2011). Compared to school-based VET, which takes mainly place at vocational schools, this combination either happens in concurrent school-based and work-based training, or alternating intervals of the different trainings. This combination leads to a direct attunement and application of the theory in practice. In addition, dual VET programmes allow for a strong corporate responsibility for VET ensuring the labour market orientation of the acquired skills. The Staff (2004) bases its distinction of the two VET programmes upon the amount of training that is provided in-school compared to training at the workplace. Programmes are classified as school-based VET if at least 75 percent of the curriculum is presented in a school environment. Accordingly, dual VET programmes consist of less than 75 percent in-school training.

Countries vary considerably on the level and development of the enrolment rates of upper secondary students in these educational programmes (see table 2 in Appendix 6.1). In Canada and Mexico for instance, over 90 percent of the students enrolled in upper secondary education are participating in general programmes (all rates for 2012). In contrast, we can observe the lowest rate of enrolment in general education programmes in Austria and the Czech Republic with around one fourth. School-based VET programmes show the lowest coverage in Denmark (1.7 percent)

and in Canada (5.7 percent), however they exist in nearly all countries covered by our sample. Dual VET programmes on the other side are only present in about one third of the countries with a broad range of enrolment rates between 3.2 percent in Belgium and 60.4 percent in Switzerland. A look at the development of these enrolment rates over 10 years (2002-2012) discloses that the rates for dual VET programmes show the least change as countries with dual VET programmes mostly stay on about the same level.

2.2 Capturing the Situation on the Youth Labour Market

News reports on the severe situation of young people on the labour market can be consumed nearly daily, especially in the wake of the financial crisis. These comparisons of the situation of young people on the labour market are usually based on youth unemployment rates. However, simply looking at the unemployment rates does not provide a comprehensive overview on the national situation of young people on the labour market. Some authors therefore advocate a more in-depth evaluation of the situation using a system of indicators covering various aspects (Freeman and Wise, 1982; O'Higgins, 2003; Dewan and Peek, 2007; Renold et al. (2014)). They suggest a multidimensional approach including but not only indicators for the labour market integration, the job quality, the transition smoothness or the education level. Examples for proposed indicators are unemployment rate for the labour market integration or the rate of temporary workers for job quality to give a couple. In this paper we are going to follow the multidimensional approach, whereby we will focus on the labour market integration and the job quality.

2.3 Theoretical Background and Hypotheses

The effective coordination of the education system and the youth labour market has become a prominent issue especially due to high unemployment rates emerging in the wake of the financial crisis. Hence, a vast amount of research is concerned with the problem of how to prepare for and integrate today's youth into the labour market. The institutional structure of education systems has been considered as one reason for cross-national differences in the labour market entry (Gangl, 2000). Accordingly, comparative studies have shown that national education systems show high variation in the way in which they try to match their output with the demand of the labour market (cf. Ryan, 2001; Raffe, 2014).

If we look at education systems from a structural functionalistic perspective, we can see society as a complex system with different parts working together to secure solidarity and stability. In this view, education is a subsystem (besides the economic and political system) delivering a performance for the society - based on its function (Fend, 2006). Although the literature offers different sets of functions that an education system has to fulfil (Herzog, 2009), all of them have one thing in common: They assume that, at the interface between the education system and the economic

system, education systems need to prepare young people for their employment and allocation to the labour market. Hence, education systems are responsible for the provision of human capital as a resource of the society (Human Capital Theory, Becker, 1964). We thereby define human capital as all skills that are useful to firms, hence education and training represent investments in future productivity. Consequently, we can measure the effectiveness of an education system with regard to the human capital function by the successful integration of young people into the labour market. Against this background, this paper analyses whether an education system with an extensive VET programme improves the situation of young people on the labour market. In doing so, we look not only at one indicator for the labour market outcome but rather account for the impact on the labour market integration and the quality of jobs for young people.

To be able to fulfil the human capital function, on the one side, the education system needs to know and meet the requirements of the labour market. This condition requires an institutional link between education system and employers. On the other side, a successful allocation of young people to the labour market asks for clear signals from the education system regarding the suitability of job seekers for a particular job. Behind this background, the current literature suggests that the successful integration of young people into the labour market depends firstly on whether there exist a direct link between the education system and employers, and secondly on how far an education system teaches occupation-specific skills rather than general skills (e.g. Hannan et al., 1996; Müller and Shavit, 1998; Arum and Shavit, 1995; Bol and Van de Werfhorst, 2013). Together, these conditions enable clear signals about a job seekers' human capital and productivity, and thus enhance employment prospects along with education-to-job matching (Breen, 2005).

In this context, many authors emphasise that VET programmes, compared to general programmes, are embedded in institutional settings that ensure a close link between job seekers and employers. Hence, these programmes prepare for a particular occupation by teaching qualifications that the workplace requires (cf. Bol and Van de Werfhorst, 2013; Levels et al., 2014). As occupational tasks are usually an important point of reference in the curricula and in the on-the-job training, VET entails many occupation- or even firm-specific elements. Aligning the training content more closely to particular occupations and tasks demanded in the labour market may reduce the problem of education-to-job mismatch (Eichhorst et al., 2012). In contrast, critics argue that VET might be too occupation-specific and thus acquired skills become obsolete quickly without having the ability to adapt to new technologies (cf. Hanushek et al., 2011). Replying to this critique, Acemoglu and Pischke (1999) and Winkelmann (1996) argue that occupation-specific skills learned in VET programmes are strongly complemented by the acquisition of general skills, particularly in dual VET. Federal regulations and quality controls can ensure that training is transferable across firms. In addition, on-the-job training in firms is not occupation-specific by default but can rather allow for learning that is embedded in real-world situations and can be transferred to other work situations.

Behind this theoretical background, we can hypothesise that in countries with extensive VET

programmes, which ensure both an institutional link between education system and employers and specific vocational skills, the education system successfully prepares young people for their integration into the labour market and ensures the quality of their entry jobs:

H1: Countries with a higher enrolment rate in school-based VET programmes have better labour market integration of young people than countries with a higher enrolment rate in general education programmes.

H2: Countries with a higher enrolment rate in school-based VET programmes have better job quality for young people than countries with a higher enrolment rate in general education programmes.

H3: Countries with a higher enrolment rate in dual VET programmes have better labour market integration of young people than countries with a higher enrolment rate in general education programmes.

H4: Countries with a higher enrolment rate in dual programmes have better job quality for young people than countries with a higher enrolment rate in general education programmes.

The following three reasons speak for the advantage of dual VET programmes for the integration of young people into the labour market and the quality of their entry jobs compared to school-based VET programmes. First, dual VET programmes come with a larger share of work experience where the knowledge acquired at school can be applied at the workplace to become productivity relevant (Choudhry et al., 2012). This work-based training goes hand in hand with formal education. Second, the share of general skills imparted is lower in dual VET programmes as students acquire more directly productivity relevant occupational skills. Third, dual VET programmes have a closer link between education system and employers because of the strong corporate responsibility for the training. Thus, our last two hypotheses can be formulated as follows:

H5: Countries with a higher enrolment rate in dual VET programmes have better labour market integration of young people than countries with a higher enrolment rate in school-based VET programmes.

H6: Countries with a higher enrolment rate in dual VET programmes have better job quality for young people than countries with a higher enrolment rate in school-based VET programmes.

However, we do not assume that it would be beneficial for a country to have only VET programmes on the upper secondary education level. Indeed, an optimal mix of general and VET programmes assumedly provides the skills-mix demanded by the labour market. The close link between the education and employment system in VET programmes ensures that the qualifications provided are in demand by the labour market, with regard to their specificity and amount.

The following subchapter summarizes the existing literature in this field with reference to our

hypotheses.

2.4 Literature Review on Empirical Evidence

In comparison to the relationship between education system and the youth labour market situation, individual outcomes of education on the labour market are well-studied. However, the authors do not reach consistent conclusion regarding different labour market outcomes of general education and VET (e.g. Shavit and Müller, 2000; Ryan, 2001; Müller and Gangl, 2003; Iannelli and Raffe, 2007). According to Ryan (2001: 73), this analysis has been problematic as: “The merits of vocational curricula and work-based preparation are particularly difficult to evaluate statistically, given the potential importance of selection around unobservables, the near absence of experimental evidence, and the paucity of prior labour market experience to use in econometric modelling”. Nevertheless, existing studies provide indication that in general, the effect of VET is more likely to be positive for labour-market entrants if the outcome is employment rather than income or, especially, occupational level (Iannelli and Raffe, 2007). This conclusion points to the importance of looking at different variables describing the youth labour market situation for a comprehensive picture of the outcome.

In our structural functionalistic perspective, the effectiveness of the whole education system with regard to the provision of human capital and thus the successful integration of young people into the labour market is of interest. However, from studies investigating educational outcomes on the individual level, we cannot just derive that there is also an impact on the macro level, namely that the education system performs well. We rather have to distinguish macro and micro levels of explanation. For example, effects of macro features such as the size of VET programmes are not simply scaled-up equivalents of their micro counterparts. From evidence that VET graduates have better labour market integration, we cannot conclude that education systems with more extensive VET programmes have better aggregate outcomes because this skills provision might not be in line with the labour markets’ requirements. Hence, the taking over of results on the individual level for conclusions on the macro level, or vice versa, without testing it, leads to fallacies (Diekmann, 1995; Gehring and Weins, 2009; for an extensive discussion of individualistic and ecological fallacy see e.g. (Subramanian et al., 2009). To avoid such fallacies, we need theories and particularly methodologies which distinguish macro and micro levels of explanation (Raffe, 2014).

In this context, previous research provides indication that the organisation and set-up of the education system on the macro level determine youth labour market integration (e.g. Müller and Gangl, 2003). Consequently, on the one hand, some studies analysing individual outcomes of education additionally account for institutional variation in education systems, which might have an impact on the signalling of the certificates and thus of the acquired human capital (e.g. OECD, 1998; Gangl, 2000; Wolbers, 2007; Hanushek et al., 2011; de Lange et al., 2014; Levels et al., 2014). On the other hand, few researchers tried to find evidence for the relationship between the education

system and the situation on the youth labour market from a macro perspective (Bol and Van de Werfhorst, 2013; Breen, 2005; Breen and Buchmann, 2002). These studies generally use country-level aggregate data on the share of upper secondary students in different educational programmes to account for institutional variation in education systems. These studies analyse either the impact of VET programmes in general, including both school-based VET programmes and dual VET programmes, or focus on the impact of only dual VET programmes in comparison to general education programmes. Hence, they do neither look at the impact of school-based VET programmes separately, which will be accounted for with our H1 and H2, nor do they test for different effects of the two types of VET programmes which is addressed by H5 and H6.

Overall, previous studies agree that education systems with extensive VET programmes, compared to systems with more general programmes, come with a better integration of young people into the labour market, thus confirming H1/H3. Using country-level regressions with data from 29 OECD-countries, Bol and Van de Werfhorst (2013) approves this by showing that the higher the enrolment rate of students in upper secondary VET programmes, the lower the average length of job search. Though, they find a positive relation of their explanatory variable with the unemployment rate. In contrast, Gangl (2000) demonstrates for labour market entrants in 12 European countries that occupational labour market systems involving extensive vocational training reduce unemployment risks as compared to internal labour market systems with more general education systems and weaker institutional linkages to the labour market. In their analysis of the labour market outcomes over the lifecycle based on micro data from 18 countries from the International Adult Literacy Survey, Hanushek et al. (2011) show that the advantages of VET in smoothing entry into the labour market have to be set against disadvantages later in life. They also control for the country cohorts' share of individuals with general vs. vocational education and provide evidence that a higher share of individuals with VET has a lower negative impact on employment, however they do not test whether this difference is significant.

Focusing on dual VET systems, current research confirms that the share of upper secondary students in dual VET programmes, often referred to as the vocational specificity of the education system, is positively related to labour market integration on the country level, hence providing evidence for H3. One of the first studies on this subject was conducted by the OECD (1998), which showed with pooled cross-section, time-series models (OLS) for 14 countries that job prospects of school leavers are better in well-developed apprenticeship (dual VET) systems. Using cross-sectional aggregate data for OECD countries, Breen and Buchmann (2002) correspondingly demonstrated strong employment protection is associated with higher youth unemployment except where the existence of close links between education system and employers sets off this tendency (extensive dual VET system). Breen (2005) confirms this result by looking at the impact of the share of students enrolled in upper secondary education programmes that combine school- and work-based VET on youth unemployment using data from 27 OECD-countries from the late 1990s. Also de Lange et al. (2014) and Bol and Van de Werfhorst (2013) show a positive effect of more vocationally specific education systems (measured by the share of upper secondary students

in dual VET programmes) on youth labour market integration whereat intermediate and higher educated particularly benefit from this effect. In terms of the likelihood of becoming inactive and the entry speed, Wolbers (2007) also confirmed the negative relation between the vocational specificity of the education system and youth unemployment. These results are based on micro data on school-leavers in 11 European countries (2000 ad hoc module of the EU LFS) and macro data from Eurostat and OECD.

The results of previous studies are less clear if we look at the variation of labour market entrants' job quality and the countries' education system, testing H2 and/or H4, also due to the different indicators of job quality used in these studies. In terms of the VET programmes in general, only Gangl (2000) finds a positive relationship between occupational labour market systems involving extensive vocational training and job quality by looking at incidence of lower-skilled employment and status attainment at labour market entry (both not significant) as well as access to professional employment positions. In contrast, Levels et al. (2014) find that the vocational orientation (measured by the share of students enrolled in upper secondary VET programmes) is negatively related to education-to-job-matches. Levels et al. (2014) base their findings upon multilevel logistic regression models with micro data on 30'000 young school leavers from 20 European countries (2009 ad hoc module of the EU LFS).

We can find the same inconsistency regarding H4, namely the impact of the vocational specificity of upper secondary education systems, mainly measured by the share of upper secondary education taking place in a dual system, on the job quality. On the one hand, researchers confirmed the hypothesis that more vocational specific education systems come with better job quality for young people by showing a positive relationship with permanent employment (de Lange et al. (2014)) and by looking at education-to-job-matches (Levels et al. (2014)). On the other hand, Wolbers (2007) proves that the share of upper secondary education students in dual VET programmes is negatively related to the occupational status of the first significant job.

In summary, we can see that the studies find evidence for the impact of institutional differences in the education system on individual labour market outcomes and that this impact varies between outcome variables. While some of these studies agree that in countries with more extensive VET programmes, youth labour market integration and job quality tends to be better compared to education systems that offer more general education, other studies come to different conclusions. Previous research only tentatively explored such cross-level interactions and mostly cannot rule out reversed causality or unobserved heterogeneity. They are thus unable to make causal claims.

The following sections outline our empirical design to test the previously presented hypotheses.

3 Empirical design, data and methods

The dataset consists of unbalanced panel data for up to 42 countries between 1998 and 2012. Tables 3 and 4 in the Appendix display details about data availability.

Our dataset consists of nine dependent variables, four of them capturing the youth labour market integration and the other five indicating the quality of jobs. As this study focuses on the youth we only consider data for the 15 to 24, in some cases 29, years olds. For the labour market integration we pick the variables youth unemployment, relaxed youth unemployment, NEET and long-term youth unemployment. The choice to include those variables is made considering the literature (see section 2.2). The youth unemployment rate is the standard labour outcome measure. The relaxed youth unemployment rate and the NEET rate give a closer view on the actual situation, as the education systems of the countries differ and therefore also the time of transition into the labour market. The long-term youth unemployment indicates how smoothly young people are integrated into the labour market. So with these four variables we cover various aspects of the labour market integration. The five indicators for job quality are temporary contract, involuntary part-time, atypical working hours, in-work at-risk of poverty and skills mismatch. The temporary contract indicates the security of the work place, whereas the involuntary part-time captures the transition into the labour market. Concerning the working hours, standard working hours are preferable because of the personal life. Then, the in-work at-risk of poverty indicates if the job pays enough to cover all the expenses. Finally, skills mismatch is an indicator for the transition smoothness into the labour market. Table 1 gives more information on the variables.

Table 1: Description of regression variables

| Measure | Description | Source | Age range |
|--|---|----------|-----------|
| Dependent variable: Labour market integration | | | |
| Unemployment | Share of unemployed workers on the labour force (according to ILO standard) | ILO | 15-24 |
| Relaxed unemployment | Share of unemployed and discouraged workers on the labour force | Eurostat | 15-24 |
| NEET | Share of young people neither in employment nor in education and training | ILO | 15-29 |
| Long-term unemployment | Share of unemployed workers longer than one year on the total unemployed | ILO | 15-24 |
| Dependent variable: Job quality | | | |
| Temporary contract | Share of employees on a contract less than 18 month on total employees | Eurostat | 15-24 |

| | | | |
|-----------------------------|---|------------|-------|
| Involuntary part-time | Share of involuntary part-time employment on total employment | OECD | 15-24 |
| Atypical working hours | Share of employees working on Sundays, at night or shifts on total employees | Eurostat | 15-24 |
| In-work at-risk of poverty | Share of employees earning less than 60% of the national median equalised disposable income on total employees | Eurostat | 15-24 |
| Skills mismatch | Index of dissimilarities between share of employment and share of unemployment at a given education level | ILO | 15-29 |
| Explanatory variable | | | |
| General education | Enrolment rate of students into general education in upper secondary education | OECD | - |
| School-based VET | Enrolment rate of students into school-based vocational education and training in upper secondary education | OECD | - |
| Dual VET | Enrolment rate of students into combined school-based and work-based vocational education and training in upper secondary education | OECD | - |
| Control variable | | | |
| Youth labour force share | Share of young people in the labour force on the total labour force | ILO | 15-24 |
| GDP per capita | Economic strength of a country | World Bank | - |
| GDP growth | Current economic situation of a country | IMF | - |
| Globalisation | KOF Index of Globalisation, which contains economic, social and political measures of globalisation | KOF | - |

Note: The used databases are the ILO KILM 8th edition, the Eurostat database, OECD.Stat, World Development Indicators of the World Bank, Economic Outlook database of the International Monetary Fund (IMF) and KOF Swiss Economic Institute.

Table 5 in Appendix 6.3 shows descriptive statistics for the sample of countries used for our regression analyses.

The baseline specification is a standard linear OLS regression for the $j = 1...12$ youth labour

market outcomes as dependent variables. Hence, we estimate in total nine OLS equations for the nine youth labour market outcomes $y_{j,i,t}^{youth}$, given by

$$y_{j,i,t}^{youth} = \beta_{j,0} + \beta_{j,1}P_{i,t-3} + \gamma_{j,t} + \varepsilon_{j,i,t} \quad (1)$$

where the indices i and t refer to individual and time, respectively, and $\varepsilon_{j,i,t}$ is a normally distributed error term clustered at the country level to account for serial correlation within the country. We compute the logarithm of the entire equation so that the interpretation of the regression coefficients becomes more intuitive. As our data includes zeros we add a one to each value before taking the logarithm.

The main explanatory variables $P_{i,t-3}$ measure the share of upper secondary students enrolled in school-based vocational education and training programmes (school-based VET) and combined school- and work-based education and training (dual VET), respectively.¹ The baseline category corresponds to the share of students in general education programmes. We lag the explanatory variables by three years for two reasons. First, it accounts for the fact that the expected impact of enrolment patterns takes place after the education is completed, i.e. after three years, the average duration of upper secondary education programmes (OECD, 2014). Second, by lagging the enrolment shares, we ensure that our results are not driven by reverse causality.

$\gamma_{j,t}$ are time dummies included for time fixed effects. We interpolate gaps of no more than four consecutive years across time. Table 5 in the Appendix provides descriptive statistics for all variables. However, with this OLS equation, our estimates might be biased due to unobserved heterogeneity across countries. As described in detail below, we address this identification issues in four ways, namely by controlling for the adult labour market outcome and the lagged dependent variable as well as by estimating random and fixed effects models.

In the first approach to address unobserved heterogeneity, we add the corresponding adult labour market outcome, $y_{j,i,t}^{adult}$ and control variables as you can see in equation 2:

$$y_{j,i,t}^{youth} = \beta_{j,0} + \beta_{j,1}P_{i,t-3} + \beta_{j,2} * y_{j,i,t}^{adult} + \beta_{j,3} * X_{i,t} + \gamma_{j,t} + \varepsilon_{j,i,t} \quad (2)$$

$X_{i,t}$ denotes a vector of time-varying observable control variables as described in Table 1. Concretely, we use the labour force share in the 15 to 24 years old population to have a reference to the total youth cohort. The GDP per capita accounts for the relative economic strength of the country and the GDP growth captures the current situation of the country's economy. With the

¹The number of students enrolled refers to the count of students studying in the reference period. Each student enrolled in the education programmes covered by the corresponding category is counted once and only once. National data collection systems permitting, the statistics reflect the number of students enrolled at the beginning of the school / academic year (from OECD.stats).

KOF Globalisation Index we capture the openness of the labour market.

Because we cannot rule out unobserved heterogeneity, we further provide estimates based on random effects models which include country-specific intercepts (γ_j, i) that follow a normal distribution:

$$y_{j,i,t}^{youth} = \beta_{j,0} + \beta_{j,1}P_{i,t-3} + \beta_{j,2} * y_{j,i,t}^{adult} + \beta_{j,3} * X_{i,t} + \gamma_{j,t} + \gamma_{j,i} + \varepsilon_{j,i,t} \quad (3)$$

Finally, the last approach to tackle unobserved heterogeneity drops the assumption of the random effects model that the country-specific intercepts $\gamma_{j,i}$ follow a normal distribution that is independent of unobserved heterogeneity. The equation is the same as for the random effects regression, with the exception that we now drop the distributional assumption of γ_i and replace it by dummy variables for each country. In doing so, we exploit within-group variation over time.

4 Results

The results of all regression models are shown in the Appendix 6.4, Tables 6 to 14. Overall, we find mixed evidence for all of our hypotheses.

As all regressions for each labour market outcomes are the same, we will go into detail in describing the results for one of them, the youth unemployment and only state the results of the other outcomes. Therefore, looking at the results for youth unemployment we see that there is no evidence for H1. So we find no robust evidence that school-based VET programmes are better or worse than general education programmes in integrating adolescents into the labour market when looking at unemployment. Regarding the other labour market integration variables the picture is a similar one with no support for H1.

Doing the same analysis for the dual VET programmes we find a significant negative correlation with unemployment in the random effects and fixed effects model. The Hausman test tells us to use the fixed effects model. Therefore, we conclude that dual VET programmes compared to general education programmes do significantly reduce youth unemployment, thus finding evidence for H2. Regarding the other labour market integration variables we find further significant results for relaxed unemployment.

In the results for job quality we find that atypical working hours and skills mismatch is significantly higher with school-based VET programmes. For the other indicators, temporary contracts, involuntary part-time and in-work at-risk of poverty we find no significant results. Therefore, concerning H3 we surprisingly find evidence for an opposite effect of school-based VET programmes on job quality.

Regarding H4, we find no significant results for any of the indicators. Thus, the enrolment rate in dual VET programmes does not have an influence on job quality.

Comparing the coefficients from the school-based VET programmes with the coefficients from the dual VET programmes of the labour market integration variables we find significant differences for unemployment and relaxed unemployment. The coefficients of the other two variables do not seem to be significantly different. We conclude that we find evidence for H5 that school-based VET programmes and dual VET programmes influence the labour market integration differently, whereas dual VET programmes have a better influence.

For H6 we find that the coefficients of atypical working hours are significantly different, but the others are not. So we cannot completely reject the H6 that the coefficients of school-based VET programmes are significant different from the dual VET programmes in the job quality variables.

5 Conclusion

In this paper, we investigated whether an education system with an extensive VET programme, measured by the enrolment rate of students in these programmes, increases the labour market integration and the quality of jobs for young people. This relationship has been studied before, but we extend the existing literature in three ways: First, we analyse the impact of the different upper secondary VET programmes separately and also test which programmes are more effective. Second, we use a broad set of labour market outcome indicators to measure the integration of young people into the labour market and their job quality. Third, we use a broader dataset with panel data for up to 42 countries between 1998 and 2012, which allows us to clearly identify the causal inference.

In general, our results support that there is a relationship between the education system and a country's situation on the youth labour market. However, our separate analysis for the impact of the share of students enrolled in school-based VET programmes and in dual VET programmes reveals that not all VET programmes have the same effect on the integration of young people into the labour market and their job quality. We can confirm that, as often shown in descriptive comparisons of national youth unemployment rates, in countries with a high share of dual VET programmes (relaxed) youth unemployment is significantly lower compared to countries with extensive general education programmes. This correlation has also been proven in previous studies, however, most of these studies were not provide causal evidence, or only with strong exogeneity assumptions. This results indicates that education systems with an extensive dual VET programme are more successful in integrating young people into the labour market as they account for the requirements of the labour market. Hence, dual VET programmes provide young people with skills that are useful to firms, and as also succeed in signalling young peoples' acquired human capital to employers. However, we find no evidence that countries with a high share of students enrolled in dual VET programmes provide better job quality for their young people if we look at the rate of temporary contracts, of atypical working hours, in-work at-risk of poverty and skills mismatch.

Regarding the extent of school-based VET programmes, which has not been neglected in other studies so far, we are not able to make final statements. We find a negative impact of the enrolment rate in school-based VET programmes on the integration of young people into the labour market, but without any significance. If we look at the results for the job quality of young people, the results show the opposite. This finding suggests that education systems with extensive school-based VET programmes are not more successful than general education programmes with regard to the human capital function. In contrast to dual VET programmes, school-based VET programmes might not succeed in accounting for the demand of the labour market and/or signal the acquired human capital of young people to the employers. In line with these results, we also find evidence that dual VET programmes are more effective in increasing labour market integration and in improving job quality than school-based VET programmes.

Finally, our results have some limitations. Firstly, our data set is restricted in terms of both the number of countries and the length of the time-series. The latter includes that most changes in the enrolment rates of upper secondary education programmes are of minor extent and variation therefore remains rather low. With regard to the dependent variable, the age range of the youth unemployment rate is 15-24. But due to the fact, that most young people are still in education at that time and complete upper secondary education usually with around 18 years, it would be more appropriate to look at the youth unemployment rate of young people aged 20-29. Unfortunately, data for this age range is not available. Regarding the methodology, we take into consideration that random effects and fixed effects regressions still come with strict exogeneity assumptions, which assumes that the explanatory variables in each time period are uncorrelated with the error term in each time period. This means that time-constant unobserved heterogeneity is allowed as only time-varying unobserved heterogeneity can bias the estimator. Such endogeneity can be the result of reverse causality which we address with lagging our explanatory variable. Still, we assume that there are no unobserved time-varying cofounders which might lead to non-parallel time trends between the countries. We think that it is reasonable to assume that our outcomes variables in countries with changes in the enrolment rates would have developed parallel to the youth unemployment rates of countries with constant enrolment rates if they had not experienced this variation in the explanatory variable. In addition, our explanatory variable, the share of students enrolled in different upper secondary education programmes, is only partially comparable between different countries as national VET programmes show high variation. Moreover, with this indicator, we are neither able to directly measure the specificity of the skills that are inculcated by the education system, nor to directly measure the link to the employment system or the quality of the education. According to OECD (2010) there is need for an accurate identification of vocational programmes in secondary and tertiary education, which is not provided by the existing indicators, to make better comparisons on the international level. Consequently, we are not able to relate our findings to the actual set-up or feature of VET programmes that might help to successfully prepare young people for their entry into the labour market. Furthermore, we assume a linear correlation between the enrolment rates and the youth labour market. However, the relationship might be nonlinear as an optimal mix of different education programmes might be the best solution for providing young people with the qualification demanded by the labour market. Unfortunately, our data set has not enough variation to empirically explore this trade-off.

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6 Appendix

6.1 Enrolment rates in upper secondary education

Table 2: Enrolment rates in upper secondary education

| Country | General Education | | | School-based VET | | | Dual VET | | |
|-----------------|-------------------|-------------------|-------|-------------------|-------------------|-------|-------------------|----------------|------|
| | 2002 | 2012 | △ | 2002 | 2012 | △ | 2002 | 2012 | △ |
| Australia | 35.8 [#] | 49.5 | 13.7 | 64.2 [#] | 50.5 | -13.7 | 0.0 [#] | 0.0 | 0.0 |
| Austria | 21.0 | 24.7 | 3.7 | 43.2 | 40.9 | -2.3 | 35.8 | 34.4 | -1.4 |
| Belgium | 30.3 | 27.2 | -3.1 | 67.2 | 69.7 | 2.5 | 2.5 | 3.2 | 0.7 |
| Brazil | 86.0 | 85.8 | -0.2 | 14.0 | 14.2 | 0.2 | 0 | 0 | |
| Canada | 92.3 [*] | 94.3 | 2.0 | 8.2 [*] | 5.7 | -2.5 | 0.0 [*] | 0.0 | 0.0 |
| Chile | 60.4 | 68.2 | 7.8 | 39.6 | 31.8 | -7.8 | 0.0 | 0.0 | 0.0 |
| Czech Republic | 19.6 | 27.3 | 7.7 | 42.2 | 41.0 | -1.2 | 38.2 | 31.7 | -6.5 |
| Denmark | 45.9 | 53.9 | 8.0 | 0.7 | 1.7 | 1.0 | 53.4 | 44.4 | -9 |
| Egypt | 35.1 | 36.1 [#] | 1 | 64.9 | 63.9 [#] | -1 | 0 | 0 [#] | 0 |
| Finland | 42.8 | 29.9 | -12.9 | 46.4 | 59.1 | 12.7 | 10.8 | 11.0 | 0.2 |
| France | 43.7 | 55.8 | 12.1 | 44.5 | 32.3 | -12.2 | 11.8 | 11.9 | 0.1 |
| Germany | 37.0 | 51.7 | 14.7 | 12.2 | 6.4 | -5.8 | 50.8 | 41.9 | -8.9 |
| Hungary | 50.3 | 72.7 | 22.4 | 36.8 | 8.3 | -28.5 | 12.8 | 19.0 | 6.2 |
| Iceland | 61.7 | 66.5 | 4.8 | 21.6 | 20.0 | -1.6 | 16.7 | 13.5 | -3.2 |
| India | 99.9 | 99.9 [#] | 0 | 0.1 | 0.1 [#] | 0 | 0 [#] | 0 | |
| Indonesia | 63.1 | 64.7 [#] | 1.5 | 35.8 | 35.3 [#] | -0.5 | 0 | 0 [#] | 0 |
| Ireland | 66.1 [∇] | 62.5 [†] | -3.6 | 31.8 [∇] | 32.5 | 0.7 | 2.1 [∇] | 5.0 | 2.9 |
| Israel | 65.2 | 60.9 | -4.3 | 31.0 | 35.4 | 4.4 | 3.8 | 3.7 | -0.1 |
| Italy | 35.2 | 40.8 | 5.6 | 64.8 | 59.2 | -5.6 | 0.0 | 0.0 | 0.0 |
| Japan | 74.3 | 76.9 | 2.6 | 25.7 | 23.1 | -2.6 | 0.0 | 0.0 | 0.0 |
| Korea, Republic | 67.9 | 80.6 | 12.7 | 32.1 | 19.4 | -12.7 | 0 | 0 | 0 |
| Luxembourg | 36.0 | 39.3 | 3.3 | 50.8 | 46.4 | -4.4 | 13.3 | 14.3 | 1 |
| Malaysia | 85.0 | 85.1 [#] | 0.1 | 15.0 | 14.9 [#] | -0.1 | 0 | 0 [#] | 0 |
| Mexico | 88.6 | 91.2 | 2.6 | 11.4 | 8.8 | -2.6 | 0.0 | 0.0 | 0.0 |
| Netherlands | 30.8 | 30.5 | -0.3 | 45.7 | 51.1 | 5.4 | 23.5 | 18.4 | -5.1 |
| Norway | 44.8 [∇] | 48.0 | 3.2 | 39.3 [∇] | 36.8 | -2.5 | 15.9 [∇] | 15.2 | -0.7 |

6 APPENDIX

| | | | | | | | | | |
|--------------------|-------------------|-------------------|-------|-------------------|-------------------|-------|------------------|------------------|-------|
| Paraguay | 79.9 | 79.6 [#] | -0.3 | 20.1 | 20.4 [#] | 0.3 | 0 | 0 [#] | 0 |
| Philippines | 100 | 100 [#] | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poland | 53.8 [∇] | 51.8 | -2.0 | 40.6 [∇] | 41.1 | 0.5 | 5.5 [∇] | 7.1 | 1.6 |
| Portugal | 71.2 | 56.4 | -14.8 | 28.8 | 43.6 | 14.8 | 0.0 | 0.0 | 0.0 |
| Russian Federation | 57.0 [◇] | 48.7 | -8.3 | 43.0 [◇] | 51.3 | 8.3 | 0 [◇] | 0 | 0 |
| Slovakia | 23.6 | 29.7 | 6.1 | 35.1 | 40.0 | 4.9 | 41.3 | 30.3 | -11.0 |
| Slovenia | 35.5 [∇] | 33.8 | -1.7 | 63.3 [∇] | 66.2 | 2.9 | 1.2 [∇] | 0 | -1.2 |
| Spain | 62.0 | 54.4 | -7.6 | 33.2 | 44.1 | 10.9 | 4.8 | 1.5 | -3.3 |
| Sweden | 50.4 | 50.6 | 0.2 | 49.6 | 49.4 | -0.2 | 0 | 0 | 0 |
| Switzerland | 35.4 | 34.8 | -0.6 | 6.0 | 4.8 | -1.2 | 58.6 | 60.4 | 1.8 |
| Thailand | 76.0 | 70.6 [#] | -5.4 | 24.0 | 29.4 [#] | 5.4 | 0 | 0 [#] | 0 |
| Tunisia | 93.2 | 94.6 [#] | 1.4 | 6.8 | 5.4 [#] | -1.4 | 0 | 0 [#] | 0 |
| Turkey | 60.6 | 57.8 [◇] | -2.8 | 30.1 | 34.8 [◇] | 4.7 | 9.3 | 7.4 [◇] | -1.9 |
| United Kingdom | 27.9 | 61.4 | 33.5 | 72.1 | 21.4 | -50.7 | 0.0 | 17.2 | 17.2 |
| United States | 100 | 100 [*] | 0.0 | 0.0 | 0.0 [*] | 0.0 | 0.0 | 0.0 [*] | 0.0 |
| Uruguay | 80.8 | 81.3 [#] | 0.5 | 19.2 | 18.7 [#] | -0.5 | 0 | 0 [#] | 0 |

Notes:

[#] Due to missing data, the table depicts the value for 2003.

^{*} Due to missing data, the table depicts the value for 2004.

[◇] Due to missing data, the table depicts the value for 2005.

[∇] Due to missing data, the table depicts the value for 2008.

[†] Due to missing data, the table depicts the value for 2010.

6.2 Data availability

Table 3: Data availability on labour market integration

| Country | Unemployment | Relaxed unemployment | NEET | Long-term Unemployment |
|----------------|----------------------|----------------------|-----------|------------------------|
| Australia | 2000-2012 | - | - | 2000-2012 |
| Austria | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Belgium | 1999-2012 | 2005-2012 | 2004-2012 | 1999-2012 |
| Brazil | 1999-2012 | - | 2009 | - |
| Canada | 2001-2012 | - | - | 2004, 2001-2012 |
| Chile | 1999-2012 | - | 2010 | - |
| Czech Republic | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Denmark | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Egypt | 1999-2003 | - | - | - |
| Finland | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| France | 1998-2012 | 2005-2012 | 2000-2012 | 1998-2012 |
| Germany | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Hungary | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Iceland | 1998-2012 | 2006-2012 | - | 1998-2012 |
| India | 1999-2003 | - | - | - |
| Indonesia | 1999-2003, 2010-2012 | - | 2010 | - |

| | | | | |
|--------------------|-----------|-----------|-----------|-----------|
| Ireland | 2005-2010 | 2006-2010 | 2005-2010 | 2005-2010 |
| Israel | 1999-2012 | - | - | 1999-2012 |
| Italy | 1998-2012 | 2005-2012 | 2000-2012 | 1998-2012 |
| Japan | 1998-2012 | - | 1998-2011 | 1998-2012 |
| Korea, Republic | 1998-2012 | - | - | 1998-2012 |
| Luxembourg | 1998-2012 | 2009-2012 | 2004-2012 | 1998-2012 |
| Malaysia | 1999-2003 | - | - | - |
| Mexico | 1998-2012 | - | - | 1998-2012 |
| Netherlands | 1998-2012 | 2005-2012 | 2000-2012 | 1998-2012 |
| Norway | 2005-2012 | 2005-2012 | - | 2005-2012 |
| Paraguay | 1999-2003 | - | - | - |
| Philippines | 1999-2003 | - | - | - |
| Poland | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 |
| Portugal | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Russian Federation | 2002-2012 | - | - | 2002-2012 |
| Slovakia | 1999-2012 | 2005-2012 | 2004-2012 | 1999-2012 |
| Slovenia | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 |
| Spain | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Sweden | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| Switzerland | 1998-2012 | 2006-2012 | - | - |

| | | | | |
|----------------|-----------|-----------|-----------|-----------|
| Thailand | 1999-2003 | - | - | - |
| Tunisia | 1999-2003 | - | - | - |
| Turkey | 1999-2005 | - | - | 1999-2005 |
| United Kingdom | 1998-2012 | 2005-2012 | 2004-2012 | 1998-2012 |
| United States | 1998-2004 | - | - | 1998-2004 |
| Uruguay | 1999-2003 | - | - | - |

Table 4: Data availability on job quality

| Country | Temporary tract | con- tract | Involuntary part- time | Atypical working hours | In-work at-risk of poverty | Skills mismatch |
|----------------|----------------------------|-----------------------|-----------------------------------|-----------------------------------|---------------------------------------|------------------------|
| Australia | - | - | 2001-2012 | - | - | - |
| Austria | 1998-2012 | - | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Belgium | 1999-2012 | - | 1999-2012 | 1999-2012 | 2004-2012 | 2000-2012 |
| Brazil | - | - | - | - | - | - |
| Canada | - | - | 2001-2012 | - | - | - |
| Chile | - | - | - | - | - | - |
| Czech Republic | 1998-2012 | - | 1998-2012 | 2002-2012 | 2005-2012 | 2000-2012 |
| Denmark | 1998-2012 | - | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Egypt | - | - | - | - | - | - |
| Finland | 1998-2012 | - | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| France | 1998-2012 | - | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Germany | 1998-2012 | - | 1998-2012 | 1998-2012 | 2005-2012 | 2000-2012 |
| Hungary | 1998-2012 | - | 1998-2012 | 1998-2012 | 2005-2012 | 2000-2012 |
| Iceland | 2005-2010 | - | 1998-2002 | 1998-2012 | 2004-2012 | 2000-2012 |
| India | - | - | - | - | - | - |
| Indonesia | - | - | - | - | - | - |
| Ireland | 2005-2010 | - | 2005-2010 | 2005-2010 | 2005-2010 | 2005-2010 |

| | | | | | |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Israel | - | 1999-2012 | - | - | - |
| Italy | 1998-2012 | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Japan | - | 1998-2012 | - | - | - |
| Korea, Republic | - | - | - | - | - |
| Luxembourg | 1999-2012 | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Malaysia | - | - | - | - | - |
| Mexico | - | - | - | - | - |
| Netherlands | 1998-2012 | 1998-2012 | 1998-2012 | 2005-2012 | 2000-2012 |
| Norway | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 |
| Paraguay | - | - | - | - | - |
| Philippines | - | - | - | - | - |
| Poland | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 |
| Portugal | 1998-2012 | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Russian Federation | - | 2002-2012 | - | - | - |
| Slovakia | 1999-2012 | 1999-2012 | 2001-2012 | 2005-2012 | 2000-2012 |
| Slovenia | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 | 2005-2012 |
| Spain | 1998-2012 | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Sweden | 1998-2012 | 1998-2012 | 1998-2012 | 2004-2012 | 2000-2012 |
| Switzerland | 1998-2012 | - | 1998-2012 | 2008-2012 | 2000-2012 |
| Thailand | - | - | - | - | - |

| | | | | | |
|----------------|-----------|-----------|-----------|-----------|-----------|
| Tunisia | - | - | - | - | - |
| Turkey | - | 1999-2004 | - | - | - |
| United Kingdom | 1998-2012 | 1998-2012 | 1998-2012 | 2005-2012 | 2000-2012 |
| United States | - | 1998-2004 | - | - | - |
| Uruguay | - | - | - | - | - |

6.3 Descriptive Statistics

Table 5: Summary statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------------------------------|------------|-------------|------------------|------------|------------|
| Country | 42 | - | - | - | - |
| Year | 15 | - | - | 1998 | 2012 |
| Unemployment | 483 | 15.73 | 7.77 | 4.00 | 54.30 |
| Relaxed unemployment | 167 | 24.95 | 11.60 | 9.32 | 67.48 |
| NEET | 195 | 10.35 | 4.06 | 3.40 | 25.70 |
| Long-term unemployment | 392 | 18.70 | 13.94 | 0.00 | 60.00 |
| Temporary contract | 290 | 19.60 | 13.41 | 0.85 | 59.96 |
| Involuntary part-time | 350 | 4.38 | 3.89 | 0.00 | 22.81 |
| Atypical working hours | 292 | 14.99 | 5.60 | 4.10 | 30.37 |
| In-work at-risk of poverty | 182 | 10.11 | 5.65 | 1.70 | 27.50 |
| Skills mismatch | 264 | 16.96 | 7.20 | 0.90 | 34.40 |
| General programme | 483 | 55.10 | 21.90 | 18.62 | 100 |
| School-based VET | 483 | 33.40 | 19.34 | 0 | 72.23 |
| Dual VET | 483 | 11.51 | 16.59 | 0 | 60.65 |
| Youth labour force share | 483 | 14.65 | 5.14 | 6.36 | 30.06 |
| GDP per capita | 483 | 27.03 | 14.14 | 1.98 | 88.85 |
| GDP growth | 483 | 2.50 | 3.00 | -8.27 | 10.73 |
| KOF Glob Index | 483 | 77.04 | 11.92 | 42.57 | 92.37 |
| Adult unemployment | 483 | 5.67 | 2.96 | 0.90 | 22.80 |
| Adult relaxed unemployment | 167 | 8.54 | 4.14 | 1.97 | 26.60 |
| Adult long-term unemployment | 392 | 33.76 | 17.44 | 0.00 | 77.60 |
| Adult temporary contract | 290 | 4.90 | 3.19 | 0.00 | 19.35 |
| Adult involuntary part-time | 350 | 2.17 | 1.59 | 0.01 | 8.51 |
| Adult atypical working hours | 292 | 12.53 | 3.33 | 5.17 | 25.00 |
| Adult in-work at-risk of poverty | 182 | 6.94 | 2.50 | 3.20 | 13.9 |
| Adult skills mismatch | 264 | 14.83 | 4.46 | 2.00 | 30.70 |

6.4 Regression results

Table 6: Unemployment

| | OLS | OLS_a | RE | FE |
|------------------|---------------------|---------------------|----------------------|----------------------|
| | b/se | b/se | b/se | b/se |
| School-based VET | 0.088* (0.049) | 0.093** (0.040) | 0.002 (0.026) | -0.020 (0.023) |
| Dual VET | -0.085 (0.061) | -0.065 (0.042) | -0.163*** (0.052) | -0.248** (0.108) |
| Y adult | | 2.193*** (0.144) | 2.224*** (0.069) | 2.247*** (0.063) |
| Youth LF rate | | 0.087 (0.145) | 0.145 (0.163) | 0.166 (0.219) |
| GDP per capita | | -0.015 (0.053) | 0.051 (0.056) | 0.110** (0.046) |
| GDP growth | | -0.049 (0.186) | -0.142** (0.055) | -0.143*** (0.050) |
| KOF Glob Index | | -0.074 (0.087) | -0.041 (0.047) | -0.006 (0.083) |
| Constant | 9.690*** (2.381) | 4.654 (7.266) | 4.229 (5.610) | 1.397 (9.281) |
| N | 389.000 | 389.000 | 389.000 | 389.000 |
| r2 | 0.162 | 0.783 | | 0.885 |
| diff_VET | 0.002 | 0.002 | 0.003 | 0.037 |
| h_test | | | | 0.012 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.

p-values in parentheses.

Table 7: Relaxed unemployment

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|---------------------|---------------------|---------------------|
| School-based VET | 0.002 (0.114) | 0.094 (0.071) | 0.011 (0.035) | 0.009 (0.032) |
| Dual VET | -0.339*** (0.099) | -0.113 (0.083) | -0.185** (0.072) | -0.279** (0.118) |
| Y adult | | 2.221*** (0.318) | 2.296*** (0.144) | 2.277*** (0.138) |
| Youth LF rate | | -0.194 (0.211) | -0.405 (0.272) | -0.426 (0.423) |
| GDP per capita | | 0.175*** (0.051) | 0.130*** (0.043) | -0.014 (0.140) |
| GDP growth | | -0.019 (0.342) | -0.099 (0.136) | -0.067 (0.132) |
| KOF Glob Index | | -0.141 (0.216) | -0.046 (0.181) | -0.029 (0.237) |
| Constant | 30.838*** (5.327) | 12.279 (17.962) | 12.007 (17.360) | 17.286 (22.372) |
| N | 161.000 | 161.000 | 161.000 | 161.000 |
| r2 | 0.365 | 0.836 | | 0.930 |
| diff_VET | 0.006 | 0.013 | 0.003 | 0.024 |
| h_test | | | | 0.987 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.
p-values in parentheses.

Table 8: NEET

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|----------------------|---------------------|--------------------|
| School-based VET | -0.020 (0.046) | -0.008 (0.052) | -0.022 (0.031) | -0.012 (0.035) |
| Dual VET | -0.112** (0.051) | -0.086 (0.051) | 0.008 (0.074) | 0.153 (0.112) |
| lfs | | -0.418* (0.201) | -0.130 (0.290) | -0.169 (0.406) |
| gdppc | | -0.129*** (0.031) | -0.174* (0.091) | -0.218 (0.149) |
| gdpgrowth | | -0.027 (0.294) | -0.092 (0.088) | -0.097 (0.083) |
| kofglobind | | 0.054 (0.115) | -0.032 (0.111) | -0.044 (0.151) |
| _cons | 11.902*** (2.591) | 15.671* (9.065) | 20.102* (10.570) | 20.124 (15.176) |
| N | 181.000 | 181.000 | 181.000 | 181.000 |
| r2 | 0.200 | 0.432 | | 0.334 |
| diff_VET | 0.079 | 0.036 | 0.671 | 0.143 |
| h_test | | | | 0.982 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.
p-values in parentheses.

Table 9: Long-term unemployment

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|-------------------|----------------------|---------------------|---------------------|
| School-based VET | 0.232* (0.122) | -0.008 (0.048) | -0.045 (0.034) | -0.051 (0.049) |
| Dual VET | 0.189 (0.167) | -0.094 (0.065) | -0.117 (0.094) | -0.145 (0.167) |
| Y adult | | 0.800*** (0.075) | 0.596*** (0.096) | 0.553*** (0.098) |
| Youth LF rate | | -0.139 (0.206) | -0.154 (0.249) | 0.062 (0.432) |
| GDP per capita | | 0.000 (0.069) | -0.008 (0.180) | 0.167 (0.186) |
| GDP growth | | 0.211 (0.329) | -0.060 (0.109) | -0.111 (0.124) |
| KOF Glob Index | | -0.345*** (0.118) | -0.166 (0.197) | 0.157 (0.264) |
| Constant | 5.506 (5.280) | 21.566** (9.069) | 17.582 (15.931) | -14.044 (24.284) |
| N | 313.000 | 313.000 | 313.000 | 313.000 |
| r2 | 0.122 | 0.842 | | 0.627 |
| diff_VET | 0.819 | 0.220 | 0.435 | 0.583 |
| h_test | | | | 1.000 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.
p-values in parentheses.

Table 10: Temporary contract

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|---------------------|---------------------|---------------------|
| School-based VET | -0.127 (0.105) | 0.075 (0.078) | -0.027 (0.042) | -0.023 (0.046) |
| Dual VET | -0.403*** (0.120) | -0.099 (0.082) | -0.073 (0.082) | 0.070 (0.119) |
| Y adult | | 3.272*** (0.723) | 2.284*** (0.281) | 2.214*** (0.255) |
| Youth LF rate | | -0.022 (0.361) | -0.183 (0.262) | -0.058 (0.274) |
| GDP per capita | | 0.067 (0.066) | -0.018 (0.086) | -0.016 (0.102) |
| GDP growth | | 0.034 (0.486) | -0.165 (0.169) | -0.190 (0.166) |
| KOF Glob Index | | 0.139 (0.287) | 0.264* (0.154) | 0.360** (0.160) |
| Constant | 28.944*** (6.453) | -12.016 (26.778) | -9.191 (14.861) | -21.672 (16.366) |
| N | 233.000 | 233.000 | 233.000 | 233.000 |
| r2 | 0.275 | 0.752 | | 0.744 |
| diff_VET | 0.014 | 0.019 | 0.438 | 0.318 |
| h_test | | | | 0.993 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.

p-values in parentheses.

Table 11: Involuntary part-time

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|----------------------|---------------------|---------------------|
| School-based VET | 0.007 (0.031) | 0.014 (0.012) | 0.014 (0.012) | 0.021 (0.014) |
| Dual VET | -0.102*** (0.031) | -0.052** (0.022) | -0.020 (0.016) | 0.059 (0.039) |
| Y adult | | 2.011*** (0.121) | 2.037*** (0.166) | 1.958*** (0.148) |
| Youth LF rate | | 0.127** (0.049) | 0.017 (0.071) | -0.172 (0.102) |
| GDP per capita | | -0.001 (0.009) | -0.032** (0.013) | -0.067* (0.034) |
| GDP growth | | 0.116* (0.066) | -0.024 (0.045) | -0.018 (0.039) |
| KOF Glob Index | | 0.095*** (0.033) | 0.029 (0.032) | -0.082* (0.048) |
| Constant | 3.935*** (1.309) | -9.675*** (2.638) | -2.147 (2.966) | 9.155* (5.133) |
| N | 273.000 | 273.000 | 273.000 | 273.000 |
| r2 | 0.257 | 0.883 | | 0.881 |
| diff_VET | 0.025 | 0.012 | 0.065 | 0.257 |
| h_test | | | | 0.005 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.
p-values in parentheses.

Table 12: Atypical working hours

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|---------------------|---------------------|---------------------|
| School-based VET | 0.020 (0.084) | -0.042 (0.040) | 0.021** (0.010) | 0.026** (0.012) |
| Dual VET | -0.056 (0.082) | -0.133** (0.052) | -0.049 (0.045) | -0.028 (0.061) |
| Y adult | | 1.377*** (0.146) | 0.989*** (0.121) | 0.933*** (0.150) |
| Youth LF rate | | 0.112 (0.229) | -0.229** (0.107) | -0.312** (0.124) |
| GDP per capita | | 0.050 (0.035) | 0.002 (0.030) | 0.000 (0.052) |
| GDP growth | | 0.194 (0.233) | -0.084 (0.093) | -0.076 (0.094) |
| KOF Glob Index | | -0.065 (0.181) | -0.043 (0.102) | -0.055 (0.099) |
| Constant | 13.537*** (4.695) | 2.852 (15.841) | 8.482 (9.381) | 10.776 (9.860) |
| N | 236.000 | 236.000 | 236.000 | 236.000 |
| r ² | 0.103 | 0.674 | | 0.642 |
| diff_VET | 0.205 | 0.013 | 0.094 | 0.346 |
| h_test | | | | 0.955 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.

p-values in parentheses.

Table 13: In-work at-risk of poverty

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|----------------------|--------------------|---------------------|---------------------|
| School-based VET | -0.112 (0.072) | -0.115 (0.068) | 0.000 (0.032) | 0.019 (0.024) |
| Dual VET | -0.070 (0.068) | -0.097 (0.074) | -0.051 (0.056) | -0.228 (0.147) |
| Y adult | | 0.172 (0.311) | 0.794*** (0.212) | 0.965*** (0.165) |
| Youth LF rate | | 0.376 (0.259) | 0.008 (0.288) | -0.284 (0.401) |
| GDP per capita | | 0.138** (0.063) | 0.041 (0.105) | -0.144 (0.097) |
| GDP growth | | 0.063 (0.313) | 0.119 (0.116) | 0.179 (0.119) |
| KOF Glob Index | | 0.001 (0.209) | 0.126 (0.169) | 0.268 (0.193) |
| Constant | 16.056*** (3.714) | 6.093 (18.716) | -7.626 (15.006) | -9.642 (16.468) |
| N | 172.000 | 172.000 | 172.000 | 172.000 |
| r2 | 0.095 | 0.272 | | 0.242 |
| diff_VET | 0.609 | 0.822 | 0.243 | 0.106 |
| h_test | | | | 0.013 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.
p-values in parentheses.

Table 14: Skills mismatch

| | OLS b/se | OLS_a b/se | RE b/se | FE b/se |
|------------------|--------------------|-----------------------|---------------------|---------------------|
| School-based VET | 0.148 (0.088) | 0.064 (0.062) | 0.069 (0.047) | 0.086* (0.048) |
| Dual VET | 0.073 (0.091) | -0.045 (0.069) | -0.004 (0.069) | -0.088 (0.229) |
| Y adult | | 0.768*** (0.164) | 0.609*** (0.125) | 0.619*** (0.122) |
| Youth LF rate | | 0.829*** (0.217) | 0.037 (0.264) | -0.839* (0.432) |
| GDP per capita | | 0.180*** (0.042) | 0.092** (0.045) | -0.046 (0.088) |
| GDP growth | | 0.336 (0.418) | -0.044 (0.287) | 0.037 (0.266) |
| KOF Glob Index | | 0.372* (0.182) | 0.319 (0.204) | 0.002 (0.257) |
| Constant | 10.560* (5.634) | -43.560** (16.709) | -24.498 (18.905) | 18.181 (25.693) |
| N | 237.000 | 237.000 | 237.000 | 237.000 |
| r2 | 0.107 | 0.443 | | 0.302 |
| diff_VET | 0.342 | 0.127 | 0.228 | 0.414 |
| h_test | | | | 0.004 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:

OLS = standard OLS regression; OLS_a = OLS regression including adult outcome variable; RE = random effects regression; FE = fixed effects regression

All regression are made with robust standard errors clustered at the country level.

p-values in parentheses.