Is Higher Education Really Higher and Secondary Education Merely Secondary?

The Transition from Higher and Vocational Education to Work from an International Perspective

Referentin: Prof. Dr. Kathrin Leuze

Korreferentin: Prof. Dr. Irena Kogan

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Abstract

This dissertation addresses the question of why the labour market outcomes of higher education (HE) graduates differ from those of vocational education (VET) graduates within European countries. To date, these educational groups, different in educational level and in educational orientation (specific vs. general), have hardly been considered within comparative transition research and how both groups interact within different educational contexts remains under-researched.

To answer the question, a three-layer theoretical model is proposed. In addition to the institutional and the individual level, the occupational level is considered as well. This is because both educational groups are prepared for different occupational sectors. The main theoretical assumption implies that institutional features of the education system moderate the closure of certain occupations and thereby affect individual labour market outcomes (matching). The focus is on two institutional characteristics: the selectivity of tertiary education and the specificity of vocational education (compared to tertiary education). While selectivity strengthens the signalling of university degrees and opens up the occupational structure for tertiary graduates, the higher occupational specificity of the VET stage (compared to the HE stage) in turn has a positive effect for VET graduates. Furthermore, it is assumed that the two institutional characteristics complement each other. This is based on the assumption that they operate at different layers of the labour market. While strong selectivity regulates entire labour market segments by the level of education, occupational specificity affects the closure of jobs within these segments by the signalling effect of educational programmes (field of education). These theoretical assumptions are tested with multilevel analyses based on the Labour Force Survey data (EU-LFS 2009) in 28 European countries. The analyses confirm most of the theoretical assumptions and allow country clusters that differ according to the constellation of both institutional settings to be defined.

The dissertation contributes to the understanding of how educational institutions affect the individual labour market outcomes of two groups with different educational levels and educational programmes. In addition, it provides an understanding of the complementarities of educational institutions.

Keywords: *Transitions from school to work*, *institutions of education systems*, *comparative analysis*

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1. Introduction

1.1 Aim of the study

The higher education sectors of European countries have been seen numerous reforms over the past two decades that aim to enhance economic and technical growth. Next to the well-known Bologna Process (CRE, 2000), which changed the structure of tertiary education by introducing a two-tier system of professional qualifications (BA and MA), and a European Credit Transfer System, a still ongoing debate about tertiary education was provoked by the Lisbon Process (Europe 2020). This agenda developed the 'Youth on the Move' strategy, recommending an increase of tertiary education rates to at least 40%. This is supposed to enhance *education as a key role* in employment and foster long-term growth (Gros & Roth, 2008).

However, research in fact reveals the opposite effect of educational expansion (Gangl, 2002; Barone & Ortiz, 2011; Verhaest et al., 2017). Countries with high tertiary rates struggle with credential inflation, which has negative effects on both individual and societal level. A brief glimpse at Figure 1 indicates that in the highly expansive countries of Southern or Northern Europe, the tertiary educated less often work in the high-skill sector, the opposite intention to the 'Youth on the Move' strategy. The strategy agenda is more commonly fulfilled by less expanded countries, especially the German-speaking ones. The success of the German-speaking model lies not only in low educational expansion but also in the high quality of education. Its small tertiary education system is often linked to the high quality of training at the secondary stage.

Research has long emphasised the role of Vocational Education and Training (VET) as a significant educational stage in providing graduates with specific training (Müller & Shavit, 1998a; Müller & Gangl, 2003) for the largest sector of the labour market (OECD, 2017, p. 121). Hence, in order to understand education's key role in employment and to

foster long-term growth, a wider group of educational graduates should be considered[1] instead of limiting this target to the tertiary educated. Both educational groups deserve similar attention since they have acquired significant skills relevant to employment (Unesco, 1997, p. 29, 37).

Figure 1: Employment of university graduates in the high-skill sector (in %)
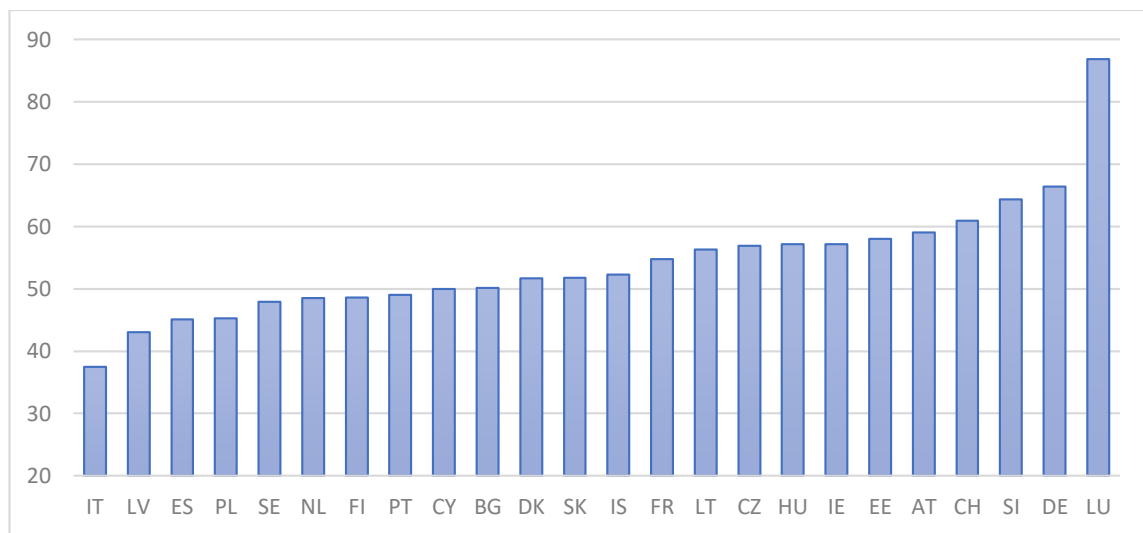
Own calculations based on Labour Force Survey data 2009; age group 15–34; university graduates are represented by the ISCED 5 group.

Comparative transition research of almost 50 years has made a significant contribution to understanding how both groups perform on the labour market (Müller & Shavit, 1998b; Müller & Gangl, 2003; Kogan et al., 2008; Kogan et al., 2011). The central assumption of this research stream is that the role of education is relative and driven by institutional settings. Thus, the value of degrees does not depend solely on the structural factors of the education system, as suggested by the Europe 2020 strategy, but also on the quality

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[1] Vocational Education and Training is addressed by the Copenhagen Declaration (2002) and Maastricht Comunique (2004), aiming 'for the promotion of mutual trust, transparency and recognition of competences and qualifications in order to increase mobility and facilitate access to lifelong learning' (European Commission, 2002). However, these political measures propose a framework for the comparability of qualifications (ECVET) but do not aim at changes of structures of VET systems in Europe, as proposed for tertiary education by the Bologna or the Lisbon Process.

of education. Both structural indicators, such as *stratification of education systems* (Allmendinger, 1989) or the quality of education, defined as *vocational specificity* (Müller & Shavit, 1998a), shape the signalling of education (Spence, 1973) and thus the employment opportunities of graduates. However, comparative research analyses institutional effects separately for the secondary and the tertiary educated.

So far, there has been no theory explaining how institutional settings influence the role of two different degrees such as HE and VET; the existing theoretical approaches on the individual level indicate contradictory mechanisms. On the one hand, a higher level of education is associated with higher skills and thus preferred by employers in the job placement process (Mincer, 1974). In short, higher education is seen as meaning higher productivity. On the other hand, specific skills are strongly valued over general ones (Becker, 1993). Thus, the secondary educated from vocational programmes are not necessarily a secondary choice for employers. This reveals two outstanding issues. First, how vocational degrees offset the value of higher level within countries remains unclear. Second, whether and how these two educational characteristics interplay in a country-specific way due to the institutional context needs further considerations.

In order to resolve these issues, this thesis aims to answer the question: 'How do educational institutions influence the signalling of higher and vocational degrees and shape labour market outcomes within European countries?'. This allows to disentangle how two degrees, different in educational level and programme orientation (general vs. vocational fields of study), interact on the labour market within different institutional settings. For this purpose, the effect of structural characteristics as well as the equally important quality of education is the focus. The structural characteristic will be represented by the *selectivity of higher education*, a concept leaning on the stratification of education systems (Allmendinger, 1989). The quality of education in turn will be represented by the *vocational specificity* (Müller & Shavit, 1998a) of both educational stages (VET and HE) at the same time. These two indicators will be addressed *not* next to each other, as in research so far, but considering their combination shaping the role of two degrees is focus of this study.

By considering a significant competitor for the tertiary educated in the labour market within both structural and qualitative settings of education systems, this research contributes to clarifying *education as a key role* in employment assumed by political measures and its consequence for the labour market.

In order to answer the research question, this thesis focuses on both educational groups within 28 European countries and makes several contributions to research.

First, it provides a systematic literature review of comparative transition research addressing both the VET and HE stages. This allows us to identify existing research gaps and inconsistencies, especially with regard to the inconclusive effect of vocational specificity.

Second, it evolves a three-layer theoretical framework, allowing us to describe how two groups different in educational level and programme orientation (general vs. specific fields of study) might coexist in different settings of the education system. Next to the institutional level and the individual level, the occupational level is also considered, since both educational groups match different occupations.

Third, new definitions of institutional settings are proposed by considering the characteristics of both educational stages at the same time in a relational way. While structural indicators such as the *selectivity of the higher education system* address how both stages differ in quantity, the quality of education is addressed by comparing the *vocational specificity* of both stages, revealing a country pattern that differs from that referred to in the research so far.

Fourth, the theoretical considerations allow us to disentangle the effect of these structural and qualitative indicators, proposing an explanation for complementarities of institutions of the educational system, so far barely addressed in research. The assumed complementary indicates that the effect of vocational specificity is dependent on the effect of the selectivity of higher education. This provides an alternative explanation as to why the effect of specificity is not conclusive in the existing transition research.

Fifth, the analysis considers a wide range of countries, allowing a systematic review of transition regimes. Research barely offers descriptions of institutional settings for a wide range of countries. Additionally, the institutional settings of Western and Eastern European societies are described at the same time in this study, rather than being considered separately so far.

All these contributions allow a better understanding of the effects of structural and qualitative educational institutions and provide insights into how to address them in future research.

1.2 Structure of the thesis

In order to achieve these goals, the thesis is structured as follow.

Chapter 2 gives an overview of the comparative transition research. It provides a generalised description of country patterns regarding labour market outcomes, on the one hand, and institutional settings, on the other. Next to these descriptive findings, the literature review addresses multivariate results. It focuses on the effect of institutions of education systems on individual labour market outcomes. While the findings on structural indicators such as the stratification of education systems reveal expected effects, the effects of quality indicators, such as vocational specificity, are less conclusive. Whereas some studies show that higher specificity fastens the transition into jobs with higher occupational prestige and earnings (Van de Werfhorst, 2011a; Bol, 2013; Bol & Van de Werfhorst, 2013; Barbieri et al., 2016; McGuinness et al., 2018), others reveal that higher specificity makes a match between job and field of education less likely (Wolbers, 2003; Levels et al., 2014).

Additionally, both institutional settings are highly correlated and some studies indicate contra-dictionary effects when considering groups different in level and programme orientation (general vs. specific fields of study). Despite the wide scope and empirical findings of this research stream, it focuses on both educational groups separately. This thesis aims at filling this gap by proposing a design that considers both groups simultaneously.

Besides educational institutions, the role of labour market institutions is briefly introduced as well, in order to address other relevant context. Although this institutional setting is not on focus of this study, the chapter emphasizes which labour market outcomes are more related to particular institutions. Accordingly, the chance of getting and keeping a job is stronger driven by labour market institutions, while outcomes such as matching of education and job is strongly driven by educational institutions. Since the study addressed the role of educational institutions, different kinds of matching are thus on focus. The match between level of education and occupational prestige (*vertical matching*) and the match between field of education and job tasks (*horizontal matching*) is thus being considered. A theoretical framework describing how institutional settings influence the matching of two groups that differ in educational level and programme orientation is proposed in the **Chapter 3**. This framework adopts theoretical concepts from comparative transition research, which predominantly focuses on the direct effect of institutions on individual outcomes. This macro-micro perspective is supplemented by a meso level in this study. The occupational structure is considered as well, since both educational levels (secondary and tertiary) match different labour market sectors such as the high-skill or the technical one. The three-layer theoretical framework describes how institutional settings shape the closure of these two sectors, leading to higher or lower educational matching of VET and HE graduates.

It is assumed that selectivity leads to higher matching for HE graduates by increasing the *value of educational level* and opening both sectors for HE graduates. However, vocational specificity is assumed to have the opposite effect, by increasing the *value of programme orientation* (general vs. specific fields of study) and opening sectors for VET graduates, increasing their matching. This indicates which institutional setting affects educational level on the one hand and educational programmes (field of education) on the other. Since all countries can be classified along a combination of both institutional characteristics, an additional hypothesis addresses their combined effect on the value of both educational characteristics. The main assumption is that selectivity and specificity do not counteract but rather complement each other on different layers of the

labour market. This allows us to disentangle the effects of selectivity and specificity, on the one hand, and identify the interplay of level and programme orientation (field of education), on the other.

Chapter 4 describes the research design of this study by introducing operationalisations of the theoretical concepts on three levels (institutional, occupational, individual) and by describing the methods used of this analysis applying a variable-oriented approach. Information on individual characteristics and the closure of occupations is derived from the European Labour Force Survey 2009. This microdata is enhanced by institutional indicators derived from official statistical databases, allowing a time variation of educational indicators within countries (1998-2009).

Chapter 5 investigates the effect of institutions on matching of both groups in the first significant job. The descriptive sub-section illustrates the shares of matching for both groups, on the one hand, and institutional settings, on the other, providing a systematic review for a wide range of countries. Additionally, it reveals the occupational closure within countries and links this descriptively to individual and institutional characteristics. This chapter introduces new findings regarding the three analytical levels on focus. First, by considering the educational outcomes of both educational groups at the same time, it shows that the highly educated have, in general, lower shares of matching than VET graduates. Second, by considering the occupational structure within countries, it reveals that the closure of high-skill jobs is different from the closure of technical jobs, indicating different recruitment logics within these sectors. Third, by considering the specificity of both stages at the same time, it reveals that VET stage is more specific than HE stage in most countries; however, in some countries, such as the German-speaking ones, this is less the case since both stages are highly specific. The multivariate sub-section links the individual and institutional layers within several multilevel analyses. Whereas selectivity shows the assumed effects, the effect of specificity turns out to be conditional on the strength of selectivity. This gives support for the theoretical assumption, indicating that both institutional settings do not counteract but complement each other on different

layers of the labour market. This offers an alternative explanation of the inconclusive effect of specificity shown in literature overview.

In the concluding **Chapter 6**, the findings of the interplay of both institutions are summarized, allowing us to identify three country clusters: the highly selective systems (1), on the one hand, and low selective, either with higher VET specificity compared to HE programmes (2) or rather a similar one (3), on the other. The detailed descriptions of these clusters allow us to identify how institutional constellations shape the value of educational level and programme orientation (field of education), leading to higher or lower outcomes. While in German-speaking countries both characteristics play a key role, this is less the case in Baltic countries, and even less so in Southern Europe, where the job placement process turns out to be least related to education.

This again confirms that low selective systems with high educational expansion struggle with the transition of youth the most, contrary to the assumptions of the Youth on the Move strategy (Europe 2020). It additionally suggests that especially highly expanded systems need complementary of highly specific programmes, otherwise the outcomes on the labour market are least related to education.

2. Comparative transition research

Comparative transition research has made a significant contribution to understanding country-specific transition regimes in the last five decades. This research stream has its roots in the 1960s. Studies initially focused on the regional or national level, with the introduction of surveys of school leavers in several European countries (for an overview, see Raffe, 2014). Later, it expanded to the international level due to the rise in youth unemployment in the 1980s and the need for proper policy regulations. This expansion manifested itself in growing literature, comparing predominantly a small number of countries. It also resulted in founding networks such as the European Research Network on Transition in Youth (TIY),[2] driving further comparative research. These developments moved transition research from a solely micro perspective to a macro-oriented one, including a wider range of countries. Furthermore, with the expansion of the EU in the 1990s, the need for comparative research became higher than ever. New international data emerged (ECHP[3] in 1994, PISA[4] in 2000, EU-LFS[5] 2000 and EU-SILC[6] in 2004), allowing analyses of the transition of young people into the labour market. Although providing detailed information on the individual level, this data was mostly cross-sectional and lacked information for the country level. Internationally oriented projects (e.g. CEDEFOP[7]) or scientific collaborations emerged, involving researchers from different countries and different disciplines. The combination of detailed country descriptions and national data allowed a synergy between research traditions from predominantly Western societies[8] (Müller & Shavit, 1998b; OECD, 2000; Kogan & Müller, 2003; Smyth et al., 2003; Blossfeld

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[2] http://www.socsci.ru.nl/maartenw/tiy/
[3] http://www.edac.eu/socio_esurvey_desc.cfm?v_id=8
[4] http://www.oecd.org/pisa/
[5] https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey_%E2%80%93_data_and_publication
[6] https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:EU_statistics_on_income_and_living_conditions_(EU-SILC)/de
[7] http://www.cedefop.europa.eu/de
[8] 'Western *societies*' refer to those European countries that did not fall under the control of the Soviet Union following the Second World War, while 'Western *countries*' refer to a small number of countries in north-west Europe (the UK, Ireland, Belgium and France), identified as a country group in comparative transition research.

et al., 2006), later expanding to Central and Eastern Europe (CEE) (Kogan et al., 2008). This research stream initially focused on graduates of secondary education, predominantly considering graduates of vocational education and training (VET). However, with the growing expansion of the education system, scholarly attention shifted towards graduates of higher education (HE). The theoretical framework already developed focusing on secondary education was applied to higher education. Further data provided by projects such as CHEERS,[9] REFLEX[10] or HEGESCO[11] allowed for the analysis of transition patterns for this group for a wider country sample (Allen & Van der Velden, 2011) – mainly Western societies and later complemented by research focusing explicitly on Central and Eastern Europe (Kogan et al., 2011).

This chapter will explore the findings from these research streams with regard to educational returns in more detail. First, it will examine studies focusing on graduates of secondary section (chapter 2.1), before then looking at tertiary education in a separate chapter (chapter 2.2), since the research stream has focused on each educational group separately. Both sections are additionally divided into descriptive and multivariate subsections. While the first sub-section addresses the institutional link with micro returns in a descriptive way, the multivariate subsection addresses the findings of variable-oriented research, testing this link empirically. Both subsections provide a systematic review of country-specific transition regimes, on the one hand, and address the main analytical findings on the other. The scope covers predominantly structural indicators (such as the stratification or demand–supply balance) and qualitative indicators (such as vocational specificity) of both educational stages.

These two main sections regarding secondary and tertiary education are followed by a third (chapter 2.4). This third section explicitly focuses on institutional effects on educational groups *within* countries. This research stream has a similar perspective to this thesis and allows for the identification of relevant aspects for a direct comparison of VET

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[9] http://www.qtafi.de/cheers-european-graduate-survey.html
[10] http://roa.sbe.maastrichtuniversity.nl/?portfolio=reflex-international-survey-higher-education-graduates
[11] http://www.hegesco.org/

and HE graduates. Additionally, this is followed by a fourth section (chapter 2.5) briefly introducing studies concentrating on the effect of labour market institutions. The literature review chapter will conclude by identifying the research gap and describing the contribution of this thesis.

2.1 Transition from secondary education to work

The research stream focusing on graduates of upper secondary education[12] started with surveys of mostly two or three countries (Allmendinger, 1989; Kerckhoff, 2001). While these case-oriented studies provided detailed information about institutional settings, the analyses did not allow the direct testing of institutional effects on individual outcomes as there were too few cases at the macro level. In order to fill this gap, the research stream shifted to a higher number of countries, replacing countries by variables standing for institutional settings (e.g. Van der Velden & Wolbers, 2003; Van de Werfhorst, 2011a). This variable-oriented approach allowed direct testing of the institutional effect by focusing mostly on 14 countries (for further description of variable and case-oriented approaches, see Della Porta & Keating, 2008). There was also an 'intermediate approach' (Raffe, 2014, p. 182) which summarised the detailed findings from case studies within a cross-national analysis (e.g. Müller & Shavit, 1998a; Kogan et al., 2011a)

In what follows, labour market outcomes and the institutional settings of secondary education will be introduced descriptively in order to define country patterns (mainly case-oriented studies). In the next step, research based on the direct testing of institutional effects on individual labour market outcomes will be described (the 'variable-oriented approach').

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[12] The following chapter introduces studies addressing labour market outcomes of secondary education graduates, especially considering VET graduates. Some of these studies focus on a sample of all educational groups, including low or higher education graduates. However, these studies are classified under the research stream 'Transition from *secondary education* to work' since they address institutional settings of the secondary stage.

2.1.1 Secondary education transition regimes in Europe

2.1.1.1 Labour market outcomes of secondary educated

Despite the wide range of literature within this research stream, descriptions of country-specific labour market outcomes are barely provided.[13] The few studies describing labour market outcomes from a comparative perspective allow identifying country patterns in the transition from school to work. This identifies a continuum of countries with German-speaking countries showing advantageous outcomes, on the one hand, and Southern or English-speaking countries having more turbulent transition patterns, on the other.

Youth unemployment rates in German-speaking countries (such as Austria or Germany) or in Denmark and the Netherlands are the lowest in Europe, being below 10% (Couppié & Mansuy, 2003, p. 78). In contrast, youth unemployment in southern Europe (except Portugal) exceeds 20%, peaking at ca. 30% in Spain. Between these both poles – although closer to the latter one – are the English-speaking countries such as Ireland and the UK, accompanied by some Nordic countries, for example Sweden. Eastern Europe does not show a uniform pattern. It is distributed across the different country groups, with low unemployment rates in Slovenia and Hungary (around 10%) and high rates in Romania and Latvia (around 20–30%) and Slovakia (around 40%) (Kogan & Schubert, 2003, p. 13). Whereas the rates in most countries slightly increased in the aftermath of the economic crisis in 2008, they almost doubled in southern Europe, reaching up to 58% in 2013 (Dietrich, 2018). However, young graduates in southern Europe were already disadvantaged before the crisis, which might be related to particular educational institutions.

Similar country patterns arise when considering the occupational status of an individual's first job. A common measure of occupational status is the Socio-Economic Index of Occupational Status (ISEI), which varies between 16 (e.g. unskilled workers) and

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[13] An alternative source for describing labour market outcomes might be official statistic databases such as OECD or Eurostat. However, these databases address outcomes such as unemployment rates, share of part-time jobs or temporary contracts, and do not provide information on job quality, such as occupational status or the matching of education and job being strongly considered in comparative transition research. That is why the following descriptions are derived from research and not from official databases.

90 (e.g. judges) (Ganzeboom et al., 1992). Again, German-speaking countries, together with Denmark and the Netherlands, show an advantageous labour market situation for young graduates. In these countries, the average ISEI of VET graduates is the highest in Europe (above 40) (Kogan & Schubert, 2003, p. 22). The lowest appears in Western (France, Belgium) or Nordic countries (Finland or Sweden) and in Spain, being around 35 on average. Again, Eastern Europe cannot be subsumed under one category, showing higher status in Hungary and Slovakia (more than 40) and lower in Lithuania and Romania (35). Conversely to the results regarding unemployment rates, Southern Europe does not show a disadvantageous situation. The ISEI in southern Europe is relatively high (except for Spain) reaching 45 in Portugal. Also, the UK and Ireland show advantageous scores comparable with German-speaking countries (Saar et al., 2008, p. 46). However, this country pattern is based on very small differences since the average ISEI scores do not vary much between countries (35–45 out of 90).

Further labour market outcomes address the match between education and job. The so-called vertical match describes how occupational status is related to educational level. The country distribution of vertical match shows comparable patterns to the occupational status described above. This is not surprising since occupational status forms a part of the vertical match. The highest rates of vertical matching appear in German-speaking countries (AT, DE, LU – above 90%), followed by Denmark and the Netherlands with almost 90% (Levels et al., 2014, p. 351). On the other hand, the lowest emerge in Nordic or Western countries (Sweden, Finland and France) and Spain, with only 70% of graduates having a job related to their educational level. All other countries are in between. Eastern Europe – again – falls into no single category (the highest vertical match is in the Czech Republic and Hungary, and the lowest in Slovakia and Slovenia).

Another type of job education match is the so-called horizontal match; this addresses how job task fits the field of education. Again, VET graduates in German-speaking countries (AT, DE and LU) show the highest rates (around 80%), followed by Denmark and the Netherlands (73–80%) (Levels et al., 2014, p. 351). They are considerably lower in southern Europe (ES, GR, IT) and Nordic countries (NO and SE) or Western Europe

(FR, IE), reaching only 50–55%. Poland falls into the latter group whereas the Czech Republic, Hungary and Slovakia show advantageous rates similar to the German-speaking countries (Levels et al., 2014, p. 351).

A German–Southern division shows also for the incidence of <u>self-employment</u>. Whereas only around 5% of graduates in German-speaking countries, Denmark and the Netherlands are self-employed, in southern Europe it is a more common employment form (reaching 20–30% in Italy, Spain and Greece) (Kogan & Schubert, 2003, p. 17). There is a similar pattern for Nordic countries (FI, SE) and Western Europe (BE, UK, IE and FR), where self-employment also appears more often. Again, Eastern Europe is a heterogenous group. Whereas in Slovakia, Slovenia and Hungary self-employment appears less often, it is more common in Lithuania and (especially) Romania (Kogan & Schubert, 2003, p. 17).

This brief description identifies country-specific transition patterns. German-speaking countries show a smooth transition into beneficial jobs (low unemployment, high occupational status, high vertical and horizontal match). Denmark and the Netherlands show similarities with German-speaking countries, although not always reaching their advantageous outcomes. Southern Europe indicates the opposite scenario. Young graduates face high unemployment risk or self-employment and less often have a job that relates to their education. Western European countries (English-speaking countries together with Belgium and France) and some Nordic countries (SE and FI) are closer to the disadvantageous situation of Southern Europe. Eastern Europe is a strongly heterogenous group in which the above-mentioned patterns appear. A north–south division appears within Eastern European countries. Countries around the Baltic Sea such as Poland or Lithuania show disadvantageous returns, while their southern neighbours, predominantly some landlocked countries (the Czech Republic, Hungary and perhaps Slovakia), show higher returns.

Besides this visible country pattern, a different pattern appears when considering job duration or temporary contracts. However, this is not further described at this point,

since these outcomes are more strongly linked to the labour market institutions being addressed in chapter 2.5.

It is worth noticing that further career development shows a stronger improvement in countries where the transition was less successful. While the high transition outcomes in German-speaking countries barely change within five years after graduation, the disadvantages of the transition period in other countries seems to diminish with further career development. Individuals in Western Europe facing difficulties within the transition period show higher mobility rates and more job shifts (Brzinsky-Fay, 2007), compared to German-speaking countries, Denmark and the Netherlands. However, this is less true for southern Europe, which shows less mobility of young labour force and struggles with higher unemployment risk (IT, GR, ES except PT) even five years after graduation (Gangl, 2001, p. 482; Couppié & Mansuy, 2003, p. 105).

This sub-chapter provides a short review of country patterns, typically addressed within the comparative research stream. This a suitable basis for linking the outcomes of countries with their institutional settings, as described in the following chapter.

2.1.1.2 Institutional settings of secondary education

Studies within comparative transition research link the above-mentioned country patterns to the institutional settings of the education system. The focus is predominantly on the vocational specificity, stratification and standardisation of secondary education systems (Allmendinger, 1989; Müller & Shavit, 1998a; Hannan et al., 1999; Kerckhoff, 2001). This chapter starts with a brief theoretical introduction to these approaches (for more detailed descriptions, see the theoretical chapter of this thesis); this is followed by a description of country-specific institutional settings. This enables a connection to be made between the country patterns in returns to education, mentioned above, and country-specific institutional settings in a descriptive way.

The comparative transition research argues that institutions influence individual outcomes due to educational signalling (Spence, 1973):[14] institutions drive the informational value of certificates within the hiring process, leading to higher returns to education.

The vocational specificity of educational programmes shapes individual labour-market outcomes. Education systems that offer strongly vocational training – either school-based or as a combination of school and work-based training (the 'dual system') – are regarded as highly specific. In these systems, employers rely on skills provided in education, since they are strongly vocational and easily applicable to the job (Müller & Shavit, 1998a; Marsden, 1999). This high valuing of skills makes credentials crucial for the job placement process, resulting in a strong match between education and job.

The stratification of the education system (Allmendinger, 1989; Kerckhoff, 2001) also shapes educational signalling. Stratification sorts pupils by performance into different tracks. In highly stratified systems, employers rely strongly on certificates, since these signal differences in performance, following the meritocratic principle. This also enhances the match between education and job, leading to higher labour market outcomes.

Along with stratification and vocational specificity, the standardisation of the education system is also assumed to affect educational signalling. Standardisation refers to the extent to which curricular requirements, teaching and examinations meet the same standards nationwide (Allmendinger, 1989). Higher standardisation enhances educational signalling, since employers are familiar with the teaching content, resulting in higher returns to education. Although standardisation is a central approach in small-case studies (Allmendinger, 1989; Kerckhoff, 2001), this concept is less established in analyses using a wider country sample. This is due, first, to low variation in standardisation between

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[14] There are further theoretical explanations for the role of education, such as the human capital theory (Becker, 1962, 1993) or credential mechanism (Collins, 1979), not always considered signalling (Barone & Van de Werfhorst, 2011; Van de Werfhorst, 2011, 2011a; Di Stasio, 2014c, 2014b; Bol, 2015; Di Stasio et al., 2016; Bills et al., 2017; Di Stasio, 2017). However, the above-mentioned mechanism is regarding as signalling because research has predominantly used this mechanism. For further details on the alternative mechanism, see the theoretical chapter of this thesis.

countries: the level of standardisation is relatively high everywhere. Second, finding adequate indicators is challenging due to a relatively wide definition of standardisation, which includes diverse components (curricular requirements, teaching and examinations). Third, standardisation shows strong correlations with other institutional settings (Müller & Shavit, 1998a). The effect of standardisation disappears after controlling for specificity (and stratification) since, for example, high vocational specificity, especially in the highly regulated dual system, requires standardised curricula. That is why 'the concept of standardisation is less useful than was initially imagined' (Müller & Shavit, 1998a, p. 39). Due to its limited application within comparative transition research it will not be further addressed in this thesis.

Research applying the theoretical concepts of stratification and vocational specificity to secondary education divides countries into, on the one hand, those with strongly evolved stratification and specificity, and, on the other, those where these features are less markedly present. While most studies draw a distinction between *occupational labour markets* (OLM) and *internal labour markets* (ILM) (Marsden, 1990, 1999), others refer to *qualification* and *organisational spaces* (Maurice et al., 1986) or to a *weak* or *strong linkage* between the education system and the labour market (Smyth et al., 2003; DiPrete et al., 2017; Bol et al., 2019). The OLM model (or qualification spaces or high-linkage countries) is characterised by high educational signalling due to a highly specific and stratified education system. In the ILM model (or organisational spaces or low-linkage countries), educational signalling is low due to more generally oriented programmes and a less pronounced stratification of secondary education.[15]

German-speaking countries represent the OLM model. The advantageous labour market situation of VET graduates is linked to the high educational signalling that is driven by high specificity and high stratification (Müller & Shavit, 1998a). Germany, Switzerland and Austria offer a highly tracked three-tier school system where transitions between tiers are limited. Additionally, they operate extensive vocational training systems at the

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[15] Although the theoretical models of OLM or ILM originally address the occupational level and primarily focus on vocational specificity, comparative transition research has used this approach at a country level to refer to both vocational specificity and stratification at the same time.

upper secondary level. The pattern in Nordic countries (DK, NL, SE, FI) resembles this. However, German-speaking countries and, to a certain extent, Denmark, offer apprenticeship-based training (the 'dual system'), while in the Netherlands, Sweden and Finland school-based training is prevalent (Smyth et al., 2003, p. 43). Additionally, tracking in Nordic countries (especially FI and SE) is less pronounced compared to German-speaking countries (Müller & Shavit, 1998a, p. 12; Smyth et al., 2003, p. 24). This might partly explain why labour market outcomes in Nordic countries are lower than those in German-speaking countries.

In contrast, English-speaking countries follow the ILM model. Low stratification and low vocational specificity in English-speaking countries (IR, GB, USA, AU) and France is related to lower educational signalling and to more turbulent transition patterns (Müller & Shavit, 1998a, p. 12). Despite some vocational improvements in educational programmes in the recent decade in these countries, the general focus within secondary education remains high and tracking is low (Smyth et al., 2003, p. 70).

In sum, there is a division between OLM and ILM models, with German-speaking countries representing the first and Western European countries (English-speaking and France) the second.

However, this division does not apply for southern Europe. Although showing characteristics of the ILM model (general training, low stratification), labour market outcomes in Southern Europe are even more disadvantageous than in ILM Western countries (Gangl, 2001). This is due to the higher labour market regulation in Southern Europe.[16] Strict regulations protect those already employed, making the job finding process for new entrants more difficult (for further details, see the chapter 2.5 addressing labour market institutions). That is why in Italy, Greece or Portugal the negative effect of general education is amplified by strong labour market regulations, leading to even lower labour market outcomes compared to ILM countries. Additionally, strong family support might prolong the transition process in Southern Europe (Gangl, 2001, p. 491) and the

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[16] Spain is an exception, revealing stronger similarities with Western countries, due to a less regulated labour market.

dominance of small-scale business structures might diminish educational signalling (Wolbers, 2003, p. 262).

Secondary education in Eastern Europe reveals rather high specificity and dominant tracking (general, technical and vocational tracks) due to their long shared past as part of the Soviet Union (Kogan, 2008, p. 19). However, after the fall of the Iron Curtain, the development of their education systems took different directions. Countries such as the Czech Republic and Hungary (and partly Slovakia) have the highest tracking within Eastern Europe and offer apprenticeship-type training (Kogan, 2008, p. 19). This resembles the secondary education of German-speaking countries – although to a lesser extent, due to a more open threshold from secondary to tertiary education (Kogan, 2008, p. 21). Other Eastern European countries, especially the Baltic countries (Lithuania, Latvia and Estonia), have lower tracking and offer mostly school-based vocational training (Kogan, 2008, p. 19). However, these descriptions are direct comparisons within Eastern European countries and are not directly linked to other country groups.

All in all, VET graduates in German-speaking countries show the highest labour market outcomes. This is linked to their high specificity and highly stratified secondary education stage. On the other hand, Southern and Western Europe lack these institutional settings, which might be related to lower labour market outcomes, especially in Southern Europe, where there is strict employment protection legislation. Despite their common recent history, Eastern Europe does not show a uniform pattern. Countries such as the Czech Republic, Hungary or Slovenia show higher labour market outcomes due to strong institutional settings comparable with German-speaking systems. Countries around the Baltic Sea (EE, LV, LT and PL) show lower outcomes due to a lack of strong institutional settings.

This brief review identifies country-specific transition regimes. However, these descriptions are based on different studies, taking into account varying country samples and different time points. While most studies focused on Western societies, studies on Eastern Europe have been conducted separately. Hence, a systematic overview of the characteristics of different country groups has barely been conducted.

Despite some limitations, the review here provides a description of country patterns commonly used within the comparative transition research. While this section reveals macro-micro links in a descriptive way, the following section addresses multivariate findings related to this link.

2.1.2 The effect of institutions on individual labour market outcomes

The descriptions presented above give a brief glimpse into labour market outcomes and institutional settings within Europe and help identify country groups. However, the chapter addresses descriptively labour market returns, on the one hand, and institutional settings, on the other. Studies empirically testing the institutional effect on individual labour market outcomes are introduced in the following (variable-oriented approach). The focus lies on the stratification and vocational specificity of secondary education, addressing the measurement of these institutional settings and the labour market outcomes affected by them. This detailed fragmentation of the findings from many different studies allows for an assessment of the conclusiveness of the effects of both institutional characteristics.

2.1.2.1 Stratification of education systems

As already described, stratification is defined as the extent to which the education system sorts pupils, based upon their performance, into different tracks. Strong tracking leads to a higher informational value of education and hence to more advantageous transition outcomes of graduates. Generally, three main measurements of stratification are applied (for operationalizations of institutional settings, see Bol & Van de Werfhorst, 2011a). First, some authors create institutional <u>variables upon in-depth descriptions</u> of case studies (the 'intermediate approach').[17] Studies using this measurement find support for the assumed effect of stratification. Stratification lowers the risk of unemployment or low skilled employment (Shavit & Müller, 2000; Gangl, 2003d, 2003e). Van der Velden and Wolbers (2003) also find a slightly negative effect on risk of unemployment or temporary

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[17] Each country is coded upon institutional descriptions from single case-studies, resulting in an ordinal scaled variable (1–3), separate for stratification and vocational specificity. This allows for the effects of institutional characteristics to be separated; this is not possible when using country dummies.

employment, although these effects are not significant. This might be provoked by simultaneously considering vocational specificity in the models. These two characteristics are strongly related, and specificity shows significant effects on these outcomes.[18]

Second, other authors use an index based on a factor analysis[19] (Van de Werfhorst, 2011a). Studies applying this measurement also reveal the assumed effects. Stratification lowers the risk of unemployment and reduces the transition period to the first job (Bol & Van de Werfhorst, 2013). Additionally, it shows a positive effect on the quality of employment, for example by improving the occupational status (Bol, 2013) or the match between education and job, regarding both the level and field of education (Levels et al., 2014). Contrary to theoretical assumptions, Van de Werfhorst (2011a) finds a negative effect of higher stratification on earnings. However, this might be related to the vocational specificity controlled in these models. As argued before, these two characteristics are strongly related, and specificity shows strong positive effect on earnings, which might offset the effect of stratification.

Third, stratification is measured by tertiary graduation rates, where low rates stand for high stratification. The assumption behind this is that less pupils end up in tertiary education when an education system is strongly stratified. This indicator is slightly different from those mentioned above. Whereas the tracking indicator focuses particularly on the secondary stage, tertiary education rates refer to differentiation of the whole education system and the selectivity between major educational stages (lower, secondary and tertiary education). Studies using this indicator reveal a positive[20] effect of stratification on occupational prestige and the odds of entering a service class (Müller & Shavit, 1998a), on occupational status (Gangl, 2002) and a slightly negative effect on risk

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[18] The authors reveal relatively a strong positive correlation between stratification and vocational specificity (Van der Velden & Wolbers, 2003, p. 39).

[19] The factor analysis considered three variables: (1) The age of first selection within the education system, (2) the percentage of the total curriculum in primary and secondary education that is differentiated, and (3) the number of educational tracks available to 15-year olds.

[20] The effect of higher tertiary education rates is negative but it represents a positive effect of stratification because stratification is inversely related to rates.

of temporary employment or unemployment, although the latter ones are not significant (Gangl, 2002; Van der Velden & Wolbers, 2003).

In sum, findings regarding the effect of stratification are relatively consistent. Stratification measured differently shows advantageous effects on labour market outcomes such as risk of unemployment, risk of low-skilled employment, search duration and the match between education and job. Some studies do not show significant effects or reveal negative effects on earnings. This might be due to simultaneously considering specificity in these models. As already addressed in the descriptive chapter of institutional settings, the OLM/ILM division emphasises that both institutional settings are either strongly or weakly evolved at the same time. Some authors confirm this empirically by emphasising a strong positive correlation between specificity and stratification (Müller & Shavit, 1998a; Van der Velden & Wolbers, 2003; Van de Werfhorst, 2011). Hence, by considering both institutional settings at the same time, their effects might offset each other.

2.1.2.2 Vocational specificity of secondary education
Whereas the effect of stratification measured in different ways is relatively consistent, the effect of specificity shows a less clear picture, revealing both expected and unexpected results.

As argued theoretically, vocational specificity improves the value of education. In highly specific systems, employers rely strongly on the skills acquired within education system and hire candidates on the basis of their degrees. Hence in highly specific systems labour market outcomes are higher and more linked to education than in more general ones.

Many studies tested these assumptions by using mainly three indicators for specificity: first, by creating institutional variables derived from case studies ('intermediate approach'), as applied to the coding of stratification; second, as the share of apprenticeship-type training; and third, as the share of vocational specific programmes within secondary education.

Country <u>classifications derived from in depth case-studies</u> confirm the expected theoretical assumptions. Higher specificity reduces the risk of unemployment or being employed in a low-skilled sector (Shavit & Müller, 2000; Gangl, 2003d; Van der Velden & Wolbers, 2003).

Studies considering the <u>share of apprenticeship type programmes</u> within upper secondary education also find convincing support. A higher share reduces the risk of unemployment and the incidence of temporary employment (Breen, 2005; de Lange et al., 2014). Additionally, it advances the speed of entry, prolongs job duration, improves the chances of a match of education and job, and lowers the risk of being inactive (Wolbers, 2007; Bol & Van de Werfhorst, 2013). Other studies using this indicator show a negative effect on the risk of a horizontal mismatch (Wolbers, 2003) or over-education (Di Stasio et al., 2016); however, both effects are not significant. Contrary to the assumptions, Wolbers (2007) reveals a negative effect on the occupational status of the first job. As argued by the author, this might be related to the diversion effect proposed by Shavit and Müller (2000). Strong vocational specificity shows a trade-off effect (Shavit & Müller, 2000): it protects those with lower and more vocational education from disadvantageous outcomes (*safety net*) but at the same time closes the opportunities for jobs with higher occupational status (*diversion*). Whereas most studies mentioned above apply the *safety net* argumentation in order to explain the positive effects of specificity on many different outcomes, Wolbers (2007) uses the *diversion* argumentation to address the negative effect explicitly on the occupational status.

While the two indicators for vocational specificity addressed above show consistent findings, the third reveals less consistent results. Measuring specificity as the <u>share of students enrolled in vocational tracks</u> shows both expected and unexpected results. On the one hand, most studies (Van de Werfhorst, 2011a; Bol, 2013; Bol & Van de Werfhorst, 2013; Barbieri et al., 2016; McGuinness et al., 2018) show expected results. Higher specificity lowers the risk of over-education, unemployment or being employed in a low-skilled job. Additionally, it enhances the match between education and job, reduces the job search period and prolongs job duration. It also shows positive effects on

occupational prestige and earnings. However, some studies show unexpected results. Wolbers (2003) finds a negative effect on matching between job and field of education in countries with highly specific secondary education. Similar findings presented by Levels et al. (2014) show a negative effect on horizontal match, especially for those finishing a vocational track (compared to the generally educated). Hence, vocational specificity lowers the chance of a job that is related to the field of education. Wolbers (2003) associates this inconclusive effect with his somewhat homogenous country sample. The analysis excluded countries with general education systems such as the UK and Ireland on the one hand and the strongly specific Germany on the other. 'Both extremes of the same continuum were missing in the data analysis. […] Therefore, the overall conclusion […] is a preliminary one' (Wolbers, 2003, p. 263). Levels et al. (2014) in turn associate it with the indicator used for vocation specificity. They argue that this negative effect might be related to the weak institutional linkage of vocational specificity, as opposed to the apprenticeship-type education, for which they found a positive effect, as mentioned above.[21]

These two studies finding a negative effect might be of less concern, since other studies find the assumed effect using similar indicators for specificity. However, these two studies explicitly focus on the match between job and programme orientation; this outcome in particular should be positively affected by specificity. It is argued that specificity enhances the value of skills provided within vocationally oriented programmes. This should improve the match between job and field of education in particular, since the field of education explicitly addresses programme orientation. Why horizontal matching in particular is negatively affected by specificity needs further consideration. Authors of a meta-analysis (Blommaert et al., 2020) regarding the effect of specificity come to similar

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[21] 'There will always be sectorial or regional imbalances between supply and demand. If a large proportion of a cohort is vocationally educated, it is more likely that they will be affected by such temporal imbalances than would be the case where only a small proportion are vocational educated. […] When vocational training is strongly institutionalized, as in apprenticeship systems, these structural imbalances are far less likely to occur' (p. 356).

conclusions. The effect of specificity varies with the measurement of this institutional setting and with the considered labour market outcomes.

All in all, this chapter provides the main findings from the comparative transition research addressing secondary education. VET graduates in German-speaking countries experience a smooth transition to the right jobs, whereas their counterparts from Western Europe (as in English-speaking countries or in France and Belgium) and especially from Southern Europe struggle with a more turbulent path. Several research projects explain these differences by the institutional settings of secondary education. Whereas German-speaking countries represent the OLM model, which is characterised by strong stratification and vocational specificity, these institutional settings are weakly developed in the other countries that are assumed to represent the ILM model. The disadvantageous outcomes in Southern Europe are additionally provoked by strong labour market regulation. Eastern Europe does not form a homogenous group, being divided into landlocked countries, on the one hand, and less efficient Baltic countries, on the other. However, descriptions of these countries allow for a comparison within this country group and not with Western societies. How the education systems of Eastern European countries are structured or specific compared to countries of other groups remains unclear.

This descriptively shown macro–micro link is in line with the findings from variable-oriented research. Stratification and vocational specificity measured with different indicators indeed affect labour market outcomes. However, the findings are more conclusive for the effect of stratification than for specificity. Specificity measured as the share of specific programme shows a negative effect, particularly on the horizontal match. This is surprising since the indicator of specificity addresses the programme orientation and should improve the match between educational programmes and jobs. Additionally, some studies do not show significant results when both stratification and vocational specificity are considered simultaneously. Both institutional settings might correlate in a

country-specific way since they are either strongly developed (OLM) or weakly evolved (ILM).

2.2 Transition from higher education to work

The comparative transition research initially focused on characteristics of the secondary stage and its effect on VET graduates. Later, due to the expansion of the education systems, the focus of research shifted towards higher education graduates. Theoretical concepts from secondary education research were applied, with detailed analyses of small country cases such as Germany and the UK (Leuze, 2010) or Germany and the USA (Jacob & Weiss, 2010), and large-scale studies for Western European countries (Allen & van der Velden, 2009), complemented by analyses relating to Eastern Europe (Kogan et al., 2011b).[22] With theoretical concepts developed from secondary education research and available international data (REFLEX and HEGESCO), this research stream predominantly applied the variable-oriented approach, considering mostly 14 countries. Educational returns such as over-education or the match between education and job was stronger on focus than in secondary education research.

The following chapter is structured similarly to the previous one regarding secondary education. The first sub-section identifies country patterns in educational outcomes of university graduates and institutional settings in a descriptive way. The second sub-section depicts variable-oriented research revealing the direct effect of institutional setting on individual labour market outcomes. It addresses the consistency of empirical evidence relating to different institutional settings.

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[22] Although Kogan et al. (2011) focused on all educational groups, this study is located within the research strand of the highly educated because – unlike other studies addressing secondary education – it also considered the characteristics of the tertiary education stage.

2.2.1 Higher education transition regimes in Europe

2.2.1.1 Labour market outcomes of university graduates

Transition patterns regarding the highly educated resemble the transition patterns of their secondary education fellows, revealing a German–South division.

The highly educated in German-speaking (AT, DE, CH) and Nordic countries (FI, NO) need only one or two months to find a job and very few search for a job for longer than six months (ca. 2%–6%) (Allen & van der Velden, 2009, p. 32). This is slightly different in Southern Europe (ES, PT, IT), where graduates need up to 5 months to find a job and 20% of graduates do not find a job within 6 months (Allen & van der Velden, 2009, p. 31). Again, Eastern Europe forms a heterogenous group. The search duration in the Czech Republic and Poland (lower than 2 months) is comparable with German-speaking countries, whereas graduates in the Baltic countries or Slovenia and Hungary need more time (up to 4 months on average), resembling the situation in Southern Europe. It is worth noting that students in countries with short search duration (such as German-speaking countries) often start their search prior to graduation (Allen & van der Velden, 2009, pp. 30, 33). This might be related to work they have done during studies and thus to a specific orientation of their HE programmes.

The familiar country pattern also appears when addressing the quality of the first jobs, such as over-education or matching.

The lowest incidence of over-education appears in German-speaking (AT, DE, LU: 17–19%) and in Nordic countries (FI, SE, DK: 14%–17%; and partly in NL: 22%) (McGuinness et al., 2018, p. 1000). On the other hand, every third graduate works below his or her educational level in Western (IE, UK, BE) and Southern Europe (ES, IT, GR, CY) (except FR 17% and PT 18%). Again, the former Soviet countries form a heterogenous group: whereas landlocked countries show even lower over-education rates compared to German-speaking countries (CZ, SK, SI[23] around 9%), Baltic countries more resemble the disadvantageous situation of Southern Europe (Flisi et al., 2017, p. 1230).

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[23] Slovenia is not a landlocked country, having a short Adriatic coast of 46.6 km. However, in this study it is grouped with the landlocked countries since it resembles them in many aspects relevant to transition research (institutionally and labour market outcomes).

The match of job with educational level (vertical match) and the field of study (horizontal match) reveals similar patterns. The vast majority of graduates in German-speaking (AT, DE, CH) and Nordic countries (FI, NO) have a first job that corresponds to their educational level (up to 85% or 80%, respectively) (Allen & van der Velden, 2009, p. 40). This is less the case in Southern Europe (ES, IT) or the UK, where around 60% of graduates have a job requiring a HE degree, although Portugal is an exception (86%). Again, Eastern Europe is a mixed group, having the highest rates in the Czech Republic, Slovenia or Estonia (75%-85%) and lower in Lithuania and Hungary (around 60%). This country pattern does not change five years after graduation.

A similar country pattern appears when considering the match between the field of study with the first job. Around 90% of those who have completed HE in German-speaking and Nordic countries have a job that relates to their field of study, whereas in Southern Europe and UK the shares are lower (60%–78%, except PT: 90%) (Allen & van der Velden, 2009, p. 41). Most Eastern European countries resemble the latter group (PL, LT, HU). Not surprisingly, this country pattern repeats when considering those with a job that corresponds to both the level and field of education (full match). The highest shares are shown in German-speaking and Nordic countries (around 80%), whereas they are lower in Southern Europe (around 70%; except for PT: 86%) and especially in the UK (60%) (Verhaest et al., 2017, p. 10). Some Eastern Europe countries have relatively high proportions (CZ, SI, EE: 77%–80%), while in Poland and Hungary they are lower (67%–70%). Not surprisingly, having a job that does not relate either to the level or to the field of education (full mismatch) is accordingly lowest in German-speaking and Nordic countries (5%) and highest in Southern Europe and the UK (10%–15%). The above mentioned patterns are relatively similar for MA and BA graduates or for the job five years after graduation (Allen & Van der Velden, 2007, p. 225).

Finally, the more precarious transition and career development might be related to lower job satisfaction: in Southern Europe and the UK, graduates report the lowest job satisfaction (50%–65%) while in German-speaking or Nordic countries it is higher (up to 74%) (Allen & Van der Velden, 2007; 2009, p. 258; 245).

In sum, German-speaking and Nordic countries show a smooth transition into education-related jobs and relatively stable careers. On the other hand, in Southern Europe and English-speaking countries (especially the UK), the transition is more turbulent and jobs are less related to level or field of education. Eastern European countries cannot be placed in a single category. Higher outcomes are shown for the Czech Republic, whereas these are consistently lower in Lithuania and also (perhaps) in Poland. This country pattern within Europe appears when considering labour market outcomes such as over-education and the education–job match, implying a link between job and education. However, different country patterns appear for outcomes such as permanent contracts (Allen & van der Velden, 2009, p. 45). Having a permanent contract might be driven more strongly by institutions of the labour market than by characteristics of tertiary education (for details of institutions of the labour market, see chapter 2.5).

This chapter provides a short review of transition patterns for tertiary education graduates within Europe. The country pattern for university graduates resemble the pattern identified for secondary graduates, although Nordic countries show more advantageous outcomes for tertiary than for secondary graduates. The next chapter describes the institutional settings of the tertiary education stage of these country groups. This allows linking the institutional context to the educational returns addressed above in a descriptive way.

2.2.1.2 Institutional settings of tertiary education

Since the research stream regarding tertiary education predominantly follows the variable-oriented approach, it implies fewer case studies. This is why descriptions of the tertiary education stage within European countries are limited. From the few studies addressing country-specific institutional characteristics we learn that high labour market outcomes in German-speaking countries are linked to relatively low tertiary education rates (Barone & Ortiz, 2011, p. 327). Low rates are associated with high stratification, since a strongly tracked educational system lowers access to the highest educational stage.

Hence, lower graduation rates represent higher stratification and this in turn results in higher labour market outcomes. This might also apply to the differences within Eastern Europe: countries with somewhat low tertiary education rates (the Czech Republic, Romania or Slovakia) reveal relatively high educational returns. Baltic countries (especially Lithuania and Estonia), on the other hand, show higher expansion (Kogan, 2008, p. 10) and lower outcomes at the same time. However, measuring stratification by graduation rates is not applicable for all countries. Italy shows very low tertiary graduation rates, despite a low tracked education system. The low graduation rates are provoked by high student dropout rates instead of higher tracking (Barone & Ortiz, 2011, p. 327). Barone and Ortiz (2011) recommend focusing on selectivity between stages instead of considering solely graduation rates at the highest level. Hence, measuring stratification by graduation rates shows clear limitations.

Graduation rates were considered as part of the demand–supply balance of highly skilled labour. Although high educational expansion is associated with over-education, this is not necessarily the case when the demand for those with tertiary educated is also high. The large supply of those with academic qualifications in Nordic countries (NO, FI, NL) is compensated for by the high demand for them in the labour market within the professional and managerial segments (Barone & Ortiz, 2011, p. 327). This high demand is provoked by the high-skill strategy prevalent in Nordic countries (Esping-Andersen, 1999): the welfare state is a dominant employer, for example in Norway nearly 60% of those with tertiary education work in the public sector (Passaretta & Triventi, 2015, p. 239). Hence, high graduation rates are compensated for by high demand for this labour, leading to relatively advantageous outcomes in Nordic countries. This is less the case in Spain, where the high expansive education does not meet an adequate demand (30%) and results in disadvantageous labour market outcomes (Barone & Ortiz, 2011, p. 328).

Next to these structural indicators, vocational specificity also shows particular country patterns. HE systems in German-speaking and Nordic countries are more specific. These countries reveal high shares of specific or professional fields (Reimer et al., 2008, p. 240) and high shares of study-related work experience (Kivinen & Nurmi, 2014, p. 8). Field

specificity is also relatively high in all Eastern European countries, especially in the Czech Republic and Poland (Noelke et al., 2012, p. 709). On the other hand, Western European countries (UK, IE, BE, FR), together with Southern Europe (IT, GR), have the highest shares of general programmes (Reimer et al., 2008, p. 240) and the lowest shares of study-related work experience (Kivinen & Nurmi, 2014, p. 8). These country patterns are in line with the in-depth descriptions of tertiary education from case studies (Kim & Kim, 2003; Van de Werfhorst, 2004; Jacob & Weiss, 2010; Barone & Van de Werfhorst, 2011; Leuze, 2011b; Passaretta & Triventi, 2015). On the one hand, countries such as Germany and the Netherlands reveal a high share of universities of applied science and offer more job experience. On the other hand, the HE system in Southern Europe (IT and ES) or the UK consists mostly of traditional universities offering strong general scope (a multi-faculty structure) and less access to work experience.

These country descriptions reveal a link between institutional settings and labour market outcomes in a descriptive way. The advantageous labour market situation in German-speaking countries is linked to low tertiary rates and highly specific educational programmes. Nordic countries also reveal high specificity and relatively high tertiary rates at the same time. However, the high graduation rates are compensated by a high labour market demand for those with academic qualifications, especially within the public sector. That is why in Nordic countries labour market outcomes resemble the advantageous situation of German-speaking countries. Conversely, low returns in Southern Europe are linked to high education expansion and the low specificity of HE. Additionally, high tertiary education rates are not compensated for by labour market demand. Western Europe (UK, IE, BE, FR) resembles Southern Europe in institutional settings and labour market returns. Eastern Europe is again very heterogenous. Although tertiary education is vocationally oriented in all the countries, they differ in expansion: while in the Czech Republic or Hungary graduation rates are low, in Poland or Estonia, in particular, they are higher.

This chapter offers a brief review of transition regimes from higher education to work referred to within comparative transition research. It also reveals a link between

institutional or structural settings and labour market outcomes. In the following section, analytical multivariate findings regarding this link will be described in detail.

2.2.2 The effect of institutions on individual labour market outcomes

2.2.2.1 Structural indicators

Research focusing on higher education uses indicators that differ from those in secondary education research. Most studies address the <u>structural imbalance in the demand and supply</u> of highly skilled labour. This approach does not address institutional settings, but is a purely structural one derived from the economic perspective. The supply side is driven by the education system and is predominantly measured by tertiary education rates. The demand side in turn addresses the job offer for tertiary graduates and is measured by the size of the highly skilled sector. The main argument of this approach is that an imbalance between the supply and demand side negatively effects labour market outcomes. Several studies used this argument to explain over-education. However, many of these are limited to analyses on the country level (Di Pietro, 2002; Croce & Ghignoni, 2012; Ghignoni & Verashchagina, 2014) or the regional level (Davia et al., 2017). Studies particularly linking macro indicators to individual outcomes reveal similar findings. While a higher supply (expansion of tertiary education) has a negative effect on the occupational status, a higher demand for highly skilled labour reveals a positive effect (Gangl, 2002). There are similar findings by Barone and Ortiz (2011) and Verhaest and Van der Velden (2012) on over-education and by Verhaest et al. (2017) on the risk of mismatch.

Fewer studies have addressed the effect of <u>selectivity in tertiary education</u>. As already argued, low tertiary rates indicate a highly stratified education system, although this does not apply for all countries, for example Italy (Barone & Ortiz, 2011, p. 327). Researchers recommend focusing on selectivity between stages instead of considering solely graduation rates at the highest level. Some studies have applied this perspective. Verhaest et al. (2017) measure the selectivity of tertiary education programmes by

aggregating information from REFLEX data at the country level.[24] In countries with more selective programmes the risk of a job mismatch is lower than in countries with less pronounced selectivity. Kogan et al. (2011a), on the other hand, address selectivity *within* higher education and find a positive effect on the speed of entry into the labour market or occupational status. However, the study focuses on the effect on different educational groups *within* countries (e.g. MA vs. BA) and does not compare the outcomes of HE graduates between countries, as do other studies described in this chapter (for further details of this study, see chapter 2.4). Van de Werfhorst (2004) shows a positive effect of selectivity on the outcomes of graduates with tertiary education from three different countries (NL, AUS, NO). Graduates from stronger selective two-tier HE system (MA and BA) have higher occupational status and wages than graduates from one-cycle systems. However, this study does not offer variable-oriented testing due to its case-oriented approach and little evidence exists so far regarding the effect of selectivity on the labour market outcomes.

2.2.2.2 Vocational specificity of (higher) education

Most studies analysing the effect of specificity address it on the micro level (for a theoretical review, see Bills, 2003; for a literature review, see Baert et al., 2017). Not surprisingly, graduating from a specific field of study (e.g. engineering) leads to higher outcomes than from a general one (e.g. humanities and arts) (Gerber & Cheung, 2008; for a theoretical review on the effect of field of study, see Barone & Schindler, 2014; for a literature review, see Capsada-Munsech, 2017). Additionally, graduates who have acquired work experience during education have higher outcomes than those with no experience, although this is less the case when the experience is not field-related (Allen & van der Velden, 2009; Robert & Saar, 2012; Passaretta & Triventi, 2015).

While research shows a clear advantage of specificity at the micro level, fewer analyses concentrate on the effect of specificity of HE systems for a wide range of countries. This might be due to the lack of proper indicators for higher education.

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[24] E.g. Programme was generally regarded as demanding; programme was academically prestigious.

Several studies apply the specificity of secondary education stages in order to explain labour market outcomes for those with tertiary education (Allen & van der Velden, 2009; Bol & Van de Werfhorst, 2011b; Bol, 2013; Barbieri et al., 2016). However, this approach is less useful because both stages might differ in specific orientation. The cluster analysis of Allen and van der Velden (2009) does not reveal a clear effect of specificity; they argue that 'the concepts and the predictions [of specificity] are not specific to higher education and the graduates labour market' (p. 124).

Only a few studies have used indicators for specificity explicitly for tertiary education by focusing on fields within this educational stage.

Reimer et al. (2008) used a dispersion index of the distribution of fields of study within occupations. Specificity of HE is considered strong when particular fields accumulate in only a few occupations. The author finds a positive effect of specificity on occupational status but no effect on the risk of unemployment.

Other studies derive the specificity of tertiary education from individual data (Van der Velden & Wolbers, 2003). Respondents to a REFLEX survey assessed six aspects referring to the focus of their study programme;[25] these were aggregated at the country level. The findings reveal that graduates from countries with higher vocational specificity face a lower incidence of over-education in the first job.

In sum, studies investigating the effect of specificity of tertiary education stage have barely been conducted. Most studies refer to the specificity of secondary education in order to explain the labour market outcomes of highly educated, which turns out to be less applicable for the HE stage. Only two large-scale studies are known to have addressed the specificity of the HE stage. Although they reveal assumed effects, they are too few in number to produce a consistency of findings on specificity for tertiary education.

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[25] The programme was generally regarded as demanding; employers are familiar with the content of the programme; there was freedom in composing your own programme; the programme had a broad focus; the programme was vocationally oriented; the programme was academically prestigious (depicted from the pre-print version Verhaest & Van der Velden, 2010, p. 12)

This chapter gave a brief review of the prominent findings from comparative transition research addressing higher education. Country descriptions reveal comparable transition patterns introduced within the secondary education research. Again, a German–Southern division appears, where the highly educated in the first country group experience advantageous labour market outcomes. This is associated with less expanded and highly specific education systems. Conversely, graduates in Southern or Western Europe (UK, IE, BE, FR) struggle to find a job related to their education, which is linked to high expansion of tertiary education and the general programme orientation. Nordic countries, on the other hand, form their own category. Although they have a highly expansive education system, this is compensated for by a high demand for highly skilled labour and high vocational specificity, resulting in relatively advantageous outcomes. Eastern Europe was considered separately and forms a heterogeneous group. While landlocked countries (especially CZ and HU) show advantageous outcomes, the Baltic countries reveal ones that are less so. This is also related to differences in educational expansion and specificity. These descriptive assumptions are affirmed by variable-oriented research linking macro indicators with individual outcomes. Structural characteristics such as expansion or the supply-demand-balance show consistent findings. This is also true for the selectivity of tertiary education, although this so far is rather under-investigated. The specificity of tertiary education has not received much attention within research, which might be due to the lack of proper indicators explicitly addressing the tertiary education stage.

2.3 Summary: from secondary or higher education to work

Taking both research streams about secondary and tertiary education together, these reveal many similarities. First, both strands identify a similar continuum of country-specific transition patterns, with German-speaking countries, on the one hand, and southern Europe, on the other. Other countries fall in between these two poles. Nordic countries show comparable outcomes to German-speaking countries, although this applies more strongly for tertiary than for secondary educated; Western countries more resemble Southern Europe. Eastern Europe was considered separately, suggesting a

north–south division, with advantageous outcomes in landlocked countries, on the one hand, and lower outcomes around the Baltic Sea, on the other.

These educational returns are linked to structural and qualitative characteristics of education systems. Structural characteristics such as stratification, expansion of education systems, as well as the imbalance between the supply and demand side of the labour market (for highly educated), show conclusive effects. The effect of specificity is less conclusive. It reveals both expected and unexpected effects on labour market outcomes of secondary education graduates, or is under-investigated for university graduates.

Research further shows that both stratification and vocational specificity are strongly (OLM) or weakly (ILM) developed, and empirical findings reveal that both are positively correlated. Additionally, some studies have showed that the effect of one institution becomes weaker when controlled for the other (Müller & Shavit, 1998a; Van der Velden & Wolbers, 2003; Van de Werfhorst, 2011).

In sum, this research stream made a significant contribution towards explaining varying transition patterns within Europe. Individual outcomes are not solely dependent on individual characteristics but are shaped by the institutional settings of education systems. However, the research stream concentrates on both groups separately. This does not make it possible to draw conclusions about a comparison of VET and HE graduates within countries. Since the country patterns in educational outcomes for both groups are similar, this suggests small differences between both groups; whereas in German-speaking they should be similarly high, in Southern Europe they might be similarly low. It also does not allow for the comparing of the institutional characteristics of both stages because research on secondary education concentrates on the different settings of education systems than research on tertiary education. Whereas the former focuses on stratification of the secondary stage, the latter addresses in particular the demand–supply imbalance. Neither specificity of both stages can be compared, being rather under-investigated for tertiary education. This, in general, does not make it

possible to draw conclusions on how both groups within countries are affected by institutional settings. Fewer studies address the effect of institutions on outcomes of different educational groups *within* countries; a short review of these studies is provided in the next chapter. Although they do not explicitly focus on those with higher and vocational education, their perspective is closer to the research question of this thesis.

2.4 Institutional effects on different educational groups within countries

As shown in the previous chapters, in countries with strongly developed institutional settings (stratification, vocationally specificity), educational qualifications provide reliable information about the performance of candidates, which leads to higher labour market outcomes. This argument is also used in order to explain the differences between educational groups within countries. Since in highly stratified or vocational specific systems, educational signalling is high, differences between educational groups are more strongly related to education. This leads to more pronounced differences of groups with different qualifications. This is less the case in countries with less stratified or more general education systems, where employers rely less on qualifications and other individual characteristics are decisive for the job allocation process, such as labour market experience (Gangl, 2003a). In sum, the gap between groups of different educational degrees is more pronounced, the higher the specificity or stratification of education systems.

Descriptive findings reveal that the gap between groups with different educational levels is indeed the greatest within the OLM countries. These countries are characterised by highly developed institutional settings (high stratification and specificity). Conversely, the gap is smaller in the ILM group (which have lower stratification and specificity) and is barely detectable in Southern Europe (Gangl, 2001). In Southern Europe, those who are better qualified face even higher unemployment risks than their less qualified peers (Gangl, 2001, p. 34).

The following sections address analyses[26] of institutional effects on the outcomes of different educational groups within countries. These analyses address the direct

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[26] Some of these studies have already been mentioned in the chapter on secondary education. These studies are considered in this section as well because they address both comparative perspectives. On the one hand, they focus on the effects of macro-coefficients on all educational groups at once. This refers to the institutional effect on graduates between countries and was already described in the secondary education chapter. On the other hand, these studies additionally analyse the cross-level interaction terms between

differences between educational groups driven by institutions. They also allow us to consider whether a particular group is more affected by institutions than another. The focus is predominantly on groups with different educational levels (low, secondary, high education) or groups with different programme orientation within the same educational stage (secondary specific vs. secondary general).

The chapter is divided into findings considering stratification, on the one hand, and specificity, on the other. As in earlier chapters, it emphasises the effect of the different measurements of institutions on particular labour market outcomes.

2.4.1 The effect of stratification

As already argued, differences between educational groups are more pronounced in highly stratified systems than in less stratified ones due to higher educational signalling.

Research applying different measurement for stratification reveals conclusive findings. Stratification enhances the gap between groups, particularly those with different levels of education.

Studies using institutional variables derived from in-depth descriptions of case studies show the expected effect. The gap between educational levels increases in terms of the chances for being employed, occupational status or occupational prestige and the risk of unemployment or employment in secondary sector (Müller & Shavit, 1998a; Gangl, 2001).

Bol and Van de Werfhorst (2011b) measures the stratification derived from a factor analysis.[27] Higher stratification provokes greater differences between educational groups in occupational status (ISEI). Using the same factor variable, Van de Werfhorst (2011a) confirms the effect on earnings: 'with increasing differentiation the differences between levels of education become bigger' (p. 1086). Andersen and Van de Werfhorst

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institutional settings and individual education. Since this term addresses how institutions affect the outcomes of different groups within countries, these findings will be considered in the following section.
[27] The factor analysis considers following variables: (1) The age of first selection within the education system; (2) the percentage of the total curriculum in primary and secondary education that is differentiated; (3) the number of educational tracks available to 15-year-olds.

(2010) come to similar findings by using a factor index, although one based on other variables then the other two studies.[28] The higher the level of stratification of education system, the greater the differences between educational levels[29] in occupational status (ISEI). They emphasise that stratification has a positive effect on all groups, but especially on those with higher education.

Whereas these studies focused on the stratification of the secondary stage, the differentiation of the tertiary stage was less addressed.

One well-known exception is the study of Kogan et al. (2011a), in which the authors focuses on selectivity within higher education in Eastern European countries. They define selectivity by addressing the threshold between stages within tertiary education and propose two indicators: first, by comparing sequentially organised systems with two cycles (e.g. BA and MA) with systems with only one cycle; second, by measuring the proportion of MA graduates among all post-secondary school leavers.[30] A stronger selectivity leads indeed to higher differences between MA and BA (or lower educational groups). MA degree holders find a job faster than lower educated in countries with sequentially organised HE systems or with higher selective MA programmes. The differences are also higher regarding occupational status, although only in sequentially organised systems. Unlike other research, this study addresses the selectivity of tertiary education and provides expected results. However, this study solely considers tertiary education in 10 Eastern European countries.

In sum, different measurements of stratification show conclusive effects: stratification enhances educational signalling and results in more pronounced differences between groups with diverse educational level (low, secondary, tertiary education). Some authors indicate that stratification improves the gap, especially in favour of the highly

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[28] (1) the percentage of the population enrolled in a vocational track at the upper secondary level; (2) enrolment in the dual (work/school based) track as a percentage of students; (3) the number of tracks available to students within lower secondary education; (4) the age of first selection into an education track; (5) the percentage of students enrolled in tertiary education

[29] Educational groups: low, secondary vocational, secondary general and tertiary education.

[30] MA programmes with relatively low graduation rates are considered to be selective, since fewer students finish this educational stage.

educated. The focus lies rather on the effect of stratification of the secondary stage, while the selectivity of the HE stage was less considered.

2.4.2 The effect of vocational specificity

Next to stratification, vocational specificity is also supposed to enhance educational signalling. Differences between educational groups should be more pronounced in highly specific contexts than in more general ones. While studies addressing stratification concentrate on groups with different *educational levels*, studies addressing the role of specificity focus in particular on the vocationally educated compared to other groups.

Case studies show that differences between educational groups are higher in Germany or the Netherlands, which offer more specific training, than in the UK, Ireland or Italy, which offer more general education (Scherer, 2005; Iannelli & Raffe, 2006; Barone & Van de Werfhorst, 2011; Bol & Van de Werfhorst, 2011b; Van de Werfhorst, 2011; Neugebauer & Weiss, 2018). However, case studies are not able to separate the effect of specificity from the effect of stratification since they describe both characteristics within one country.

Within the variable-oriented approach, two main measurements of specificity were used: the share of vocational programmes and the share of apprenticeship type of programme within secondary education. This again reveals that the institutional characteristics of the secondary stage were the focus in order to explain the differences between educational groups.

Studies using the share of apprenticeship type of programme show expected results on different outcomes. A higher share enhanced the differences between educational groups (differences in level and specificity) in terms of the likelihood of getting a job, the occupational status of first job, or the risk of unemployment or becoming inactive (Wolbers, 2007). A higher share also improves the differences in terms of horizontal match, especially in favour of the vocationally educated (compared to the generally educated) (Levels et al., 2014). Some studies show that in a more specific context, the vocationally trained are more fully prevented from the risk of low skill

employment compared to the generally trained (Shavit & Müller, 2000). This indicates that those with specific training in particular benefit within a vocational context. However, this is less true for Eastern Europe. Kogan et al. (2011a) could not find convincing support that the gap between the vocationally and specifically secondary educated is higher in countries with an enterprise training system than in countries with school-based VET training.

Other studies measure specificity by the share of <u>specific programmes within secondary education</u>.

Barbieri et al. (2016) considers the effect of specificity on occupational prestige and speed of entry for different educational groups within 17 European countries. Their cross-level interaction effects show that a higher share of vocational programmes leads to higher differences in occupational status between educational levels, especially for the secondary educated. This also suggests that the vocational context pays off, especially for the vocationally trained. The authors reveal similar findings regarding the speed of entry into the first job after graduation. Van de Werfhorst (2011a) comes to similar conclusions regarding earnings. With rising specificity, the differences in earnings between educational groups (of different levels and programme orientation) become more pronounced. Additionally, the author shows that these differences between certificates are smaller when controlled for actual skills.[31] Hence, behind specific degrees stand specific skills, which are more valued in specific contexts. In short, both studies indicate that the context is particularly beneficial for those with specific training. However, Levels et al. (2014), using the same indicator for specificity, come to different conclusions. The authors do not find an effect of higher share of vocational programmes on the vertical match. Additionally, they even find a negative effect on the horizontal match, especially for the vocationally educated. As already described in chapter 2.1.2.2, the authors argue that this is due to the weak institutionalisation of vocational programmes (Levels et al., 2014, p. 356).

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[31] By using IALS data containing measured skills.

In sum, specificity enhances the differences between educational groups. Some authors suggest that this is especially true for secondary educated (Barbieri et al., 2016) or the vocationally educated (Andersen & Van de Werfhorst, 2010; Levels et al., 2014). This finding indicates that specificity enhances the differences in favour of those with specific education. However, not all studies can confirm this assumption (Kogan et al., 2011a; Levels et al., 2014), revealing even negative effects, especially for the vocationally educated.

2.4.3 The institutional effect on educational groups within countries

In sum, the research provides evidence for both specificity and stratification enhancing educational signalling, leading to greater differences in labour market outcomes within countries.

On the one hand, stratification enhances educational signalling and improves the differences between graduates from different educational stages, and this effect is especially advantageous for the highly educated. On the other hand, higher specificity improves the gap in labour market outcomes between groups as well. Some authors show that this is in favour of the vocationally trained, although this effect is less conclusive.

Although many of these studies considered both VET and HE educated within their sample, the analyses in fact addressed the gap between all groups (from low to tertiary educated with different programme orientation). Both institutions similarly enhance the gap between groups different in level *or* different in programme orientation. However, when explicitly focusing on both groups different in level *and* programme orientation, the institutions are expected to have reverse effects. Stratification might enhance the outcomes, especially of the highly educated, while specificity might enhance the outcomes of vocationally trained. Thus, these institutions do not enhance the gap between groups in the same way but might counteract each other when these two groups are considered. This should especially be the case in countries where strong specificity is accompanied by strong stratification. As already addressed, both stratification and vocational specificity are strongly (OLM) or weakly (ILM) developed and empirical findings

from the variable-oriented research reveal that both institutions are positively correlated. This indicates that many countries have both institutions strongly developed and thus the effect of these institutional settings might offset each other when focusing on vocational and higher education graduates. This assumption is supported by some studies showing that the effect of one institution becomes weaker when controlling for the other one (Müller & Shavit, 1998a; Van der Velden & Wolbers, 2003; Van de Werfhorst, 2011), as described in earlier chapters.

How both institutions affect two groups different in educational level and programme orientation remains so far unclear.

Before summarising all findings presented in these chapters and identifying research gaps, another relevant context shaping individual labour market outcomes is introduced in order to address other important considerations for this thesis.

2.5 Excurse: the role of labour market institutions

Next to institutions of the education system, a wide research stream has focused on the effect of the characteristics of the labour market. This chapter offers a brief review in order to describe another significant context shaping educational returns.

Many studies analysing the effect of educational institutions have considered the characteristics of the labour market in order to control for other contextual factors. While the majority focus on cyclical factors, mostly using the GDP change or the unemployment rate of a country (Gangl, 2001, 2003b; Müller & Gangl, 2003; Müller, 2005; Wolbers, 2007; Hensen et al., 2009; Croce & Ghignoni, 2012; Verhaest & Van der Velden, 2012; de Lange et al., 2014; Gebel & Giesecke, 2016; Verhaest et al., 2017), some also consider the size of the labour market sectors (e.g. service sector, see Kogan et al., 2011a).

Apart from these labour market *characteristics*, many studies explicitly address the effect of labour market *institutions*. While the degree of unionisation or the existence of a minimum wage enjoys some attention (Passaretta & Wolbers, 2016; Davia et al., 2017), the most prominent labour market institution considered is the employment protection legislation (EPL) (for a review of indicators for EPL, see Gebel, 2017). This institution

addresses regulations regarding hiring and firing practices within countries. The effect of this institution follows an insider-outsider logic (Lindbeck & Snower, 1989). A strictly regulated labour market protects employees (insiders) and makes dismissals more difficult. This in turn diminishes the opportunities to hire new labour (outsiders). This in particular has a negative effect on the integration of young people into the labour market, since they are outsiders searching for jobs after having left education.

The findings reveal that labour market regulation prolongs the transition period or raises the risk of unemployment for young graduates (Van der Velden & Wolbers, 2003; Breen, 2005; Wolbers, 2007; de Lange et al., 2014). But when finding a job, it lowers the risk of losing the job (Wolbers, 2007), lowers job mobility (Gangl, 2003c) and lessens the risk of temporary employment for young graduates (de Lange et al., 2014; Passaretta & Wolbers, 2016)

In short, labour market regulation affects outcomes regarding the chance of having, changing or keeping a job. Less research addressing outcomes related to job quality has been conducted and what there is reveals less conclusive findings. Skills mismatch is higher with stronger regulation (Assirelli, 2015; McGowan & Andrews, 2015; Verhaest et al., 2017) because of the higher difficulties of firing mismatched workers. However, the effect is not clear regarding over-education and occupational status. Whereas Di Pietro (2002) or McGuinness et al. (2018) find a positive effect of EPL on the risk of over-education, Gangl (2004) shows a negative effect. The latter author argues that employers may be more risk averse in recruitment, leading to a better fit between education and job. Research addressing the occupational status also reveals inconsistencies: while some studies show a positive effect of stronger regulation on occupational status (Wolbers, 2007; Verhaest & Van der Velden, 2012), other analyses cannot support this assumption (Reimer et al., 2008).

This in general emphasises that research on EPL is stronger focusing on its effect on outcomes such as the speed of entry or the risk of unemployment, and reveals conclusive effects. Less attention is paid to the quality of job and the findings are inconclusive. This might be related to the mechanism behind the effects of EPL. It

addresses the chances of entering or staying in the labour market (insider-outsider protection) and hence the chances of having or changing a job. Job quality, on the other hand, might be more strongly related to educational signalling, and is rather driven by education systems than by labour market institutions.

Besides EPL, another relevant labour market institution is addressing the *employment and income sustaining policies.* The effect of sustaining policies on individual outcomes is explained by the search and matching theory (Mortensen, 1973; Barron, 1975). The theory describes the job search behaviour of an unemployed worker from a rational choice perspective. Accordingly, candidates search for a job as long as the search costs do not exceed the wages of currently available jobs. When candidates face high searching costs, they are keen to accept jobs which do not meet their wage expectations. This individual behaviour is driven by employment and income sustaining policies: these policies compensate for wage deficits during unemployment periods and thus lower the search costs. As a consequence, these policies allow a longer search duration in order to find a job that suits the wage preferences of workers. These effect were shown by several pieces of research on youth labour (Gangl, 2004; Bredgaard et al., 2005; Jacobsen, 2005).

Additionally, much research emphasises the complementarity of income sustaining policies and employment protection legislation (for an theoretical review addressing the coexistence of both institutions, see Bukodi et al., 2008; for further development and empirical analyses, see Saar et al., 2008).

The main assumption behind this complementarity is that sustaining policies provide unemployment benefits offsetting the longer search duration caused by strong EPL (Estévez-Abe et al., 2001). A brief look at

Figure 2 indicates that this might be true for Nordic or German-speaking countries, which show both institutional settings strongly evolved. On the other hand, English-speaking and some Eastern European countries do not require the sustaining effect due to low regulation and thus easy access to the labour market. Southern Europe, however, does not fit this assumption. It has a strict labour market regulation, which is not

compensated for by sustaining policies but rather by family support (Gangl, 2001), as described in chapter 2.1.1.2. This assumption might also apply to the Baltic countries.

Besides the complementarity of these two labour market institutions, there are also approaches describing the complementarity of labour market institutions, on the one hand, with the institutions of education systems, on the other (Breen, 2005; Scherer, 2005; Andersen & Van de Werfhorst, 2010; Leuze, 2010; Barbieri et al., 2016; Brzinsky-Fay, 2017). In particular, the authors address the complementary effect of EPL and vocational specificity or stratification. The main assumption of these complementarities is that high specificity (or high stratification) compensates for the negative effect of EPL in entering the labour market by stronger educational signalling. Thus, having a strong educational signalling may prevent young people from low outcomes even in highly regulated labour markets (for further theoretical descriptions, see Estévez-Abe et al., 2001). This might be true for German-speaking and some Nordic countries showing both strong EPL (Figure 2) and strongly specific educational programmes, as revealed in former chapters.[32] English-speaking countries, on the other hand, show the opposite scenario, with weak signalling and weak EPL.

In sum, this chapter briefly describes the effects of labour market institutions. Although this research stream is broader than addressed in this chapter, this short review allows us to identify some relevant aspects for this thesis. First, findings indicate that labour market institutions influence outcomes related to the chance of having a job (unemployment, search duration or job duration) rather than its quality (over-education, matching). Since outcomes relating to the chance of having a job are strongly related to labour market institutions, they are less relevant in this study. Instead, outcomes addressing job quality are on focus (matching), being linked to education systems, as shown in former chapters. Second, it further addresses the complex structure and the complementarities of

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[32] Saar et al. 2008 classify Nordic countries (FI and SE) as ILM model and thus as countries offering general education instead of a vocational one, as assumed for Nordic countries in the literature review in this thesis. The authors might refer to different studies classifying Nordic countries than in the literature review of this thesis. Since studies consider different country samples, this may result in different classifications of countries. Additionally, the authors do not find empirical support for the assumptions of this country cluster.

institutions of both the labour market and education systems. Thus, considering all institutions at once is less useful because the effect of institutions of education systems might be offset by institutions of the labour market. This is why this study concentrates solely on the institutions of the education system. In order to consider the labour market side, characteristics such as GDP change, unemployment rates or the size of the labour market sectors within countries will be controlled for, as applied in many studies described above.

Figure 2: Labour market institutions in European countries
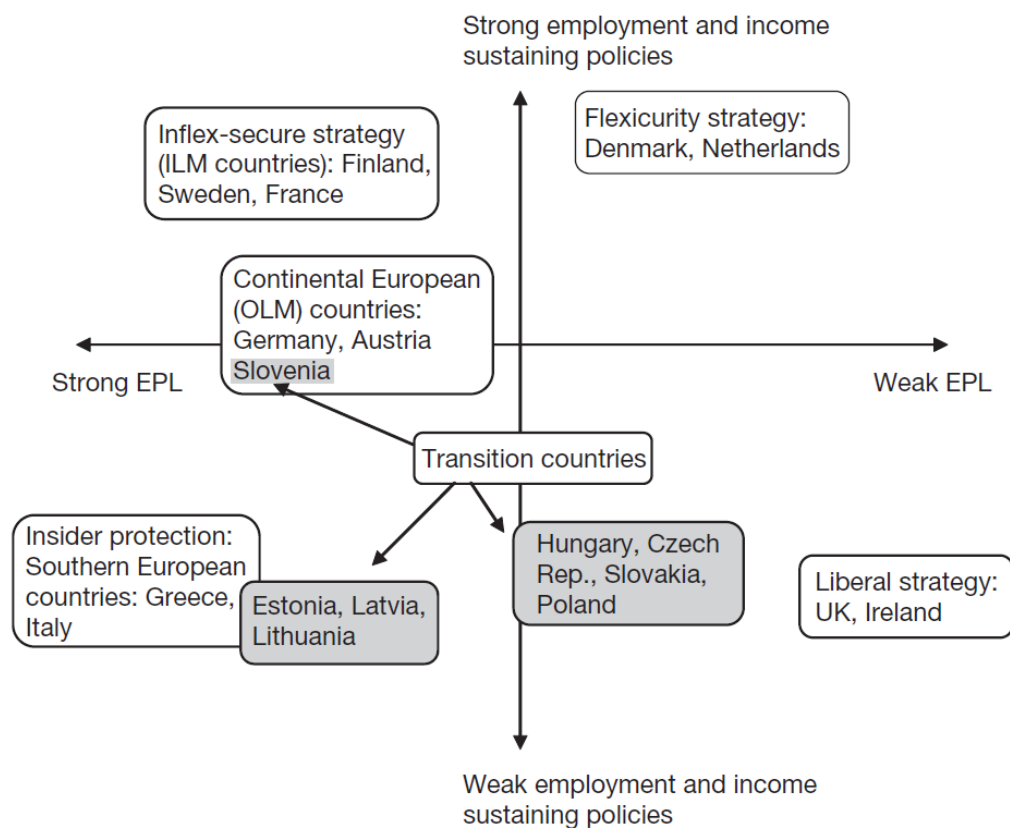
Source: Saar et al. (2008, p. 39)

2.6 Summary and research gap

Comparative transition research has made a significant contribution to understanding country-specific transition regimes in the last five decades. A wide range of prominent studies emphasises that individual outcomes are not solely dependent on individual characteristics but are shaped by the institutional settings of education systems and labour markets.

This chapter introduced the comparative research strand by predominantly focusing on the role of education systems. This strand is divided into research addressing the transition from secondary education to work, followed by research regarding tertiary education. Although both research strands were conducted separately, they reveal many similarities. Both identify a continuum of country-specific transition patterns, with German-speaking countries at one end and Southern Europe at the other. Other countries are in between these two poles. Nordic countries show comparable outcomes to German-speaking countries, although this applies more strongly to those with tertiary education than to those with secondary education; Western countries resemble Southern Europe. Eastern Europe was rather considered separately and shows a heterogeneous group with a north–south division. While landlocked countries reveal advantageous outcomes, on the one hand, countries around the Baltic Sea have lower outcomes on the other. These educational returns are linked to the structural and qualitative characteristics of education systems. While the advantageous situation in German-speaking countries is linked to strong stratification and high vocational programme orientation, in Western and especially southern Europe these settings are less evolved, causing rather low outcomes.

Behind this institutional influence stands predominantly educational signalling: institutions improve the informational value of education, which leads to higher outcomes. Studies following the variable-oriented approach provide support for these assumptions. Structural characteristics such as stratification, expansion or the selectivity of education systems, as well as the imbalance between the supply and demand side of the labour market, show conclusive effects. The effect of specificity is less conclusive. It reveals both expected and unexpected effects on the labour market outcomes of secondary education

graduates – especially on horizontal matching – or is under-investigated for university graduates.

In sum, these two research streams made a significant contribution to explaining varying transition patterns within Europe for both the secondary and tertiary educated. However, the research concentrates on both groups separately. Fewer studies explicitly addressing the effect of institutions on outcomes of different educational groups *within* countries provide relevant insights. Since institutions enhance educational signalling, this leads to greater differences in labour market outcomes within countries. Stratification improves the differences between graduates from different educational stages, and this effect is especially advantageous for the highly educated. Higher specificity improves the gap in labour market outcomes between groups as well. Some authors show that this is in favour of the vocational trained, although this effect is less conclusive.

Although many of these studies considered both the VET and HE graduates within their sample, the analyses rather addressed the gap between all educational groups (from low to higher educated), without focusing on these two in particular. Institutions similarly enhance the gap between groups different in level *or* different in programme orientation. However, when explicitly focusing on both groups different in level *and* programme orientation, the institutions are expected to have rather reverse effects. While stratification improves the outcomes especially of the highly educated, specificity improves the outcomes of the vocationally trained. Thus, these institutions do not enhance the gap between groups in the same way but might counteract each other. This should be especially the case in countries where strong specificity is accompanied by strong stratification. As already addressed, both stratification and vocational specificity are rather strongly (OLM) or weakly (ILM) developed and empirical findings from the variable oriented research reveal that both institutions are positively correlated. Thus, the effect of these institutional settings might offset each other when focusing on vocational and higher education graduates. This assumption is supported by some studies showing that the effect of one institution becomes weaker when controlling for the other one (Müller & Shavit, 1998a; Van der Velden & Wolbers, 2003; Van de Werfhorst, 2011).

How both institutions are dependent on each other and whether they form a complementarity remains so far unclear. Prominent research addressing complementarities of institutions already shows how two institutions can offset or strengthen each other's effect on labour market outcomes. However, they focus rather on complementarities of institutions of the labour market (such as EPL with sustaining policies) or on complementarities of institutions of the labour market (especially EPL) and the education systems (especially vocational specificity). So far, research addressing complementarities of institutions within education systems has been barely conducted.

This indicates two main research gaps. First, studies explicitly focusing on both educational groups such as the vocationally educated and those with higher education at the same time have barely been conducted. So far, research proposes generalised statements on how institutions affect different groups within countries. However, a proper theoretical framework explicitly indicating how two groups such as HE and VET are affected by institutional settings is lacking. Second, the comparison of these two groups might shed light on correlations of different institutions of the education system. Findings so far rather suggest opposed effects of stratification and specificity when considering educational groups such as HE and VET. Thus, it remains unclear if both institutions might stand in a complementary relation.

Contribution of the dissertation

The dissertation makes four main contributions to comparative transition research.
First, it evolves a three-layer theoretical framework allowing us to describe how educational returns to vocational and higher education are affected by institutional settings. Labour market outcomes such as matching are the focus since they explicitly address job quality, which is more strongly driven by education systems than other outcomes (search duration, job duration, temporary contract, unemployment). The framework builds on the perspective of the comparative transition research by considering the direct effect of institutions on individual outcomes. However, this macro-

micro perspective is supplemented by a meso level in this study. Since both educational groups are designed for different job sectors, the occupational level is considered as well. Several layers of the labour market at once have been barely addressed in comparative transition research (for a prominent exception, see Di Stasio, 2014c which focuses on hiring processes at the firm level in three countries (Italy, England and the Netherlands)). The three-layer theoretical framework describes how institutional settings shape the educational returns of VET and HE graduates. Since both groups differ in level and programme orientation, these two characteristics will form a stronger focus. Whereas the selectivity of education systems is supposed to increase signalling of educational level and thus strengthen the outcomes of HE graduates, vocational specificity is assumed to have the opposite effect, by increasing the signalling of programme orientation (field of education) and thus improving the outcomes of VET graduates. This in turn allows us to take into account the institutional effect on educational level and the effect on educational programme (field of education) at once, thus far considered separately.

Second, the three-layer framework allows us to disentangle the effect of structural and qualitative indicators. Selectivity enhances the signalling of HE degrees, while specificity enhances the signalling of VET. Since both work in different directions, theoretical assumptions about the interdependency of these two crucial institutions are proposed. This makes it possible to understand how different educational institutions might relate to each other. It is assumed that both settings affect outcomes on different layers of the labour market. This approach proposes an alternative answer why the effect of specificity shows inconclusive effects in comparative transition research. This also contributes to the research by introducing a complementarity regarding two institutions of the education system.

Third, this thesis proposes structural and qualitative indicators addressing the characteristics of both educational stages at the same time. Comparative transition research rather focuses on characteristics of secondary stage while characteristics of the

HE stage have been less considered, especially regarding vocational specificity. This study proposes indicators taking into account both educational stages. While the selectivity of the HE stage addresses how both stages differ in quantity, the indicator for quality of education compares the vocational specificity of both stages directly. This gives a proper operationalisation of institutional settings, considering both stages at the same time.

Fourth, this study considers a wider range of countries (28), allowing us to verify the continuum of transition patterns. First, it provides descriptions of labour market outcomes for this wide country sample upon the same data. This allows a systematic review since earlier research rather built upon studies addressing different time points, using different operationalisations, or addressing different age groups. Additionally, descriptions of labour market outcomes for both educational groups at once will be provided, addressing also differences between both groups within countries, merely offered in earlier research. Second, it describes the institutional setting for a wider range of countries. Former research used different country samples, which might lead to different classifications of countries. Proper descriptions are provided, by using the same indicators for institutions for a wide country sample at the same time. This also provides descriptions of institutional settings of Western societies and Eastern Europe in a direct comparison, less offered within research.

In order to understand institutional effects on individual outcomes of groups like VET and HE graduates, the following chapter describes the three-layer theoretical framework.

3. A multi-layer theoretical framework

Labour market research is mainly driven by two disciplines: economics and sociology. On the one hand, economic approaches assume that the labour market functions as a standard market for goods and that job placement decisions are driven by individual negotiation processes and the free play of market forces. By contrast, sociology sees labour markets as a subsystem of society embedded in institutional and social frameworks. Accordingly, the labour market is dependent on other areas of society, such as social norms and values, the legal system or education systems, etc. These social contexts usually lead to the labour market not functioning as a standard market (Hinz & Abraham, 2008, p. 17). Sociological approaches thus emphasise the relative character of processes, dependent on the context, in which they take place; these processes cannot be reduced to the consequences of individuals' actions as driven by free market forces.

A central supra-individual context for job placement processes in labour market research are the institutions of the education system or of the labour market. 'Institutions' refer to fixed forms and procedures relating to how exchange processes in the labour market should take place and provide general framework conditions. 'Institutions consists of cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to behavior' (Scott, 1995, p. 33). From a sociological perspective, they serve as 'inequality machines'. 'A society's educational institutions (or labour market institutions) can be described as its 'sorting machine' because they are a major part of the society's institutional arrangements that serve to stratify its population' (Kerckhoff, 2001, p. 3). In economic thinking, institutions are not always efficient by limiting the power of labour market players, even if institutions are economically motivated (Hinz & Abraham, 2008, p. 46).

In sum, institutions provide a framework of conditions affecting the actions of both workers and employers in the labour market. Individual actions are not solely dependent on individual preferences, resources and capital etc., but framed within these contexts.

This, on the other hand, does not mean that institutions determine individual actions, but that they form a context in which individual behaviour takes place.

The following chapter will introduce a theoretical framework addressing the institutional context shaping the individual outcomes. This chapter shortly introduces main labour market theories of both sociological and economical perspectives and proposes an suitable explanation for the effect of institutional settings on the individual outcomes of groups that differ in level and programme orientation (for a theoretical review on economic and sociological labour market theories, see Bills, 2003; Hinz & Abraham, 2008; Schiener, 2010; Di Stasio, 2014a; Abraham & Hinz, 2018). This framework adopts theoretical concepts from comparative transition research, focusing on the effect of institutions on individual outcomes. Additionally, this macro-micro link is supplemented by a meso level. Since both educational groups match different job sectors, the occupational level is considered as well.

The following chapter is divided into three sub-sections addressing these analytical levels. The first introduces labour market theories focusing on the preferences of employers. It offers a description of relevant theories derived from an economical perspective by introducing more sociological approaches and their applicability for this analysis. Although these micro theories do not explain the differences between countries, they are crucial for understanding the mechanism behind the effects on higher analytical levels. The second subsection addresses the occupational level. In particular, it describes how occupations are segmented by different certificates, such as HE and VET. These sectors, in turn, can follow a particular segmentation logic, being either open to all degrees or closed by a particular one. The third and final sub-section will, in turn, introduce institutions and their effect on educational signalling shaping the closure of labour market sectors.

In sum, this three-layer theoretical framework describes how institutions shape the closure of occupations, leading to higher or lower matching of VET and HE graduates on the individual level.

3.1 Labour market theories and the decision-making process

Theoretical approaches from both economic and sociological perspectives propose different explanations regarding the role of education. The most prominent micro-oriented theories are introduced in what follows by applying them to the role of tertiary education and VET degrees. These theoretical approaches mainly evolve from criticism of the neoclassical perspective.

Neoliberal economy defines the labour market as a standard market for the good 'work'. The labour market demand is represented by employers, while the supply side is represented by workers. The mechanism leading to an exchange between both sides is the wage negotiation process. Workers exchange their free time for a particular income in order to perform tasks demanded by employers. Those workers are hired who are willing to work for the lowest income negotiated with the candidate pool. The neoliberal perspective focuses on the imbalance of the demand and supply side and is suitable for explaining wage structures or even unemployment rates on the country level (Hinz & Abraham, 2008, p. 22). However, it is less suitable for explaining the differences between educational groups on the individual level since it is limited to the wage negotiation processes, assuming perfect competition of homogenous labour and perfectly informed individuals (Schiener, 2010, p. 46).

Several theories have been developed to address these limitations. These approaches introduce other relevant aspects essential for understanding labour market processes, by predominantly focusing on the perspective of employers.

Human capital theory (HCT) explicitly addresses the characteristics of workers by focusing on their skills. Although there is not one single HCT but rather a compilation of several theoretical approaches, they all share the idea that skills – human capital – rather than price negotiations shape the value of candidates (Hinz & Abraham, 2008, p. 33). Skills are neither inherent nor constant goods but are acquired under costs (Becker, 1962). Employers prefer candidates with higher human capital because they require lower training costs in order to be productive. Human capital is commonly measured by

schooling years, where more years of education stand for higher productivity of candidates (Becker, 1964; Mincer, 1974). In contrast to the neoclassical model, HCT addresses a heterogeneous labour force by emphasising the different productivity associated with different skills. However, as the neoclassical perspective it assumes perfectly informed employers: skills represent the productivity of a candidate and schooling years form an objective measure whereby an additional year equals higher productivity (Mincer, 1974). Applying these assumptions on the comparison between HE and VET graduates, employers perceive university graduates to be the most productive educational group due to their longer educational path. According to HCT, HE graduates should therefore always be preferred over VET graduates.

Further sociological theories have been developed emphasising the issue of imperfect information (for more details, see Stiglitz, 2002). Unlike HCT, these information theories share the idea that the skills of candidates are not known ex ante and their productivity can be assumed only to a certain extent. These sociological theories address how decisions under conditions of insecurity are made and what consequences they can have. Whereas *(queuing and) signalling theories* focus on the decision-making by imperfectly informed employers before the start of the job, (*search and) matching theories* concentrate on the consequences of these choices for further mobility in the labour market.

Starting with the latter, the matching theory[33] (Jovanovic, 1979; for empirical findings, see Eliason, 1995; Franz, 2006) addresses the suitability – the 'match' – of workers with the job requirements. Although the theory focuses less on decision-making processes but rather on the consequences of wrong decisions, it introduces a relevant context for understanding productivity. The central assumption of this theory is that

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[33] Next to the perspective of employers, matching theory addresses the perspective of workers within the job placement process: workers search for jobs that match their preferences. However, employers' preferences are considered strongly, since they are the stronger gatekeepers within the job placement process. Matching theory is associated with the *search theory (Roth & Sotomayor, 1992)*. Central to the search theory are the search costs during the job placement process. Both employers and candidates search for matching workers or matching jobs and their success depends on the balance between search costs and expected returns. This balance affects the search duration and can explain the risk of unemployment.

productivity is driven by the match between workers and jobs. Contrary to HCT, it emphasises that workers productivity is not *absolute* but *relative*; it depends on the characteristics of the job. Some skills are more suitable for particular jobs, resulting in higher productivity, than they would be in other jobs. Although the theory does not address how skills or degrees are related to jobs, its assumption about the relative form of productivity emphasises the role of jobs. Applying it to the two educational groups VET and HE, this perspective allows us to identify jobs in which both groups might be more productive. According to definitions of both educational levels (Unesco, 1997), HE degrees are designed for *high skill jobs* such as managers or professionals and HE graduates should show higher productivity within these jobs. On the other hand, there are *technical jobs* such as hairdressers, cashiers or cooks, etc., to whom secondary education degrees including VET are designed; here – contrary to the HCT assumption – university graduates should show lower productivity than VET graduates. In other words, productivity is related to the job characteristic and HE graduates should show higher productivity in high-skill jobs while VET graduates should be more productive in technical jobs.

Another informational theory questioning the applicability of educational years for measuring skills is the signalling theory[34] (Arrow, 1971; Spence, 1973). This approach addresses how employers assess productivity with only imperfect information by focusing on education as a screening device. Since employers do not know productivity ex ante, they rely on *signals* for productivity by focusing on candidates' characteristics, such as education. Degrees do not represent particular skills but signal productivity related to characteristics, such as abilities, talents or motivation (Schiener, 2010, p. 48). The theory indicates that degrees serve as productivity signals and – unlike the claim made by HCT – not as a direct measurement of skills. Since they consider imperfectly informed employers, the informational value of degrees varies with the context in which employers

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[34] A similar theory focusing on signals is the queuing theory (Thurow, 1978). This relies on similar assumptions about the role of signalling, but rather focuses on signals for learnability in a context where training takes place in the labour market and is less suitable for this study, which addresses the context of education systems.

make their decision. This allows us to emphasise the role of education systems as a crucial context shaping the value of degrees. Hence, a higher educational level, by the HCT measured in years, does not necessarily have the same meaning in all countries but is dependent on the characteristics of the education system. In some educational context, HE signals higher productivity than VET, while in another context it might be the other way around.

These descriptions give a brief review of prominent labour market theories addressing the job placement process. Based on the limitations of the economical perspective (neoclassical and HCT), the sociological approaches taken as informational theories point out the relative value of education. Although they are not suitable for explaining country differences, they emphasise the importance of the context in which decisions are made. Whereas matching indicates the role of occupations, signalling is suitable for understanding the role of the education system. The following chapter will further address these two context shaping decisions of employers.

3.2 The context of labour market decisions

In order to explain labour market differences between both groups from the *within-country-perspective*, it is convenient to start at the micro level by focusing on the preferences of employers for a particular group. It is assumed that employers compare two candidate groups in order to choose the more productive one. According to the Human Capital Theory (Becker, 1964), employers perceive university graduates as the most productive educational group due to their longer educational path. HE graduates are always preferred over VET graduates and get higher labour market outcomes than VET graduates.

Indeed, a higher level of education should lead to higher labour market returns since the investment in education of tertiary graduates is higher compared to that of other educational groups. However, this HCT assumption does not consider the context in which employers make their decisions.

First, it ignores the characteristics of jobs. Matching theory emphasises the relative character of skills, which depends on the requirements of the job. Contrary to the HCT

assumption, the tertiary educated do not necessarily show higher productivity; their productivity depends on their match with jobs. According to the definition of both degrees, HE degrees are designed for high-skill jobs, while VET degrees are designed for technical jobs, and each group should be more productive in one occupation than in another. Employers should therefore prefer VET degrees for technical jobs and HE degrees for high-skill jobs. However, it remains unclear if employers indeed consider these degrees as the best choice for their jobs. The matching theory focuses less on the decision-making process and is not suitable for explaining how employers decide upon particular degrees. This gap fills the segmentation theory by differentiating between open and closed segments. It describes to what extent employers rely on degrees as an entry requirement for jobs, and hence when degrees are more favoured in the matched occupations and when they are not necessarily favoured.

Second, the HCT assumption ignores the context of the education system. Contrary to HCT, level of education or education years are not a direct measure of skills but only a signal of productivity. The informational value of degrees is not absolute but varies with the context in which employers make their decision. Education systems are a crucial context influencing the informational value of degrees. Hence, a higher educational level measured in years does not necessarily have the same meaning in all countries but is dependent on the characteristics of the education system. While in some education systems, HE does signal higher productivity than VET, in another educational context it might be the other way around. This, in turn, affects the role of degrees as an entry requirement and the closure of labour market sectors such as high-skill or technical ones.

The following chapter addresses these two contexts in detail. The occupational level addresses the closure of occupations, which has an effect on matching at the individual level. The institutional level, in turn, addresses the role of education systems as shaping signalling and mediating this closure of occupations. It is assumed, that institutions affect

the signalling of education and mediate the closure of labour market sectors (high skill and technical) and thus shape individual chances for matching.

3.2.1 The structure of occupations

The matching theory emphasises that productivity is not absolute but relative and depends on the match between candidates and jobs. Since HE degrees are designed for high-skill jobs, while VET degrees are designed for technical jobs, each group should be more productive in one occupation than in another. Employers should therefore prefer VET degrees for technical, and HE degrees for high-skill jobs. However, it remains unclear if employers do in fact consider those with these degrees as the best choice for their jobs. The matching approach focuses less on the decision-making process and is not suitable for explaining how employers decide upon degrees. This gap fills the segmentation theory addressing the extent to which employers rely on degrees as an entry requirement for jobs and hence when the assumed matching between designed degrees and jobs indeed takes place.

As already described, neoclassical theory assumes a labour market defined by perfect competition, one where jobs are available to everybody and decisions depend on individual negotiations between employers and workers. Sociological approaches resumed as *segmentation theories* question the existence of 'one' labour market open to everybody but emphasise its division into segments (for a review of different segmentation type, see Georg & Sattel, 2006). The main idea is that segments differ by recruitment strategies and career prospects. Several segmentation theories apply this argument and define two or three types of segment models (Doeringer & Piore, 1971; Lutz & Sengenberger, 1974; Sengenberger, 1987; Marsden, 1990). Sørensen (1983) distinguishes between *closed* and *open* segments and represents a generalised version of the other approaches.[35] Open segments are characterised by perfect competition, implying market rules, and are open to everybody. 'Buyers, the employers, offer wages

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[35] The other approaches either use comparable argumentation or apply it to particular countries and identify country-specific labour market segmentation, as with the tripartite labour market in Germany (Lutz & Sengenberger, 1974) or the dual labour market in the USA (Doeringer & Piore, 1971).

for particular tasks and sellers of tasks (= workers) decide if they exchange their leisure time for this wage in order to perform these tasks' (Sørensen, 1983, p. 208). However, closed segments, on the other hand, do not involve market mechanisms but are rather structured by particular entry requirements and career ladders. The positions within these segments are closed to outsiders not meeting the entry requirements. Degrees are a common entry requirement and can regulate the chances of being employed in a particular segment. In sum, in open segments the job allocation is open to all degrees. Closed segments, on the other hand, have particular entry requirements and decisions are based upon particular degrees; graduates with other degrees will not be hired.

This logic of segments can be applied to job positions within firms, to whole firms or even branches or occupations. For the purposes of this study, it is applied on recruitment logics within high-skill and technical labour market sectors. Whereas the differentiation of *high-skill* and *technical* sectors refers to different skill requirements (content, tasks, responsibilities), the *closed* and *open* differentiation addresses the recruitment strategies within these occupations. Hence, high-skill jobs or technical jobs can be either open to all degrees or closed by a particular one. The crucial argument is that the assumed matching of *designed* degrees takes place only when sectors are closed by *these* degrees. However, if occupations follow the open logic, one particular degree is not a prerequisite and different degree holders are considered for the job. Hence, if high-skill jobs or technical jobs are open to all degrees, contrary to the matching assumption, both candidate groups with VET and HE degrees are considered as possible workers within these sectors.

In sum, if labour market sectors follow the closed logic, education pays off the most because sectors are closed by the matching degrees: high-skill jobs are closed by HE degrees, while technical jobs are closed by VET degrees, and other degree holder are less considered within the hiring process. However, when each of these sectors follows an open recruitment logic, both VET and HE graduates are considered as possible candidates and the job placement process depends on other characteristics and less on the 'right' degree. Thus, decisions are made less upon VET degrees within technical jobs or HE

degrees within high-skill jobs, but further characteristics of candidates are also relevant within the job placement process.

Before addressing why decisions are made upon the 'right' degrees and when it is less the case in the next section, the consequences for matching in closed and open sectors are described.

The different closure of sectors should be manifested in matching on the individual level. If sectors are closed, education pays off the most, resulting in higher matching. If sectors are open, then matching is lower. Matching can be considered as the fit between job and level of education (vertical match) or with the educational field representing particular skills (horizontal match). This study considers the combination of these two characteristics, allowing matching to be distinguished in more detail.

Since the tertiary education level is designed for high skill sectors and the secondary education level for technical ones, being employed in the right sector should be manifested in a job that fits at least the educational level (*mere vertical match*), or that fits both the educational level and the educational field (a *full match*), which stands for the highest outcome to education. On the other hand, being employed in "the other" sector should indicate lower matching, especially in the case of a *mismatch*, where neither the educational level nor programme orientation is related to job. However, in these sectors candidates can have a job that fits at least their educational field, which allows them to make use of the skills taught in education; this is considered as a higher outcome than a mismatch. Thus, this so called *mere horizontal match* stands for being employed in the wrong occupational sector (with the wrong educational level) but at least within a job that matches the skills of the employee. Thus, VET graduates achieve a mere horizontal match in jobs matching their skills in the high-skill sector and HE graduates in jobs matching their skills in the technical sector.

The above described closure of segments is applied to both labour market sectors, the high skill and the technical. If sectors follow a closed logic, one group is favoured and the hiring chances for the other are limited. For example, if the high-skill sector is indeed

closed by HE degrees, this should show in a full match or a mere vertical match for university graduates, because they meet the entry requirements in form of a tertiary educational level. Since this sector is closed to secondary educated VET graduates, their employment in the high-skill sector and thus achieving a mere horizontal match is less likely (Figure 3). Similar assumptions can be applied to the closure of the technical sector: since it is closed by secondary education degrees, including VET degrees, employment in this sector is more likely for VET graduates and less likely for university graduates. This should be manifested in higher chances of a full match and mere vertical match for VET graduates (Figure 4). The tertiary educated should in turn have a lower mere horizontal match, increasing their risk of a mismatch. If each sector is more open, then these matching outcomes are reversed (Figure 3 and Figure 4). The full match and mere vertical match is less likely, while the mere horizontal match or a mismatch is more likely.

Figure 3: Closure of the high-skill sector and its effect on matching

high closure of high-skill jobs **low closure of high-skill jobs**

HE-degree =
entry requirement   vs.   *HE-degree <>*
for high-skill jobs   *entry requirement*
                                             for high-skill jobs

high full & mere vertical match HE   **low** full & mere vertical match HE
low mere horizontal match VET   **high** mere horizontal match VET
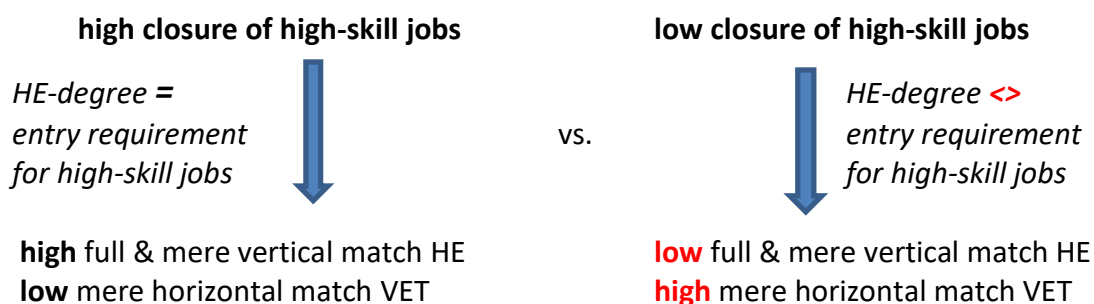
Figure 4: Closure of the technical sector and its effect on matching

high closure of technical jobs   **low closure of technical jobs**

VET-degree =
entry requirement   vs.   *VET-degree <>*
for technical jobs   *entry requirement*
                                             for technical jobs

high full & mere vertical VET   **low** full & mere vertical match VET
low mere horizontal match HE   **high** mere horizontal match HE
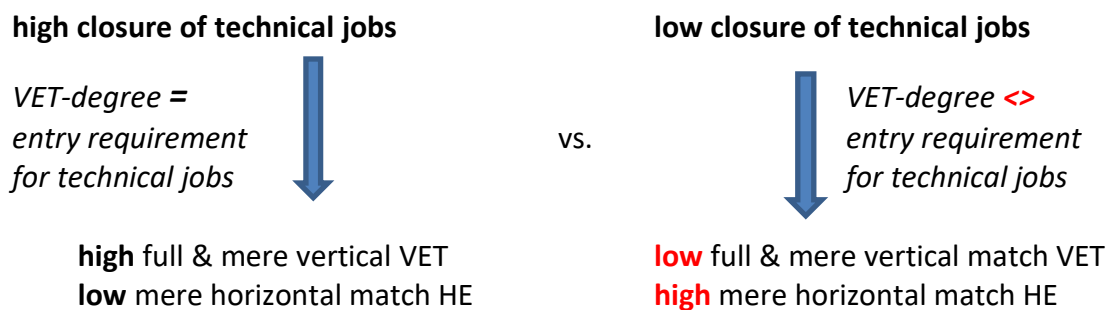
3.2.2 Institutions of the education system

Matching emphasises the relative character of productivity dependent on job characteristics. This allows us to differentiate between jobs for which HE degrees have been designed and jobs for which VET degrees have been designed, and graduates with a particular educational level might be more productive in these jobs. How employers rely on degrees shows the segmentation theory. If job sectors follow the closed logic, employers rely on matching educational levels and sectors are closed by this particular level (secondary or tertiary). In these sectors, education pays off the most resulting in higher matching. However, if sectors follow the open logic, there are fewer entry requirements and both VET and HE are considered as possible candidates for these jobs. In these open sectors, education pays off less. Segmentation theory addresses *whether* a degree such as VET or HE closes labour market sectors and what happens when an employer does not rely on the 'right' educational level. Signalling addresses *why* these degrees close[36] labour market sectors and why this is not always the case. Signalling explains the role of degrees as a screening device. Their informational value varies with the educational context in which employers make their decision. In some contexts, HE degrees signal higher productivity than VET degrees, while in others it is the other way around and the highly educated are not the favoured ones. This, in turn, mediates the closure of segments. It is assumed that both sectors rather follow the closed logic and are closed by the designed degree: the high-skill sector is closed by higher education degrees while the technical is closed by secondary education VET degrees. However, this can be offset by the signalling of other degrees, when they also signal high productivity. If the matching degree does not signal productivity because other degree holders are considered as suitable candidates for these jobs as well, then the sector follows the open recruitment logic more strongly.

In order to understand the varying productivity signal of degrees and its effect on the closure of occupations, the concept of stratification (Allmendinger, 1989) and vocational specificity (Müller & Gangl, 2003) of educational systems is applied considering

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[36] 'Closure by degrees' is related to closure of occupations provoked by signalling and not by the social closure and credentialism mechanism (Collins, 1979).

the VET and HE stage. As shown in the literature review, these are central institutional settings addressed in comparative transition research. The main assumption is that the structure of educational systems or its vocational specificity shapes educational signalling and can *mediate* the closure of occupations by degrees, leading to lower and more open sectors; this, in turn, has an effect on matching at the individual level (Figure 5). Whereas the selectivity of higher education is supposed to mediate labour market sectors in favour of HE graduates, vocational specificity is assumed to have the opposite effect and mediate closure of labour market sectors in favour of VET graduates.

Figure 5: Three-layer theoretical framework

Characteristics of the HE and VET stage

Productivity signalling of HE-degrees compared to VET-degrees

high closure of high-skill jobs???   **high closure of technical jobs???**

HE-degree = entry requirement for high-skill jobs???   *VET-degree = entry requirement for technical jobs???*

high match for HE graduates???   **high match for VET graduates???**
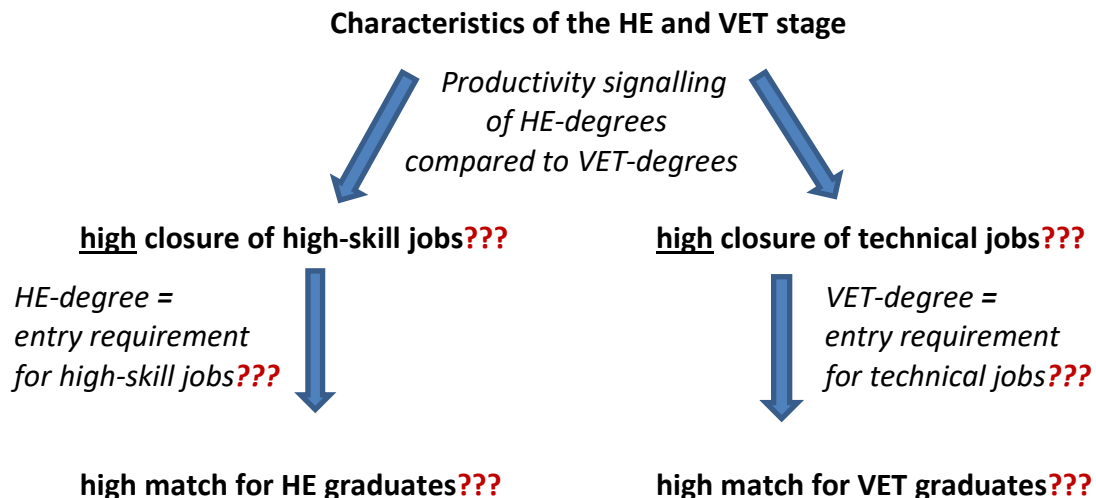
3.3 Selectivity of higher education and the closure of occupations

The stratification of educational systems (Allmendinger, 1989; Kerckhoff, 2001) defines the extent to which graduates are sorted into different educational levels (or programmes). 'Stratification is the proportion of a cohort that attains the maximum *number of school years* provided by the educational system, coupled with the degree of differentiation within given educational levels (*tracking*)' (Allmendinger, 1989, p. 233). Whereas the selection into maximum number of school years addresses the differentiation of educational levels within the whole education system, the tracking addresses the differentiation of educational programmes (general vs. specific) within a

particular educational stage. This differentiation has consequences for the value of degrees in the labour market. In more highly stratified systems, pupils are strongly selected upon performance and achieving a particular certificate implies higher or lower productivity. This follows the meritocratic principle where employers assume productivity using certificates as a basis for this judgement. The strong signal of education (Spence, 1973) leads to a higher match between job and education. In less stratified systems, graduates followed similar educational paths and job applicants do not differ much in educational attainment. In order to distinguish between them, employers focus on further characteristics of the candidate rather than on education. This low educational signal leads to a less frequent match between education and job.

While the tracking concept is suitable to address the differentiation of one educational stage, the number of school years allows different educational stages to be considered. Since I focus on different educational stages (HE and VET), I address the threshold from secondary to tertiary education. This *selectivity of higher education* is considered high if the selection of this threshold is strong and only a few graduates manage to reach higher education, while the majority completes education at the upper secondary level. In these systems employers might perceive the strongly selected and smaller HE group as more productive than VET graduates and choose candidates on the basis of the educational level. In short, graduates from the tertiary stage are perceived as more productive than graduates from the secondary stage. In fact, however, the high productivity of university graduates is questionable in countries with a lower selectivity of the HE stage, since a majority of graduates could easily transition from secondary to tertiary education. In this context, candidates are less preselected by performance and educational level allows to make fewer assumptions about productivity. Tertiary degrees signal a lesser advantage in productivity compared to graduates from the secondary stage. Hence, employers evaluate candidates' productivity not solely by educational level but also by other characteristics.

The overall matching assumption implies that HE degrees are designed for the high-skill sector, while VET degrees are designed for the technical one. As assumed by

the segmentation theory, the high-skill sector should be closed by higher education degrees, and technical jobs should be closed by secondary education VET degrees because these degrees are designed for these sectors. However, how much employers rely on these degrees might be driven by selectivity. The underlying assumption is that the closure of both segments can be mediated by selectivity, depending how much tertiary degrees signal productivity compared to other candidates with lower educational levels, such as VET.

First, since selectivity improves the signalling of the level of education and thus of tertiary degrees, tertiary graduates are perceived as more productive and this enhances the closure of high-skill jobs by HE degrees, amplifying tertiary certificate as an entry requirement and closing them for other groups, such as VET graduates (Figure 6). Second, since the highly educated send a high productivity signal, this could lead to a stronger opening of technical jobs, where both degrees might be considered because the signalling of VET degrees is offset by the strong signalling of HE degrees.[37] University graduates are perceived as suitable candidates for technical jobs and both VET and HE graduates might be considered for these jobs. Which candidate gets the job depends on further job negotiations rather than on a VET degree.

This has consequences on the matching of both groups in each sector. It is assumed that selectivity closes the high-skill jobs by HE degrees (Hypothesis 1). This should be manifested in higher chances of an HE graduate being employed in the high-skill sector, measured by the full and the mere vertical match (Hypothesis 1.1 and Hypothesis 1.2, respectively). On the other hand, it hinders VET graduates from entering the high-skill sector and makes a field-related job in the "other" sector less likely. Thus, a mere horizontal match for VET graduates is less likely in highly selective systems (Hypothesis 1.3).

Next to affecting the closure of high-skill jobs, selectivity is supposed to offset

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[37] This argument focuses on the preferences of employers. Regarding the preferences of candidates, it is assumed that HE graduates prefer high-skill jobs, but that some of them do not manage to get a high-skill job and might apply for a job within the technical sector. However, university graduates employed in the technical sector can have a job that is at least field-related, which is supposed to be improved when the signalling of HE degrees is strong.

the closure of technical jobs by VET degrees (Hypothesis 2). On the one hand, employers are keen to hire university graduates in the technical sector within the right field of education (Hypothesis 2.3). On the other, this might occur at the expense of VET graduates, by reducing their chances of a full or mere vertical match (Hypothesis 2.1 and Hypothesis 2.2) and increasing the risk of a mismatch.

Hypothesis 1: *The higher the selectivity of the Higher Education stage, the more closed are high-skill jobs by HE degrees and …*

Hypothesis 1.1: … the higher the full match of HE

Hypothesis 1.2: … the higher the mere vertical match of HE

Hypothesis 1.3: … the lower the mere horizontal match of VET

Hypothesis 2: *The higher the selectivity of the Higher Education stage, the less closed are technical jobs by VET degrees and.…*

Hypothesis 2.1: … the lower the full match of VET

Hypothesis 2.2: … the lower the mere vertical match of VET

Hypothesis 2.3: … the higher the mere horizontal match of HE

Figure 6: The effect of selectivity on occupational closure and returns to education

Selectivity of HE

Signalling of level:
*Higher productivity
of HE degrees
compared to VET degrees*

higher closure of high-skill jobs   **lower closure of technical jobs**

*HE degree =
entry requirement
for high-skill jobs*

*VET degree <>
entry requirement
for technical jobs*

higher match for HE graduates   **&**   **lower match for VET graduates**

3.4 Vocational specificity and the closure of occupations

Apart from the educational level, the vocational orientation of educational programmes can also signal productivity. An educational programme is vocation-specific (Kerckhoff, 2001; Müller & Gangl, 2003) if it provides training in specific skills for a particular occupation. An educational system is defined as specific if it has a strong focus on specific fields of education, such as engineering or medicine, as opposed to humanities and arts, which have a more general focus and lack a sharp vocational profile. Another indicator of highly vocational specific systems is the classic example of the dual system in German-speaking countries, where specific skills are taught at school and on the job.

Employers are more likely to rely on qualifications when they signal highly specific skills. Employers favour graduates of highly specific programmes because they might be immediately productive and thus do not need further training – they have already been trained within the education system. Employers tend to align job tasks to skills provided within the educational system if they are specific (Müller & Shavit, 1998a, p. 6). This high

signal of productivity for specific educated applicants leads to higher outcomes of education.

Applying the vocational specificity to the training system, I directly compare the specificity of both educational stages and address which one is more specific

I expect that in most countries the VET stage is more specific than the HE stage because higher education institutions have more general educational programmes while VET stages are supposed to provide vocational skills applicable in the labour market (Unesco, 1997). The stronger this specificity advantage of VET programmes (above the HE programmes), the higher the signal of their productivity; employers might similarly consider or even prefer VET graduates over the more generally educated HE group. This signal mediates the closure of both sectors.

Again, the overall matching assumption implies that HE degrees are designed for the high-skill sector, while VET degrees are designed for the technical one. As assumed by the segmentation theory, high-skill jobs should be closed by HE degrees and technical jobs should be closed by VET degrees. However, how much employers rely on these degrees might be dependent on the specificity of both stages. The underlying assumption is that the closure of both sectors can be mediated by specificity, depending how much VET degrees signal productivity compared to other candidates, such as university graduates. First, since specificity improves the signalling of VET degrees, VET graduates are perceived to be more productive than HE graduates, and this enhances the closure of technical jobs by VET degrees, amplifying VET degrees as an entry requirement and closing them for other groups, such as HE graduates (Figure 7). Second, since a VET degree sends a higher productivity signal, this could lead to a stronger opening of high-skill jobs, where both degrees might be considered because the signalling of HE degrees is offset by strong signalling of VET degrees. The vocationally educated are perceived as suitable candidates for high-skill jobs and both VET and HE might compete for jobs in this sector.

This has consequences for the matching of both groups in each sector. Hypothesis 3 assumes that a higher signalling of VET certificates should lead to a higher

closure of technical jobs by VET degrees (Hypothesis 3). This enhances the chances of a VET graduate being hired in the technical sector, which is manifested in a higher full match or mere vertical match (Hypothesis 3.1 and Hypothesis 3.2). At the same time, the chances for the highly educated in the technical sector are smaller and thus the chances for a field-related technical job should decrease for HE, making mismatch more likely (Hypothesis 3.3).

It was further argued that specificity affects the *closure of high-skill jobs* (Hypothesis 4). Since a rising VET specificity improves the signal of VET certificates, it opens up the high-skill sector for VET graduates, provoking lower closure by HE degrees. On the one hand, this should be manifested in higher horizontal matching for VET within the high-skill sector (Hypothesis 4.3). This should happen at the expense of university graduates, reducing their chances of a high-skill job (full match, mere vertical match; Hypothesis 4.1 and Hypothesis 4.2).

Hypothesis 3: *The more specific the VET stage compared to HE stage, the more closed technical jobs are by VET certificate and …*

Hypothesis 3.1: … the higher the full match of VET

Hypothesis 3.2: … the higher the mere vertical match of VET

Hypothesis 3.3: … the lower the mere horizontal match of HE

Hypothesis 4: *The more specific the VET stage compared to the HE stage, the more open high-skill jobs become and…*

Hypothesis 4.1: … the lower the full match of HE

Hypothesis 4.2: … the lower the mere vertical match of HE

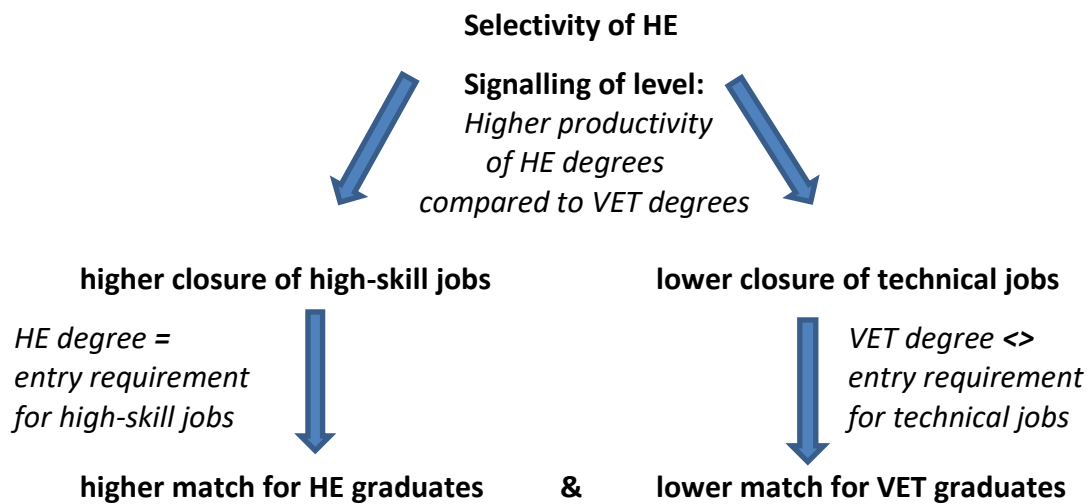**Hypothesis 4.3:** … the higher the mere horizontal match of VET

Figure 7: The effect of specificity on occupational closure and returns to education

Specificity of VET (vs. HE)

Signalling of programme orientation:

*Higher productivity
of VET degrees
compared to HE degrees*

lower closure of high-skill jobs   **higher closure of technical jobs**

*HE degree <>
entry requirement
for high-skill jobs*

*VET degree =
entry requirement
for technical jobs*

lower match for HE graduates   **&**   **higher match for VET graduates**
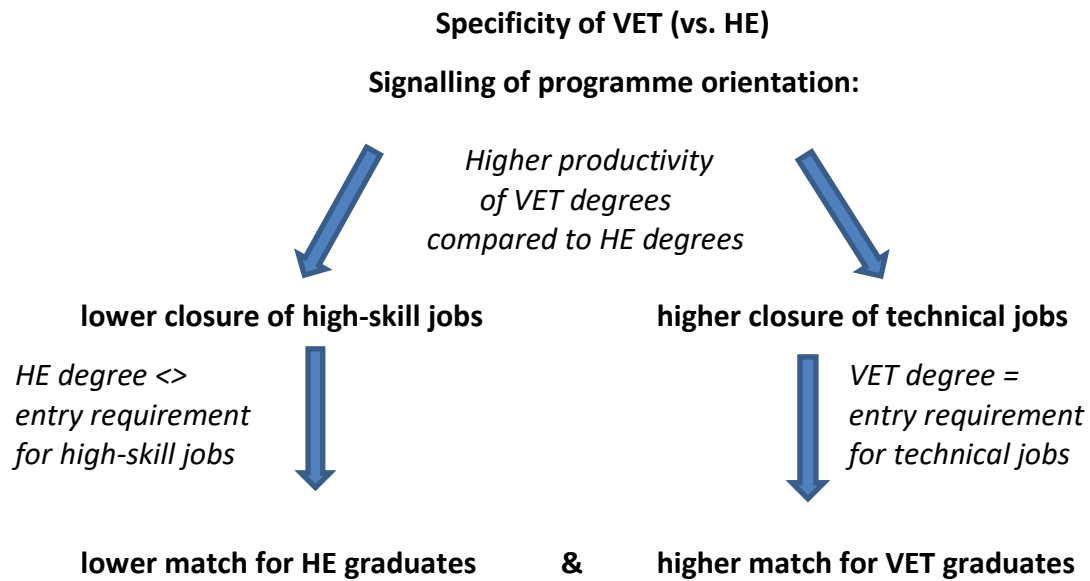
3.5 The effect of selectivity and vocational specificity

So far, the effect of these two institutions on signals has been described separately. Selectivity shapes the signalling of HE certificates, where employers rely strongly on the information provided by the *level of education*. Specificity, on the other hand, shapes the signalling of VET certificates, where employers rely on *programme orientation* in order to choose productive candidates. This is supposed to affect the closure of sectors and, in turn, individual labour market outcomes.

In sum, both institutional settings work in opposite directions. Since all countries can be classified along both institutional characteristics, it is interesting to determine how both institutions interact with each other. Do their effects counteract each other when both institutions are strongly developed? Or is one institutional effect more pronounced when the other effect is weak?

In order to understand interdependencies on the macro level, the interdependence of signals on the micro level needs to be addressed. Only by understanding the coexistence of different educational signals, such as the level of

education or programme orientation (field of education), assumptions about the coexistence of different institutions enhancing these signals can be derived. This section will describe the coexistence of educational level and programme orientation (field of education) by assessing whether they close whole sectors or solely jobs within these sectors. This, in turn, allows us to make assumptions that selectivity and specificity might affect productivity signalling on a particular labour market layer, since they shape these two educational characteristics.

It is assumed that both educational level and programme orientation (field of education) work on different layers of the labour market. While educational level has a stronger effect on the occupational closure by being an entry requirement of *whole* sectors (high-skill vs. technical), programme orientation (field of education) is rather responsible for the closure of jobs *within* these sectors. This is due to the structure of the labour market, where *sectors* such as the high-skill or the technical one cluster *jobs* upon programme orientation (ILO, 1990, 2012). The job placement process is thus assumed to be a *hierarchical* screening process. First, employers decide upon the educational level in order to choose the right candidate for a labour market sector (high-skill or technical). In a second step, after deciding upon the educational level, employers screen on the programme orientation (field of education) of candidates. For example, jobs such as financial analyst or building engineer belong to the high-skill sector and thus require a tertiary degree. The highly educated are more accepted for these jobs, because these jobs belong to the high-skill sector and require a tertiary degree.

On the job level, the programme orientation (field of education) of the tertiary educated is decisive; for a financial analyst there is a preference for tertiary graduates from business over tertiary graduates from the humanities, since the first signal more matching skills related to these jobs. Thus, VET graduates in business will not be considered for a job as a financial analyst, because they lack the right level, despite revealing a matching programme orientation. Hence, the same field of education of VET and HE is not decisive for applying to jobs, if the sector is closed by the educational level. Business VET graduates are rather considered for jobs such as credit and loans officers in

the technical sector, for which secondary educational level is designed. Thus, some occupations are not available for graduates of similar programme orientation when they are closed by educational level.

Figure 8: The effect of specificity in selective HE systems
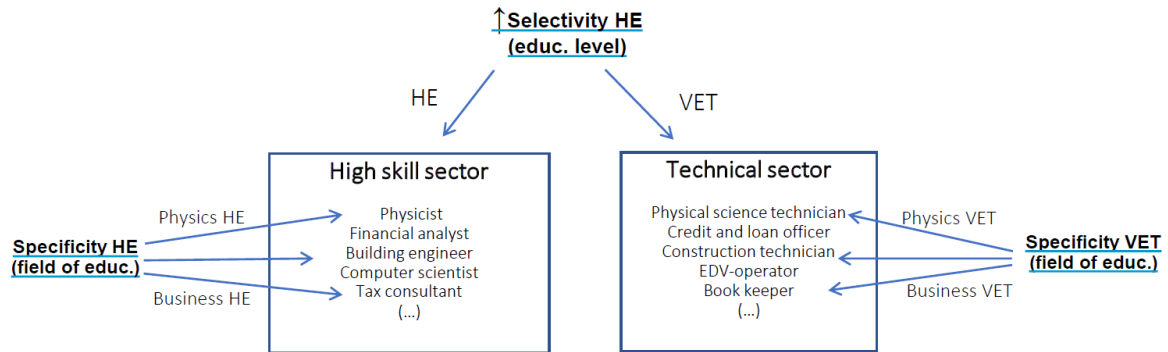
However, this assumption might be true if the educational level sends strong productivity signals and closes whole sectors (see Figure 8). If educational level is not a reliable signal for closing sectors, the employer focuses more strongly on further characteristics in order to assess the productivity of candidates. Thus, when the signalling of the level is low and the sectors are not entirely closed by degrees, the programme orientation might be important for deciding between applicants *of different levels* within the same sector (see Figure 9).

Going back to our example, since the level of education is not a reliable signal, choosing between candidates for a high-skill job such as financial analyst might be more strongly driven by a programme orientation such as business. Thus, both groups the tertiary educated and VET graduates are considered, and the candidates preferred might be those who signal more specific skills in business.

In sum, there is a hierarchy of signals, where the level is responsible for sector closure, while programme orientation is responsible for job closure within each sector. The job placement process is thus assumed to be a *hierarchical* screening process. First,

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candidates of different levels are sorted into sectors, and then candidates of the same level are sorted upon programme orientation. Hence, programme orientation influences the decisions made *between groups of the same level*, but not in terms of groups of different educational levels, such as VET and HE. However, if the signalling of level is low and sectors are less closed, employers might consider the programme orientation of *groups with different educational level* within the same sector. If programme orientation signals the productivity of one educational group more strongly than for the other, the employer might favour the first educational group over the second.

Since there is a hierarchy of signals, there is a hierarchy of institutional effect because both institutions shape the signalling of two different characteristics. As assumed in former sections, selectivity shapes the signalling of educational level. Employers differentiate more strongly between VET and HE graduates in more highly selective systems. Specificity, in turn, shapes the signalling of programme orientation, where strong specific stages improve the extent to which employers rely on programme orientation (field of education). Since selectivity improves the signalling of educational level, it is responsible for the closure of whole labour market sectors. Since specificity shapes the signalling of programme orientation, it is responsible for job closure within these sectors. This shows that both institutions work on different layers of the labour market. Employers rely on levels driven by selectivity and then rely on programme orientation driven by specificity (see Figure 8). Hence, if selectivity is highly evolved, the educational level enhances the closure of sectors and specificity only affects the closure of jobs within sectors. Employers thus decide upon the programme orientation of applicants *of the same level*.

In short, specificity has an effect on the difference between groups of the same level, but not on groups of different ones such as VET and HE. Thus, it cannot open whole sectors, as assumed in Hypotheses 3 and 4. However, if selectivity is weak, educational level is a less reliable signal, and sectors are less driven by educational level and more open for both groups, employers focus on further characteristics in order to assess the

productivity of candidates. Programme orientation (field of education) might be more decisive in these settings. Thus, specificity in less selective systems might have a stronger effect on applicants *of different levels*, as assumed by Hypotheses 3 and 4. In other words, the specificity of different stages has an effect when sectors are more open for different groups, as in less selective systems (see Figure 9). If the specificity of VET is higher compared to the specificity of the HE stage, VET graduates signal high matching skills and are also perceived as suitable candidates, even for the high-skill sector. If specificity of VET stage is not higher and both groups send similar specific signalling, employers seek additional signals and the decision-making process might be less related to education.

Figure 9: The effect of specificity in less selective HE systems
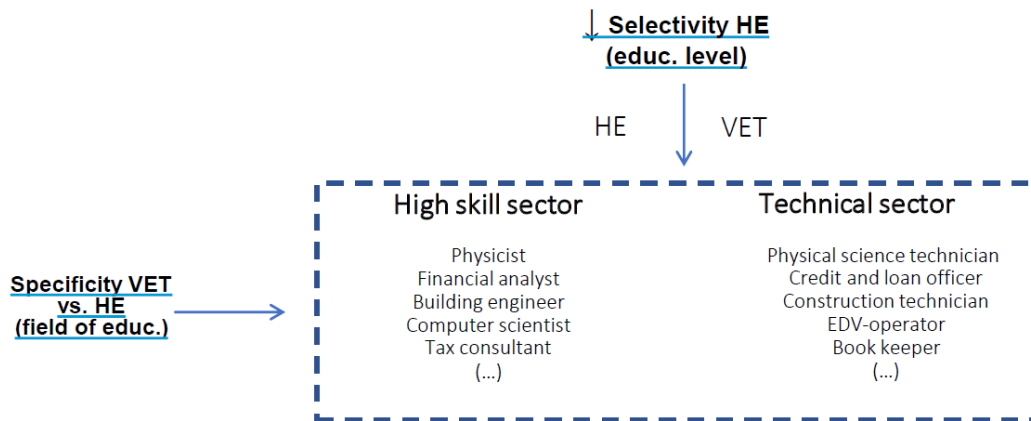
All in all, this discussion indicates that the effect of specificity is conditional on the effect of selectivity. If selectivity is highly evolved, the effect of specificity is reduced to the job level. Hence, specificity does not open sectors but rather can strengthen the signalling of programme orientation for graduates of the same level (see Figure 8). However, if selectivity is less evolved and employers cannot rely solely on educational level, they focus on further characteristics in order to assess the productivity of candidates. This can be a strong vocational programme driven by specific education (see Figure 9). Hence, the effect of specificity assumed in Hypotheses 3 and 4 on matching in jobs within the high-skill and the technical sector on both groups is supposed to be stronger in less selective systems than in highly selective ones. In order to test these assumptions, the effect of specificity

is shown in countries with high selective HE stages, on the one hand, and low selective ones, on the other (Hypothesis 5).

It is assumed that stronger specificity of the VET stage (compared to the HE stage) should have a more pronounced effect in low selective systems because both sectors are more open to VET graduates. In highly selective systems, VET specificity should show smaller or no effect because sectors are driven by level and the specificity of these two groups is less important since both groups are less considered within the same sector.

Hypothesis 5: S*pecificity has a stronger effect in weakly selective HE systems than in highly selective ones.*

3.6 Main theoretical assumptions

This chapter describes a three-layer theoretical framework allowing us to address how educational returns to vocational and higher education are affected by institutional settings. The framework builds on the perspective of the comparative transition research by considering the direct effect of institutions on individual outcomes. However, this macro-micro perspective is supplemented by a meso level in this study. Since both educational groups are designed for different job sectors, the occupational level is considered as well. The three-layer theoretical framework describes how institutional settings mediate the closure of labour market sectors and thus the chances of matching for VET and HE graduates. Since both groups differ in level and program orientation, these two characteristics are stronger on focus. Whereas the selectivity of higher education is supposed to increase signalling of educational level and thus mediate labour market sectors in favour of HE graduates (Hypotheses 1 and 2), vocational specificity is assumed to have the opposite effect, by increasing signalling of program orientation and thus mediate the closure of labour market sectors in favour of VET graduates (Hypotheses 3 and 4).

By considering different layers of the labour market it further allows to disentangle the effect of both institutional settings. Again, selectivity enhances the signalling of HE degrees, while specificity enhances the signalling of VET certificates. Since both institutional settings work in different directions, theoretical assumption about the interdependency of these two institutions are proposed. It is assumed that both institutional settings work on different layers of the labour market. Whereas selectivity is assumed to close whole sectors by educational level, specificity is assumed to close jobs within these sectors by program orientation (field of education). This emphasizes the hierarchy of institutions and that the effect of specificity is conditional on the effect of selectivity. If selectivity is strong, the sectors are stronger mediated by educational level and specificity of two groups with a different educational level is less significant, since these two groups are hired in different sectors. When, in turn, selectivity is less evolved and employers rely on educational level to a lesser extent, candidates like VET and HE stronger compete for the same jobs. Thus, specificity shaping the effect of vocational skills is supposed to have a more pronounced effect when selectivity is low (Hypothesis 5). This allows to understand how different educational institutions might relate with each other.

In order to test these assumptions empirically, the following chapter provides descriptions of how these theoretical concepts are transformed into empirical constructs.

4. Research design

Sociology and political science have long contributed to understanding country-specific processes. Comparative analysis forms a significant part of social science research and its application is constantly growing. This scientific perspective distinguishes two main approaches: the variable-oriented and case-oriented approach (Della Porta, 2008; Ragin, 2014a, 2014b). Both approaches are complementary rather than conflicting: whereas the first identifies social processes on particular examples, the second tests the applicability of these assumptions for a wider sample. The case-oriented approach seeks to understand complex units, while the variable-oriented approach aims at establishing generalised relationships between variables (Della Porta, 2008, p. 198).

As already addressed in the literature review, the findings reached from comparative transition research are based on both approaches. The in-depth descriptions of case studies provide reliable information about the institutional settings of countries. Extensive micro level analyses allow for a better understanding of micro-processes in a particular context. In the variable-oriented approach, country descriptions are limited to few empirical indicators, however, provided for a broad number of countries. The higher sample at the macro level allows direct testing of the macro-micro link assumed in the case-oriented approach.

This study follows the variable-oriented approach in order to test the effect of institutional settings on individual educational returns. Despite the limited information on the education system, it allows us to use separate indicators for different institutional settings in order to disentangle structural and qualitative characteristics. Next to analysing the institutional effects on educational outcomes, this study additionally considers the occupational structure within countries.

The following chapters describe the operationalisations of the theoretical constructs. First, the suitability of micro data for analyses will be briefly discussed. Second, the measurement of variables at all three analytical level will be described, starting with individual variables relating to education and labour market outcomes (matching),

followed by institutional characteristics and occupational closure. Third, descriptions of the used method are provided, addressing the logistic regression and multi-level model.

4.1 The European Union Labour Force Survey

The European Union Labour Force Survey (EU-LFS) is a large household sample survey conducted in European Union states (and candidate countries such as Norway, Switzerland and Iceland)[38] since 1983.

The data is collected quarterly (and pooled annually) by the national statistical institutes of the participating countries and the project is coordinated by Eurostat. In particular, the surveys are conducted by the National Statistical Institutes (NSIs) of the participating countries and the data is harmonised by Eurostat. The EU-LFS is based on a probability sampling (random sampling), allowing us to make reliable inferences about the entire population and to quantify the error in the estimates. Additionally to the random sampling, most countries (except Lithuania, Luxembourg, Malta and Iceland) used stratified sampling where the population is partitioned into non-overlapping groups (strata), and a sample is selected within each stratum. Sampling units are independently sampled from each stratum. Stratification is used to ensure that the sample represents different groups in the population, and a stratum aims to represent a homogenous group of the population.[39] The stratification is mainly done on geographical areas (NUTS 2, NUTS 3 or NUTS 4 levels). The degree of urbanisation is also a common stratification variable. The degree of comparability of the EU Labour Force Survey results is considerably higher than that of any other existing set of statistics on employment or unemployment available for Member States (Eurostat, 2007, p. 97). Due to the high number of cases, the descriptive results did not differ when using sampling weights (results not shown).

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[38] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_labour_force_survey
[39] https://ec.europa.eu/eurostat/statistics-xplained/index.php?title=Labour_force_survey_(LFS)_-_sampling_design,_sample_size_and_sampling_errors#Who_decides_on_the_sampling_methodology_.3F

This internationally harmonised data contains information on the labour participation of respondents aged 15 and more.[40] It offers a wide range of information about the current employment status and about educational background (for more details, see Eurostat, 2007). Since 1999, the core questionnaire is supplemented by additional questions of the so-called *ad hoc module*, each year addressing a particular topic related to the labour market. The ad hoc module from 2009 addresses the topic 'Entry of young people into the labour market'. This complements the core questionnaire by relevant questions about the transition period from school to work of 15–34-year-olds. It contains information on the first job after leaving education (e.g. occupation, type of contract, methods used to find this job, etc.) and further information about educational programmes (e.g. programme orientation, work during education, etc.) (COMMISSION REGULATION, 2009).

The information provided by the ad hoc module 2009 forms a basis for testing the research hypotheses identified. First, the data explicitly relates to the first significant job after leaving education and allows us to illustrate the transition period addressed in this thesis. Second, the additional information on educational programmes allows us to identify both educational groups considered in this research. Most international data fails to identify VET graduates by not distinguishing between general and vocational programmes at the upper (post-)secondary level. Next to LFS, PIAAC data (Programme for the International Assessment of Adult Competencies[41]) distinguishes this coding. PIAAC is a survey measuring skills and their application to the labour market. Although it started to be collected more recently than the LFS data (2011/12 and 2014/15 vs. LFS in 2009), it contains fewer European countries (21 vs. 30 in LFS)[42] and with fewer cases per country (ca. 2000–4000 vs. ca. 20.000–70.000 in LFS). Hence, LFS 2009 is the most applicable data basis for this research, providing suitable educational coding and information on the first

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[40] https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey
[41] For further details, see http://www.oecd.org/skills/piaac/
[42] These numbers refer to European countries only. The survey covers in total 24 countries in the first round (2011/12) and nine additional countries in the second round (2014/15). https://www.gesis.org/en/piaac/structure-of-the-project/international/participating-countries/

job after graduation. Additionally, it offers harmonised data[43] for a wide number of countries with large samples and shows a high validity of the results (Eurostat., 2011; Eurostat, 2012).

However, some limitations of LFS data need to be addressed.

First, the transition period is limited to the 'first job of more than three months after leaving formal education for the last time'. Information on later jobs within the transition period is not provided due to the cross-sectional design of the data.[44] However, 90% of these jobs last longer than six months, with an average length of 18 months. This corresponds to definitions of the first significant job after leaving education applied in research. Second, the ad hoc module was collected far back in 2009.[45] This might depict a different situation than the current one in 2021, due to institutional changes within education systems or within labour markets. Hence, empirical findings based on data from 2009 might be obsolete. Although education systems do not evolve rapidly and are assumed to be relatively stable (Bol & Van de Werfhorst, 2013), large educational reforms of both educational stages took place shortly before the data collection: in 2000, the Bologna Reform (CRE, 2000) was initiated, harmonising tertiary education, whereas in 2002 the Copenhagen Declaration (European_Commission, 2002), harmonising VET systems, although the latter related to targets such as improving transparency or recognition of degrees and had a lower impact on changing VET programmes. Since the data analysis addresses graduation cohorts between 1998 and 2009, the reforms might

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[43] The comparability between countries is ensured by similar standards (EU Regulations of the data). Most of the countries used similar definitions of the target population (persons aged 15–34), and applied a similar survey methodology (two or three stages of the stratified random sampling scheme) and interview methodology (face-to-face interviews or a combination of face-to-face and telephone interviews) (Eurostat, 2012, p. 36). The questions in the ad hoc module were usually attached to the core questionnaire, although the number of questions varies between 11 and 30 and some variables were defined differently due to national concepts of the educational system. All in all, despite these exceptions, the data is characterised by a high harmonisation and comparability between countries and shows a high validity of the results (Eurostat., 2011; Eurostat, 2012).

[44] Since 1998, the Labour Force Survey is also designed as a continuous survey but the follow-up surveys collect information on the current job derived from the core questionnaire and do not relate to the first job derived from the ad hoc module 2009. Hence, for the purposes of this study, the data can be used only in its cross-sectional form.

[45] The ad hoc module of 2016 refers to a similar topic ('young people on the labour market'), but the information explicitly focuses on the current job and not on the transition period.

provoke heterogeneous cohorts within countries. However, it is assumed that reforms such as Bologna have been introduced gradually, retaining similarities of programmes and allowing comparability of cohorts within countries.

Regarding the labour market, its cyclical situation might have changed strongly since 2009, especially due to the economic crisis of 2007–2008.[46] However, economic downturns affect particular educational groups or countries, which might be less challenging for this study. First, such downturns affect the lower educated rather than graduates of secondary or higher education (Scarpetta et al., 2010). Second, the crisis more strongly affected Southern, Western and Baltic countries than German-speaking or Nordic ones (Giannakis & Bruggeman, 2017). As shown in the literature review, these more strongly affected countries reveal unfavourable transition patterns driven by educational settings. Hence, the crisis might amplify the already weak role of educational settings within these particular countries. This is why data collected before the crisis is suitable for analyses concentrating on the effect of educational systems since it does not entail this amplified negative effect of the labour market, being secondary to this study.

Despite these limitations, however, the LFS data is a suitable basis for this research by providing crucial information on the individual level addressed by this study; the educational coding and labour market outcomes. The following sections describe operationalisations of these individual characteristics in more detail.

4.2 Operationalisation of variables

4.2.1 Individual variables

4.2.1.1 Educational coding

The LFS data offers educational coding by applying the *International Standard Classification of Education (ISCED 1997)* (Unesco, 1997). This classification scheme is

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[46] It is assumed that the data sample is not strongly affected by the economic crisis since it was widely announced in the second half of 2008 with the collapse of the investment bank Lehman Brothers and the data collection took place only months later. The majority of the respondents started their first job before 2009.

designed to organise statistical information on education within countries and internationally. It allows us to distinguish different levels of education, on the one hand, and different programme orientation (general and vocational), on the other[47] (for more details, see Unesco, 1997; for a critical evaluation, see Schneider, 2008).

The relevant educational groups are defined as follows: 'graduates of vocational education and training' refer to both upper secondary education (ISCED 3b and ISCED 3c[48]) and post-secondary non-tertiary education (ISCED 4b) with a *vocational* programme orientation. Although ISCED 4 has predominantly a longer educational path compared to ISCED 3, both groups do not differ in other aspects since they are educated within the VET system and match to the same occupational positions (see the next chapter, addressing vertical matching). 'Graduates of higher education' refer to the long cycle of the first stage of tertiary education (ISCED5a). This programme is supposed to prepare graduates for professions with high-skill requirements, which corresponds to definitions of high-skill labour addressed in the theoretical chapter. Graduates of the short cycle of the first stage of tertiary education (ISCED 5b) are excluded from the group of the highly educated. This is due to different national definitions of ISCED 5b; while in some countries it represents the BA level, in others it represents either educational groups at universities of applied sciences or it is not defined as part of tertiary education but rather as part of the high prestigious VET system (e.g. 'Meister' in German-speaking countries). Additionally, some countries have a less evolved two-cycle tertiary education system or the ISCED 5b level is rarely the final educational degree but rather an intermediate step to attaining education at the ISCED5a level (especially in Eastern Europe and Nordic countries[49]). A ISCED5b-

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[47] ISCED 0: Pre-primary level of education; ISCED 1: Primary level of education; ISCED 2: Lower secondary level of education (2A, 2B, 2C); ISCED 3: Upper secondary level of education (3A = general, 3B & 3C = vocational); ISCED 4: Post-secondary, non-tertiary education (4A = general, 4B & 4C = vocational); ISCED 5B: First stage of tertiary education, short cycle; ISCED 5A: First stage of tertiary education, leading to advanced research programmes and professions with high skills requirements; ISCED 6: Second stage of tertiary education (PhD programme).
For more details, see:
https://ec.europa.eu/eurostat/cache/metadata/Annexes/educ_uoe_h_esms_an2.htm
For definitions of programme orientation, see Cedefop (2012, p. 15).
[48] Graduates of the vocational programme ISCED 3c of less than two years were excluded from the sample due to their shorter educational path.
[49] These countries show the lowest ISCED5b rates compared to ISCED5a in LFS data.

graduate's first job is thus not necessarily a first significant job after leaving education but might be a stepping stone before continuing education at a higher level. Robustness checks considering the ISCED 5b group show that this group is positively affected by both institutions resulting in higher matching. On the one hand, this group profits even more from selectivity than the ISCED 5a group (see Figure 30 and Figure 31 in the appendix). On the other hand, vocational specificity also has a positive effect on this group, as was assumed for VET and not for HE graduates (see Figure 32 and Figure 33 in the appendix). This ISCED 5b group might thus represent either the highly specific VET group or a selective BA group which has chosen not to continue education at the MA level but rather enter the labour market due to good job opportunities. Since ISCED 5b graduates seem to be a very heterogeneous and selective group, they are excluded from the main analyses.

The lowest educated groups (ISCED 1, 2) were also excluded, since the focus of this study is the comparison of the two main educational certificates designed for the labour market (VET and HE), while lower educational groups are rather designed for continuing education. In order to account for the lowest educational group, the size of the ISCED 1 and 2 group is considered as a control variable in the models.

4.2.1.2 Matching of education and job

This study aims to explain the match between education and job. The following section introduces the operationalisation of the vertical and the horizontal match in the first job, finalising with the operationalisation of the dependent variable as a combination of these two characteristics.

Vertical match

A vertical match describes whether the occupational status is related to the educational level. Since no subjective measure of this concept is provided by the LFS data, this study applies an objective coding by aligning respondents' educational level and occupational status. As already described in the previous section, educational level is measured by the International Standard Classification of Education (ISCED 97). The occupational status is measured by the International Standard Classification of Occupations (ISCO 88). This

classification scheme was designed to organise statistical information on occupations within countries and internationally (ILO, 1990). It is hierarchically structured by ten major groups at the top level of aggregation, and is additionally subdivided into further sub-groups providing information on required skills[50] (for critical evaluation, see Budlender, 2003; Hoffmann, 2003). The major groups allow us to distinguish different occupational status and are applied for coding vertical matching.

In order to align both sides, the classification of the *ISCO skill level*[51] is used. The four skill levels consider educational level defined by ISCED, on the one hand, and occupational status defined by ISCO, on the other (ILO, 2012, p. 14). This adjustment is illustrated in Table 1. The match takes place as follows: University graduates match vertically with occupations such as 'Legislators, Senior Officials and Managers' (ISCO1) or 'Professionals' (ISCO2); VET graduates match with ISCO4–ISCO8 occupations, for example 'Technicians and Associate Professionals', 'Clerks', 'Service Workers and Shop and Market Sales Workers', etc. ISCO-0 'Armed Forces' are not included in LFS ad hoc data. In addition to the proposed classification by *ISCO skill level*, the ISCED 3 and ISCED 4 groups are adjusted to ISCO 3 'Technicians and Associate Professionals' because this group consists of subgroups such as 'Computer associate professionals', 'Nursing and midwifery associate professionals', 'Finance and sales associate professionals', 'Police inspectors and detectives', 'Social work associate professionals', etc., who might be educated within the VET sector in most countries.

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[50] Including 28 sub-major groups, 116 minor groups, and 390 unit groups, e.g. 2 "Professionals" → 22 "Life science and health professionals" → 222 "Health professionals" → 2221 "Medical doctors"). For the entire structure, see https://ec.europa.eu/eurostat/documents/1978984/6037342/ISCO-88-COM.pdf)

[51] The classification distinguishes four skill levels (ILO, 2012, p. 12):
Skill Level 1: Occupations typically involve the performance of simple and routine physical or manual tasks.
Skill Level 2: Occupations typically involve the performance of tasks such as operating machinery and electronic equipment; driving vehicles; maintenance and repair of electrical and mechanical equipment: and manipulation, ordering and storage of information.
Skill Level 3: Occupations typically involve the performance of complex technical and practical tasks that require and extensive body of factual, technical and procedural knowledge in a specialised field.
Skill Level 4: Occupations typically involve the performance of tasks that require complex problem-solving, decision-making and creativity based on an extensive body of theoretical and factual knowledge in a specialised field.

Table 1: Coding of vertical matching

ISCO 88 major group	ISCO skill levels	ISCED 97
1. Legislators, Senior Officials and Managers	3, 4	5b, **5a**, 6
2. Professionals	4	**5a**, 6
3. Technicians and Associate Professionals	3	**3, 4,** 5b
4. Clerks	2	2, **3, 4**
5. Service Workers and Shop and Market Sales Workers	2	2, **3, 4**
6. Skilled Agricultural and Fishery Workers	2	2, **3, 4**
7. Craft and Related Trades Workers	2	2, **3, 4**
8. Plant and Machine Operators and Assemblers	2	2, **3, 4**
9. Elementary Occupations	1	1
0. Armed Forces	1, 2, 4	1, 2, 3, 4, 5a, 6

HE = ISCED 5a; VET = ISCED 3 + ISCED 4
Source: Modified version of Table 1 and Table 2 from ILO (2012, p. 14)

Horizontal match

The *horizontal match* is also measured objectively, by comparing the field of study with the tasks performed in occupations. Occupations are coded using the three-digit ISCO 88[52] classification, providing a detailed skill differentiation, already described in the previous section.

The field of education is coded by the ISCED-F 1997 classification. ISCED-F 1997 is a hierarchical system for classifying fields, allowing the differentiation of up to three-digit coding[53] (Unesco, 1997; Andersson & Olsson, 1999). However, the LFS data offers only one-digit coding for all countries, providing a crude classification of educational fields. This limitation might result in generalisations when adjusting educational fields to occupational skills.[54] However, one-digit coding of educational fields is commonly used

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[52] The 10 major groups are further differentiated by 28 sub-major groups, 116 minor groups, and 390 unit groups, e.g. 2 "Professionals" → 22 "Life science and health professionals" → 222 "Health professionals" → 2221 "Medical doctors". For the entire structure, see
https://ec.europa.eu/eurostat/documents/1978984/6037342/ISCO-88-COM.pdf)
[53] There are 9 "broad fields" (one-digit), 25 "fields of education" (two-digit) and 65 "fields of training" (three-digit) (e.g. 3. Social Sciences, Business and Law; 34 Business and Administration; 342 Marketing and Advertising).
[54] This might be particularly the case for the bigger field groups such as 'social sciences, business and law' or 'Engineering, manufacturing and construction'.

for the operationalisation of horizontal matching within comparative transition research (Kivinen & Nurmi, 2003; Wolbers, 2003; Leuze, 2010; Levels et al., 2014; for a literature overview, see Somers et al., 2016). This is the only possible operationalisation for horizontal matching since the LFS data does not entail a subjective assessment of a horizontal match. However, self-assessment measures are less reliable than objective approaches ('job analysis'), even crude ones. The subjective indicators deliver higher incidences of horizontal mismatch or are driven by the popularity of fields of study (Sellami et al., 2018).

This research applies the objective operationalisation of the horizontal match proposed by Wolbers (2003), further adjusted by Levels et al. (2014). The latter study complements Wolbers (2003) classification by additionally proposing occupational matching for general programmes (Table 2). Applying a nearly identical coding ensures comparability with these two studies, which reveal a negative effect of specificity on horizontal matching, as shown in the literature review.

Table 2: Coding of horizontal matching

Field of study (ISCED97)	Field of education (ISCO88)
General	100 110 111 114 121 130 131 247 344 400 410 413 414 419-422 511-513 520-522
Education	200 230-235 300 330-334
Humanities and arts	200 230-232 243 245 246 300 347 348 414 500 520-522
Social sciences, business and law	100 110 111 114 120-123 130 131 200 230-232 240-245 247 300 340-344 346 400 401-422 511 520 522 910 911
Sciences	200 210-214 221 300 310-313 321 421
Engineering, manufacturing, construction	200 210 213 214 300 310-315 700 710-714 720-724 730-734 740-744 800 810-817 820-829 831-834 930-932
Agriculture	200 221 222 300 321 322 600 610-615 741 800 827 833 900 920 921
Health/welfare	200 220-223 244 300 320-323 330 332 346 500 510 513 900 920 913
Services	300 315 345 347 400 410-419 420-422 500 510-514 516 520 522 800 830-834 900 910 912 913 914 915 916 933

Source: Wolbers (2003), complemented by Levels et al. (2014) for coding of general programmes

4.2.1.3 Dependent variable

This study applies a dependent variable combining both vertical matching and horizontal matching in order to provide a more differentiated matching coding.

First, it allows us to identify the full match representing the fit of both level and field of education, being the highest outcome related to education as opposed to full mismatch. Second, this combination allows a stronger differentiation of matching in different labour market sectors addressed by the hypotheses. On the one hand, it reveals whether field of education is related to job in the 'right' or 'wrong' labour market sector (full match or mere horizontal match, respectively). On the other, if reveals whether the job is acquired in the right sector but the wrong field (mere vertical match). This allows a more detailed analysis of job quality and a better differentiation of the matching within particular labour market sectors. Alternative labour market outcomes such as earnings or occupational status show only vertical differentiation and would not allow us to classify the role of vocational specificity affecting the horizontal match. Other outcomes such as speed of entry and the employment or unemployment length are less suitable since they do not relate to labour market sectors and – as described in chapter 2.5 – partly depend on labour market institutions.

The four matching categories are as follows:

1. Full match (field-related occupation in the 'right' sector[55])
2. Mere horizontal match (field-related occupation in the 'wrong' sector[56])
3. Mere vertical match (non-field-related occupation in the 'right' sector)
4. Full mismatch (non-field-related occupation in the 'wrong' sector)

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[55] VET in the technical segment, HE in the high-skill segment.
[56] VET in the high-skill or low skill segment, HE in the technical segment.

The hypotheses address the institutional effects on the chances of matching (either full match, mere horizontal or mere vertical match) compared to full mismatch. The full mismatch is a convenient reference category since institutional settings might enhance the chances for matching as opposed to the risk of a mismatch.[57]

The reference category, mismatch, is defined as working in a non-field-related job outside of the 'right' sector. While the mismatch for highly educated represents overeducation (working in the technical sector), the mismatch of VET graduates implies both overeducation (working in the low-skill sector) and undereducation (working in the high-skill sector). Hence, a mismatch for VET also implies advantageous outcomes, such as working in the high-skill sector, although not a field related one. However, coding mismatch as employment in the low skilled sector ('overeducation') for VET is less convenient. It would not allow to identify field related jobs in the high-skill sector of VET necessary for testing Hypotheses 1.3 and 4.3. That is why the full mismatch defined as working outside of the technical sector is considered as the reference category. Robustness checks considering alternative coding of matching for VET show similar results to those, which will be presented in the analytical chapter (5.2) (see Figure 25 and Figure 26 in the appendix).

4.2.2 Institutional characteristics
4.2.2.1 Selectivity of higher education
One of the contributions of this thesis is considering the institutional characteristics of both educational stages. As elaborated in the theoretical chapter, selectivity reflects the

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[57] Using all other categories as a reference category, for example 'full match' (ref. 'mere horizontal' + 'mere vertical match' + 'full mismatch'), is less convenient since institutions might positively affect both the main category and one of the reference categories. E.g. as assumed within Hypothesis 3, higher vocational specificity is supposed to have a positive effect on a 'full match' (H 3.1) and on a 'mere vertical match' (H3.2) for VET graduates. When using the underlined coding in this footnote, the positive effect of specificity on 'full match' might be offset by the positive effect on the 'mere vertical match' included in the reference category. Mismatch is thus a more convenient reference category since it is conversely affected by stronger institutions as the matching categories.

threshold between secondary and tertiary education stages. In order to operationalise this theoretical construct, the selectivity of HE stage is measured by comparing the size of both educational stages:

Selectivity = VET graduation rates – HE graduation rates

Since countries vary by population, the size of both stages is represented by graduation rates. It is defined as the share of a graduate group of the population with at least upper secondary education (ISCED 3a+b, ISCED 4a+b, ISCED 5 a+b).[58] The numbers of graduates are derived from the Eurostat database[59] for the years 1998–2009. This allows us to use time-varying indicators for the characteristics of the education system.

As indicated in the formula above, selectivity compares the size of both stages by subtracting the HE graduation rate from VET graduation rate for each country and year. Negative values represent a less selective HE system while positive values stand for more selective ones, since fewer graduates finish tertiary education compared to the VET stage.

Considering a subtraction of graduation rates is more convenient than using a quotient, although a quotient is closer to the definition of the threshold between two stages – for example: selectivity = number of tertiary educated / number of secondary educated. However, this quotient does not result in a ratio scale: in countries with fewer

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[58] The shares of both stages are computed as follows:
VET graduation rates = (ISCED 3b + ISCED 4b) / (ISCED 3a + ISCED 3b + ISCED 4a + ISCED 4b + ISCED 5b + ISCED5a)
HE graduation rates = ISCED 5a / (ISCED 3a + ISCED 3b + ISCED 4a + ISCED 4b + ISCED 5b + ISCED 5a)
The denominator is restricted to the group with at least upper secondary education (ISCED3-5) instead of taking the population of all educational levels (ISCED 0-ISCED 6) into account. This represents the theoretical definition of selectivity: selectivity stands for the threshold between secondary and tertiary stage and only graduates allowed to enter higher education should be considered in the denominator (min. upper secondary). This is why the educational graduates of lower stages are excluded from the denominator.
The secondary stage is represented solely by VET graduates, instead of considering all those who have had secondary education. This operationalisation is closer to the perception of employers. They compare the different numbers of graduate groups such as VET or HE applying for their jobs rather than being aware of official transition rates from secondary to tertiary education provided by statistical publications.
[59]https://ec.europa.eu/eurostat/de/data/database?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_nPqeVbPXRmWQ&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=2

tertiary than secondary graduates, the values of the quotient would distribute across a smaller range (between 0 and 1) than in countries with more tertiary than secondary graduates (between 1 and infinity). The effect of selectivity on the first group of countries (between 0 and 1) would be thus underestimated, while the effect of the latter one would be overestimated. A possible solution to this problem might be a logarithmic quotient. However, logarithmic quotients do not give an intuitive interpretation and would limit the understanding of country-specific selectivity described in the empirical chapter of this thesis. The operationalisation of selectivity is thus defined by a subtraction of graduation rates, allowing an intuitive interpretation.

This construct is derived from the concept of stratification, mostly measured by tertiary graduation rates (with low rates representing high stratification). Since tertiary graduation rates form a major part of selectivity, both indicators are adversely related: the lower the tertiary graduation rates, the higher is the selectivity of tertiary graduation. However, selectivity is a more valid construct than tertiary graduation rates. As shown by the example of Italy, low tertiary rates do not necessary stand for high stratification but can result from high dropout rates. Selectivity avoids this measurement error because it considers the relation between tertiary and secondary rates. Tracking is another part of stratification but rather addresses the horizontal differentiation within a particular educational stage and would be less convenient for describing why the level of education is driven by horizontal differentiation.

4.2.2.2 Vocational specificity of both educational stages

Furthermore, specificity takes into account the characteristics of both educational stages. As elaborated in the theoretical chapter, specificity is defined as the difference of vocational orientation between VET and HE programmes. In order to operationalise this theoretical construct, the specificity shares of both stages are compared:

Specificity VET (vs. HE) = specificity within VET − specificity within HE

A subtraction is chosen over a quotient for the reasons described in the previous chapter. For each educational stage, vocational specificity is defined by the share of graduates of specific programmes within this stage. In particular, specificity is measured as the share of the graduates of *specific field of education* within an educational stage.[60] The definition of general versus vocational fields of education is based on the division proposed by Noelke et al. (2012). This classification is theoretically derived from studies that identify fields of education providing either vocational or general skills (Van de Werfhorst, 2002; Autor et al., 2003). Based on these studies, Noelke et al. (2012) classify fields of education into academic, vocational and professional. In this thesis, vocational and professional fields are put into one group, as opposed to academic. This allows a binary coding of specificity, one relevant for calculating the share of specific fields within a stage.

This results in the following classification of fields:

- Fields classified as **vocational** are: Business, computer science, engineering, manufacturing, services, agriculture, health, veterinary, law, teaching, architecture.

- Fields classified as **academic** are: Natural sciences, mathematics, social sciences, journalism, arts/humanities, educational science (Noelke et al., 2012, p. 3).[61]

The numbers of graduates in particular field of education for each stage are derived from the Eurostat database for the years 1998–2009. This allows the use of time-varying indicators for vocational specificity.

Transition research mostly used school-type vs. apprenticeship type indicators. However, this indicator is suitable for secondary and less for tertiary education. With regard to tertiary education, the share of universities of applied sciences as opposed to classical

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[60] Specificity within HE: graduates from specific fields in ISCED5a / all ISCED5a graduates;
Specificity within VET: graduates from specific fields in ISCED34b / all ISCED34b graduates.
[61] The study of Noelke et al. (2012) emphasises that this field division is applicable for operationalising the vocational specificity of the tertiary education stage, which is less considered in research, as shown in the literature review. Additionally, a higher share of specific fields within tertiary education might form a proxy for applied universities offering vocationally oriented education.

universities might be an equivalent. However, these indicators are not available for a broad country sample and – more importantly – would not provide identical operationalisations as for the VET stage (school type vs. apprenticeship type). A more convenient indicator would be the share of students with work experience during education, often used in secondary education research (apprenticeship type or `dual system`). I derived this information from the LFS data. In a question from the ad hoc module, 2009 respondents could indicate whether they gained work experience during education. I aggregated this information on the country level for both VET and HE graduates, which allows us to use the same indicator for both groups. However, this coding only shows frequencies of graduates reporting any work experience and does not provide information on the extent of this experience (e.g. hours during a week), nor allow us to differentiate whether this experience was part of educational programmes or gained outside of it. It additionally considered the information collected in 2009 as opposed to time varying indicators presented above. Due to these limitations, the results using this alternative coding are only reported as robustness checks. For country patterns and multivariate results using work experience see Figure 27, Figure 28 and Figure 29 in the appendix. These robustness checks show similar findings compared to the main findings described in the analytical chapter (5.2.3).

4.2.3 Occupational closure

The closure of occupations is operationalised by using the *multigroup segregation measure based on the concept of entropy* (introduced by Henri Theil & Finizza, 1971; Henry Theil, 1972; extended by Reardon & Firebaugh, 2002; for a comparison with other decomposable segregation indices, see Mora & Ruiz-Castillo, 2011; for a non-technical understanding of the concept, see DiPrete et al., 2017). In this thesis, this measure reveals

the extent to which workers in a given occupation have similar educational degrees (DiPrete et al., 2017, p. 1884).[62] The following formula is applied:

$$M(occ)_j = \sum_j p_{j|g} \log (p_{j|g} / p_j)$$

where $p_{j|g}$ is the conditional probability of being in the educational group j, given that one is working in occupation g, and p_j is the unconditional probability of being in educational group j (DiPrete et al., 2017, p. 1920). This essentially compares the educational distribution within an occupation with the educational distribution in general. In other words, it compares for each occupation the chances for different educational groups of being employed in this occupation. Similar chances result in low scores, while different chances result in high scores (for further details of using the formula, see appendix A). This allows us to describe how occupations consist of either one particular or rather different educational group(s). The higher the score, the more strongly an occupation clusters workers with similar degrees, and hence the higher the occupations closure by degrees. The values range within [0; ∞].

This measure is aggregated from the weighted LFS data and applied for occupations within each country.[63] Occupations are defined by major groups of ISCO88, allowing us to identify technical and high-skill occupations. Using the one digit ISCO coding is most suitable because it clearly addresses a vertical differentiation of occupations and thus allows a distinction between technical and high skill sectors. Other digit coding mixes vertical and horizontal differentiation and is less suitable for this operationalisation.

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[62] 'Entropy measures are based on the amount of additional information one gains about an outcome by knowing a particular characteristic of the individual' (DiPrete et al., 2017, p. 1919). In this study, the interest is in the gain in information about an individual's occupation that comes from knowing that person's educational history.

[63] The considered number of graduates within each occupation (ISCO1-9) was larger than 70 in order to avoid a sparseness bias. Most of the occupations clearly exceeded this threshold (on average 100–400 but also 2,000 or even 4,000), except for smaller occupations such as ISCO 1, ISCO 6 and partly ISCO 8 and ISCO 9. That is why these occupations will be considered less within the descriptions in the descriptive chapter of this thesis. Iceland shows low case numbers in all occupations, hence offering a limited basis for interpretations.

Clustering of secondary and tertiary graduates is considered. I do not limit both educational levels to VET graduates and HE graduates (ISCED 5a) only. The generally educated within the secondary (ISCED 3a) and short-cycle ISCED 5b within the tertiary level are also considered, since they match one of the sectors as well.

Lower educational groups are excluded because they do not appear in the high-skill sector, while they dominate in the technical sector (ISCO6-8). This might underestimate the closure of the technical sector and overestimate the closure of the high-skill sector.

In sum, a higher score of an occupation (ISCO major group) represents a higher closure by degrees.[64] This measure will be used in order to identify the closure of labour market sectors within countries in the descriptive chapter and for robustness checks for testing the assumed mechanism of the closure of occupations (see appendix C).

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[64] Although the measure does not provide information on which educational group dominates in each occupation, additional analyses reveal that the closure of occupations is in line with the assumed matching of occupations with degrees: the higher values of high-skill jobs (ISCO 1 until 3) stand for dominance of HE degrees, while the higher values of technical jobs (ISCO 4 until 9) stand for stronger clustering of secondary degrees.

4.2.4 Control variables and sample

Country sample

The sample includes 28 European countries: Austria (AT), Belgium (BE), Bulgaria (BG), Switzerland (CH), Cyprus (CY), the Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Iceland (IS), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI) and Slovakia (SK). Norway is excluded because it does not offer the information on graduation year necessary for merging the indicators for institutional settings, varying by years. The UK is also excluded due to the lack of macro indicators for field specificity. The sample includes very small countries such as Iceland, Malta and Luxembourg. A smaller country size might be related to a different mechanism within the job placement process where the link between labour market and education system might be stronger due to closeness on the regional level. This is considered as well within the sensitivity checks run by excluding each country.

Data for Switzerland did not entail information about the first job; hence for the Swiss sample of 15–35-year-olds, information on the current job was considered. It is assumed that the current situation might be similar to the first job particularly in Switzerland, due to very low job mobility in German-speaking countries within the first 5 or 10 years after graduation (Gangl, 2003a; Verhaest et al., 2017).

On the individual level, the sample consists of 15–34-years-old HE and VET graduates who graduated between 1998 and 2009. This time span is limited by the macro indicators available from 1998. The sample excludes those who are self-employed or found work via family and friends in order to eliminate job-finding mechanisms that differ from educational signalling, for example social capital (Granovetter, 1973).

This results in a sample of 28 European countries and ca. 41 500 relevant cases.

Control variables

All regression models control for individual characteristics such as field of study, work during study, job change since first job, gender, age, duration of stay in country (migration), marital status, parents' educational level.

The models include also control for variables on the country level. In order to control for factors related to the labour market, GDP change and unemployment rate are considered as proxies for new vacancies. Additionally, the size of labour market sectors (ISCO major groups) is considered since the demand side is a crucial factor in shaping job opportunities. Indicators for labour market institutions such as Employment Protection Legislation (EPL) or Income Sustaining Policies are not taken into account since they might correlate with educational institutions and offset their effects. Additionally, the rate of low educated population (lower than ISCED3) is also considered as a control variable, in order to account for the size of lower educational stages.

All macro variables are available for the years 1998 and 2009 (sources: Eurostat[65] and OECD[66]), providing time-varying indicators within countries.

Sample composition

In the following, a brief description of the sample composition regarding control variables within highly and less selective systems and within systems with different specificity is provided. The higher selective systems form the biggest part of the sample (31 285), indicating that in most countries the tertiary education stage is smaller than the secondary one (

Table **3**). Regarding specificity, as expected, in most countries, the VET stage is more specific than the HE stage. Since there are barely countries with a lower specificity of the VET stage compared to the HE stage, they are divided into systems with clearly higher specificity of the VET stage over the HE stage ('specificity VET > HE') and systems with comparable specificity of both stages ('specificity VET = HE').

Table 3: Sample composition (in %)

	High selective	Low selective	Specificity VET (>HE)	Specificity VET (=HE)
Dependent variable				
full match	60.5	50.9	55.0	62.3
mere vertical	16.4	14.9	17.5	14.1
mere horizontal	14.0	20.0	16.3	14.4
mismatch	9.1	14.2	11.2	9.2
Field of edu.				
General progr.	0.7	1.3	0.6	1.1
Education	5.2	9.6	5.7	7.0
Humanities & arts	5.2	6.6	5.1	6.1
Soc. science, busin. & law	28.5	27.3	28.5	27.9
Science	5.1	8.0	5.5	6.2
Engineering	30.2	24.3	29.5	27.8
Agriculture	3.0	2.6	3.4	2.3
Health	10.7	11.4	10.3	11.5
Services	11.3	9.0	11.3	10.0
Working exp.	64.4	49.8	59.1	63.1
Still in first job	50.3	48.5	51.4	48.0
Sociodem.				
Parents' tertiary educ.	24.9	28.6	24.8	27.0
Female	50.6	55.2	50.8	52.7
Migrant	7.6	5.2	3.9	11.0
Married	27.9	24.6	29.3	24.4
Age				
15–19	16.4	13.5	24.7	12.3
20–24	35.4	44.1	37.6	36.8
25–29	39.2	38.8	31.5	42.2
30–34	9.0	3.7	6.1	8.7
MACRO				
high skill sector	21.6	21.8	21.7	21.6
unempl.	7.2	8.9	8.2	6.9
GDP	3.0	3.6	3.0	3.3
low educ.	18.5	22.5	18.7	20.3
total	31 285	10 137	23 377	18 045
total sample	41 422		41 422	

Calculations based on LFS data 2009

Regarding the dependent variable, in the four presented clusters, the most common outcome is the full match, where at least half of the graduate sample has a job related to both level and field of education (full match: 50%–62%), whereas a clear minority has a job not related to education at all (mismatch: 9%–14%, see Table 3).

In between are graduates with a mere horizontal match or mere vertical match, varying between 14% and 20%. Looking at the differences between the country clusters, in highly selective systems the full match takes place more often than in less selective ones. Surprisingly, in systems where both stages are similarly specific the outcomes are also advantageous, whereas the full match is lower in systems with higher VET specificity (over HE specificity). In the first group, both stages of the secondary and the tertiary education are perhaps highly specific, leading to higher outcomes than in the latter one, which has a more general focus of tertiary education compared to secondary education. How both stages differ in specificity and how both educational groups differ in matching will be further addressed in the descriptive section of the following chapter.

Regarding the field of education, the samples of the four groups rather show similar composition; with the biggest groups such as social science, business and law and engineering, on the one hand, and agriculture, humanities and arts, and especially general programmes, on the other. Additionally, in all clusters at least half of the sample has experienced working during education, more so in highly selective systems and in countries with comparable specificity of both stages. Also, around the half of the sample is still working in the first job, indicating a stable career for young graduates. Regarding the sociodemographic composition, the sample of the four groups does not differ strongly. The same applies to the macro characteristics of the labour market. All four groups show almost identical high-skill demand, comparable unemployment rates, GDP change and shares of low educated. Although the number of individual variables is limited, these descriptions do not reveal strong composition differences between the demonstrated groups.

4.3 Empirical methodology

4.3.1 Logistic regression

Since the dependent variables of this study are coded as binary (matching vs. mismatching)[67], this chapter describes regression models for dichotomous dependent variables.

Logistic regression models compute the probability of an event or outcome which may either apply or not apply by using a logistic function.[68] They assume a linear latent (unobservable) variable y* which constitutes the probability for this event to occur and which is linearly related to the independent variables. The binary dependent variable y switches from 0 to 1 when the latent variable crosses a particular threshold (set at 0 by default).

These characteristics of logistic regression models – unlike the linear regression models – are associated with two main problems. First, the coefficients of these models (log-odds or odds ratios) do not provide an intuitive interpretation of the magnitude of the effect due to the nonlinear character of the logistic function. Second, the comparability of coefficients between models is limited (see Mood, 2010, p. 67). This is associated with the latent variable; since its variance is unobservable, it is fixed by default. This, in turn, limits the comparability of the total variance between models because its scale changes with additional covariates. The research refers to this limitation as the problem of *unobserved heterogeneity*.

One viable solution for these two limitations is to apply linear probability models (LPMs), which model linear effects on binary dependent variables (Wooldridge, 2013). It thus has the advantages of linear regression models, avoiding the problem of unobserved heterogeneity. Another solution to this problem is the computation of average marginal

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[67] The results of this study are based on *binomial* multilevel analyses because *multinomial* regression analyses with cross level interaction terms for a sample of 28 cases on the higher level and ca. 41 500 on the individual level are very complex and exceed reasonable analysis duration with stata 14. Sensitivity checks with multinomial logistic regression using the function 'cluster' reveal comparable results to the ones of the binomial multilevel analyses presented in this study.

[68] $\mathrm{Ln}\left[\dfrac{P}{1-P}\right] = a + x_{1i}b_1$ (Mood, 2010, p. 68)

effects (AMEs) rather than reporting coefficients. When applying AMEs, the effect for each observation is computed and this product is averaged over all observations. This average over all observations standardises the variance and solves the problem of unobserved heterogeneity, allowing reliable comparability across models (Mood, 2010, p. 78[69]). Both LPM and AMEs provide a suitable solution for the problem of unobserved heterogeneity. Additionally, both describe an intuitive magnitude of the effect by expressing it in percentage points. Despite these advantages, both AMEs and LPMs yield only one single estimate per coefficient and thus do not acknowledge the nonlinear shape of the relation. This can lead to values outside the feasible probability range of 0 and 1 (Mood, 2010, p. 78). However, this is of less concern 'if we are only interested in sign and significance of an (average) effect and not in the non-linearity of the relation per se' (Mood, 2010, p. 78).

Despite these limitations, LPMs and AMEs have become established in social science research in the last decade, as they provide a suitable alternative to report the common coefficients from the logistic regression models. This study applies LPMs since they provide similar estimations to AMEs and do not require logistic models as an intermediate step. 'AME and LPM coefficients are identical or as good as identical [...] and deriving AME from logistic regression is just a complicated detour' (Mood, 2010, p. 78). That is why the following section describing the multi-level model method implies a metric-dependent variable.

4.3.2 Multilevel models

The application of multilevel modelling has gained much attention within comparative research in the last decade. Multilevel modelling is designed to analyse data with hierarchical structures (Snijders & Bosker, 2012). These structures arise when observations are grouped into higher level units, such as individuals in households,

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[69] Several simulation studies show, that even under extreme conditions AMEs yield reliable values (Auspurg & Hinz, 2011; Best & Wolf, 2012).

schools or countries, etc. (for examples of non-hierarchical structures, see Rasbash, 2008). The underlying assumption of these structures is that individuals nested in a group tend to be more alike than individuals of another group. By ignoring the nested structure in data, the standard errors of the regression coefficients may be underestimated. Multilevel models not only correct standard error, they also allow us to account for variation among and between groups and, thus, for collinearity among residuals.

Since the focus of this study is the institutional effect of education systems at the country level on outcomes on the individual level, the central assumption of this study is that individuals from the same country are more similar than individuals from different countries. This might be driven by similar economic, political or societal circumstances affecting individuals within countries in a comparable way.

In order to model institutional effects on different educational groups (VET and HE) within countries, this study applies random slope multilevel models, being a central pre-condition for modelling cross-level interactions (institutions x indiv. education). Random slope models allow a variation of slopes and assume a different association between y and x between countries[70] (Steele, 2008).

I thus estimate the random slope for individual educational characteristics and the institutional settings at the country-level. The equation for a random slope regression model is described in detail, considering the two-level structure.

$$y_{ij} = \beta_0 + \beta_1 x_{1ij} + \beta_2 x_{2j} + \beta_3 x_{1ij} * x_{2j} + u_{0j} + u_{1j} x_{1ij} + e_{ij}$$

The subscript i indicates individuals, while j indicates countries, where y_{ij} is the dependent variable for matching (ref. mismatch) and β_0 is the grand mean standing for the average intercept of all countries. β_1 is the effect of individual characteristics such as education ('the within-group coefficient'). β_2 is the effect of the institutional variable x_{2j} (e.g. selectivity or specificity) that is additional to the effect of the individual independent

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[70] It also allows variation of intercepts, which are assumed to be specific to a country.

variable (Steele, 2008, p. 36). The cross-level interaction factor $x_{1ij} * x_{2j}$ models the effect of the educational variable by the value of an institutional variable. β_3 thus reveals the effect of institutional settings on educational returns of VET and HE graduates in a direct comparison and is a central component of this study.

Next to this fixed part, the random part forms the level specific residuals u_{0j}, u_{1j} and e_{ij}. The country-level residuals u_{0j} and u_{1j} and the individual residuals e_{ij} are assumed to follow a normal distribution with a mean of 0. A characteristic of the random slope is the u_{1j} x_{1ij} showing the interaction between country characteristics and individual independent variables; the 1 in u_{1j} indicates that the slope of variable x_1 is random.

A central descriptive statistic for multilevel models is the *intra-class correlation coefficient* (ICC; also known as variance partition coefficient VPC) which is derived by calculating the share of the variance of a certain level (e.g. country) from the total variance (random part). The total variance in this study consists of two components: the between group variance addressing the difference *between* countries; and the within-group variance addressing differences *within* countries. The intra-class correlation coefficient puts the between-group variance in relation to the total variance and measures the proportion of the total variance that is due to differences between countries (Steele, 2008, p. 8). The ICC ranges from 0 (=no *between* country differences) to 1 (=no *within* country differences; all individuals in a group have the same y value).

5. The transition from vocational and higher education to work

This chapter builds on the previous ones and examines the institutional effects on the matching of the higher and the vocationally educated as related to their first job. It is divided into a descriptive sub-section and an analytical multivariate one. The descriptive section (5.1) addresses country patterns on three levels: the individual, the occupational and the institutional. On the micro level, the labour market outcomes are addressed for both groups within the country sample. This short review allows us to verify the identified country patterns in comparative transition research described in the literature review of this thesis. Since the literature review is based on different studies addressing different country samples, reflecting different measurement time points or operationalisations, this sub-section allows us briefly to review whether these country patterns appear when using the same data and the same definitions. Additionally, Eastern Europe will be considered in a direct comparison with Western European societies, which so far have been described separately.

Second, it allows us to describe the labour market outcomes of both educational groups at the same time. This has been so far barely offered within this research stream since it focuses on both groups separately and studies addressing different groups within countries barely provide descriptions. After giving this brief review of labour market outcomes, the meso level will be introduced by describing the closure of occupations. This rather new perspective on occupations within transition research provides interesting findings about different closure of labour market sectors in general and its country-specific variation in particular. In the third step, the institutional settings of countries will be described by introducing the country characteristics of both selectivity and specificity of education. This offers a review of a wide country sample of institutional settings considering both educational stages. These three levels will be descriptively linked with each other, revealing possible associations between the macro, the meso and the micro levels.

These associations will be empirically tested in the multivariate sub-section of this chapter (5.2).

5.1 Descriptive results: country patterns

5.1.1 Labour market outcomes

This chapter gives a brief overview of the matching shares for both groups within European countries. The findings are focusing on describing the vertical match because this outcome is explicitly associated with the closure of labour market sectors. This is central for comparing the distribution of vertical matching with the closure of occupations addressed in the following section. Next to vertical match, occupational status is described as well. Although the latter outcome is not part of this study, it reveals interesting findings in comparison with vertical matching. Further outcomes such as the full match are presented in appendix B since they show comparable country patterns to vertical matching. This sketches very generalised country patterns, bearing in mind that the complexity of countries cannot be illustrated by particular labour market outcomes.

Before addressing the country patterns in matching of both groups, general findings applicable for all countries are discussed.

Whereas in all countries university graduates have a higher occupational status than VET graduates (Figure 11), this is the other way around when considering matching (Figure 12). Surprisingly, in all countries HE graduates have a job that corresponds to their educational level less often than VET graduates. On average, 90% of VET graduates work in the technical sector but only 57% of HE graduates work in the high-skill sector. In short, university graduates are more often employed outside the 'right' sector than VET graduates. This might be related to the lower labour market demand for university graduates. In all countries, the technical sector is bigger than the high-skill sector and this might explain the higher matching for VET compared to HE graduates (Figure 10). Technical jobs accommodate more than half of the total labour force, varying from 56% in Luxembourg to 75% in Romania or 77% in the Czech Republic (Figure 10). The numbers

are clearly lower for high-skill jobs, which barely account for a third of the labour force: from the lowest, 12% in Romania, to the highest, 36% in Luxembourg. The technical sector is clearly larger than the high-skill sector. Low-skill jobs form a very small sector, smaller even than the high-skill sector (on average, 10% of the total labour force).

Figure 10: Labour market demand: high-skill and technical sectors
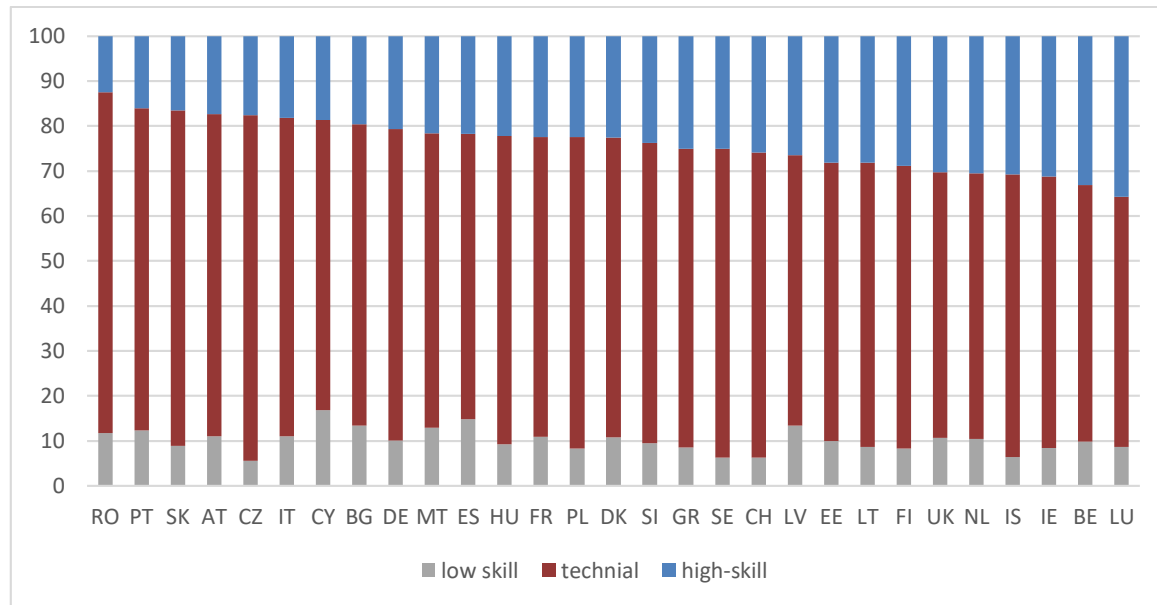
Total employment by occupation in 2009;
high-skill sector (ISCO 1+2), technical sector (ISCO 3-8), low-skill sector (ISCO 9)
Source: Calculations based on data from OECD.stat

In sum, this short description of labour market sectors reveals that the higher matching of VET graduates is clearly related to the higher demand for them in the labour market. The labour market does not provide enough jobs designed for university graduates, forcing some of them to work in the technical sector. In short, this explains why university graduates less often have a job that relates to their educational level than VET graduates. On the other hand, university graduates have, on average, a higher occupational status than VET graduates. This indicates that they work in the high-skill sector or in jobs with higher occupational status within the technical sector. However, although they have a higher occupational status, the cost in investment in education pays off less than for VET graduates because more university graduates are overeducated.

Apart from the lower share in the vertical matching of university graduates, the graphs also reveal a different variation of both educational groups. Both figures regarding ISEI and vertical matching reveal a higher variation between countries for HE than for VET outcomes. This is especially the case when regarding matching (Figure 12). Whereas the shares of vertical matching for VET graduates vary only between 81% (IS) and 97% (LU), the variation of HE shares is more pronounced: 39% (IT) to 87% (LU). This indicates that the gap between both groups in matching is more strongly driven by the variation of outcomes of the highly educated than by VET outcomes.

This gives new insights from a within-country perspective. HE graduates have less often a job that corresponds to their educational level, as compared to VET graduates. Additionally, VET outcomes vary less than HE outcomes, suggesting that the gap between both groups is more strongly driven by HE outcomes than by VET outcomes. Besides these two general findings, the following sections address labour market outcomes for particular country groups.

Figure 11: Occupational status of first job (ISEI)

Average ISEI (16-90)
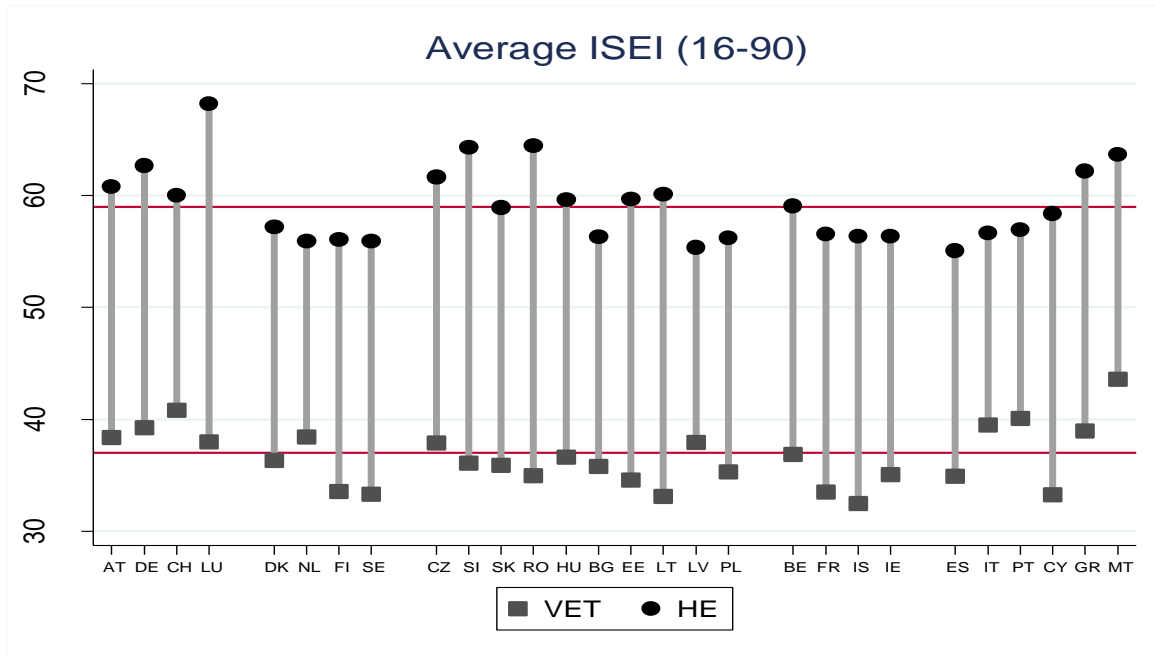
Data: calculations based on LFS data 2009 of the 15-35-year-old graduates

Figure 12: The match between educational level and occupational status in first job

Vertical match (%)
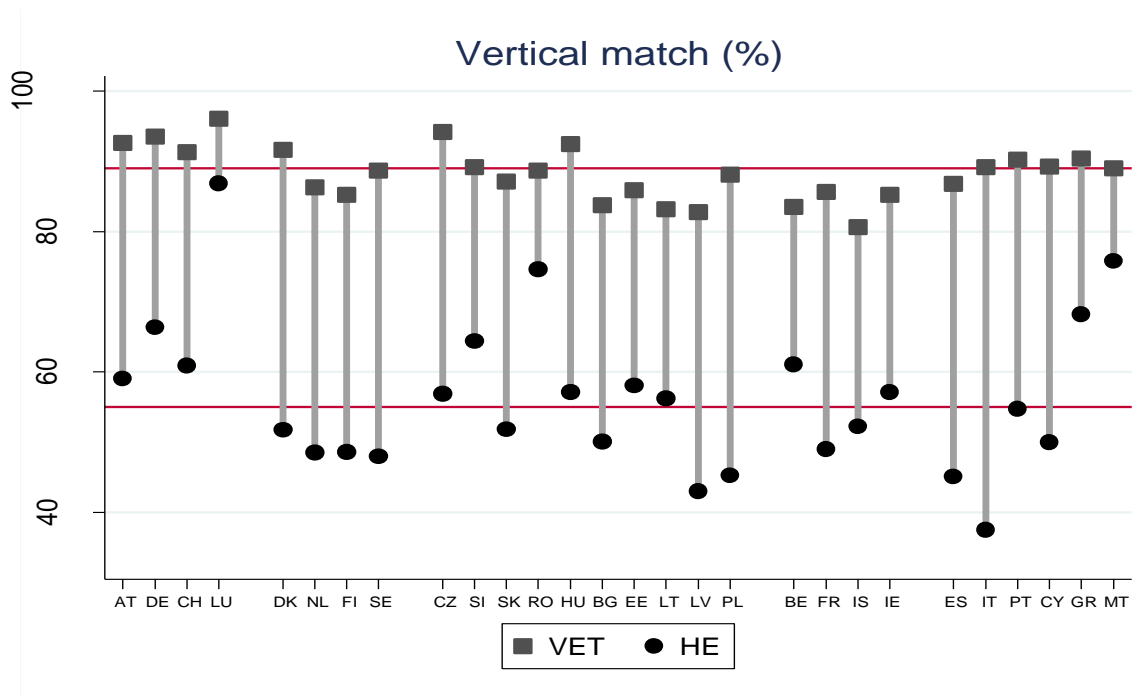
Data: calculations based on LFS data 2009 of the 15–35-year-old graduates

Country patterns

The literature review identified country patterns along a continuum of transition regimes. At the one extreme are German-speaking countries showing advantageous transition patterns; at the other extreme is Southern Europe with strongly turbulent ones. In between are Nordic and South-Eastern countries closer to the German model, while Western European and Baltic countries tend towards Southern Europe. This country order is applied in the descriptive figures of this study. Before describing country-specific labour market outcomes, a brief introduction of the members within the country groups is needed. Looking at Figure 12, on the left side are German-speaking countries (AT, DE, CH, including Luxembourg). Next to this group are Nordic countries, in research often represented by Finland and Sweden, but also by the Netherlands and Denmark. Next to Nordic countries is the heterogeneous Eastern European country group, applying the country order identified within the literature review about former Soviet countries. This starts with South-Eastern, predominantly landlocked countries such as the Czech Republic, Slovakia, Hungary and Slovenia[71], on the one hand, showing higher outcomes and countries around the Baltic Sea (including Poland) on the other, showing lower outcomes then their neighbours. Next to the Eastern European group is placed Western Europe, consisting of Ireland, Belgium, France and Iceland. The latter country is considered within the Western European group due to similar institutional settings described in this study (selectivity and specificity; see the following chapters). On the right extreme is Southern Europe, including bigger countries such as Spain, Italy or Portugal and Greece, which have been more strongly considered in research so far, as well as their smaller neighbours Malta and Cyprus.

The continuum of these countries identified within comparative research is mainly confirmed by the shares of vertical matching (Figure 12). In German-speaking countries, the shares of both VET and HE graduates are the highest in Europe. On the other hand, Southern and Western Europe shows the opposite pattern. The shares of both groups are

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[71] Slovenia is not entirely a landlocked country but since it resembles this country group in labour market outcomes and institutional settings it will be referred as member of the landlocked group.

mostly beneath the European average (except GR and MT, BE and partly IE for VET), although this applies less for VET in Southern Europe, which has more or less average outcomes. However, the shares of VET do not vary much between countries in general. Eastern Europe also shows a familiar pattern. It is a heterogeneous group, being divided into Southern countries such as the Czech Republic or Slovenia and Romania, which have advantageous outcomes, and the Baltic countries, which have lower ones. In contrast to the findings of the literature review, the Nordic countries reveal outcomes below the average, especially for the highly educated. Their expansive educational system might be less compensated for by higher demand in the high-skill sector than is suggested in the literature review.

Next to vertical matching, the country continuum is confirmed when referring to occupational status (Figure 11). There are advantageous outcomes in German-speaking countries and South-Eastern Europe (CZ, SI or RO), on the one hand, in contrast to Southern[72], Western, Baltic and to some extent Nordic countries, on the other. Similar patterns are shown for the full match (see appendix B). All in all, the country patterns identified in the literature review are in line with the ones presented here. With some smaller exceptions, the continuum between German-speaking and Southern Europe is clearly illustrated.

As described in literature review, higher outcomes are related to higher educational signalling. This also provokes stronger differences of groups *within* countries. This is visible for occupational status (Figure 11): in German-speaking and South-Eastern countries, the advantage held by university graduates is higher than in Baltic (LV, PL) and Nordic countries, and especially in Southern Europe (ES, IT, PT). However, the differences in matching show the opposite pattern (Figure 12): in countries with strong educational signalling (such as German-speaking ones), the gap between both groups is smaller than in countries with a weak one (such as Southern Europe). While higher signalling improves the advantage of university graduates in terms of occupational status, it lowers their disadvantage in matching, resulting in more comparable outcomes to VET graduates. To

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[72] Except Malta and Greece; and except Italy and Portugal for VET.

be precise, the gap between HE and VET in German-speaking countries is small; HE is closer to the advantageous outcomes of VET than in other countries. This is especially the case in Luxembourg, where the gap is barely pronounced (96% VET vs. 88% HE). A similar pattern is shown for Central Eastern countries such as Slovenia or Romania and partly the Czech Republic. This is less the case in Baltic countries such as Poland and Latvia and least so in Southern Europe. In Spain or Poland, the disadvantage experienced by university graduates is very high (ca. 90% VET vs. 45% HE). Also, Nordic countries show a higher disadvantage of university graduates. Western Europe has a medium-size gap in comparison to other countries.

This short review of matching is generally in line with the country pattern identified in the literature review. There is a continuum of transition patterns, with German-speaking on the one side and Southern European on the other, with other countries distributed in between. The separately considered Eastern European countries represent a heterogeneous group. While South-Eastern, predominantly landlocked countries reveal higher outcomes, as they are closer to the German-speaking group, countries around the Baltic Sea show lower outcomes, being closer to Southern Europe. Nordic countries reveal lower outcomes than shown in the literature review; according to these descriptions the labour market demand is less compensating for the expansion of tertiary education. The smaller countries of Southern Europe such as Greece or Malta reveal higher outcomes of the highly educated than their bigger neighbours Spain, Portugal or Italy. Regarding the differences within countries, this shows that the tertiary educated have lower matching than VET graduates. This is related to the lower demand for high-skill labour compared to the demand for vocational labour. While university graduates have higher occupational status, their chances of matching are lower. However, this disadvantage of university graduates is less pronounced in countries known for higher educational signalling. In German-speaking or some Eastern countries the shares of the higher educated are closer to the advantageous situation of VET graduates, while the disadvantage is bigger in Baltic countries, Nordic and – especially – in Southern Europe.

5.1.2 Closure of occupations

This section describes the closure of both labour market sectors on the focus of this study, the high-skill and technical sector. A sector is considered closed when those working in it hold similar degrees. Conversely, sectors consisting of different degrees are more open, since apparently no particular degree forms an entry requirement for this sector. Figure 13 illustrates the closure of sectors. ISCO 1 and ISCO 2 represent high-skill jobs, while ISCO 3 to ISCO 8 represent technical jobs and ISCO 9 stands for the low-skill sector. Thus, high bars of ISCO1 and ISCO2 represent the dominance of HE graduates, while high bars of ISCO 3-ISCO8 jobs stand for dominance by VET degrees. The following descriptions concentrate more on the bigger occupational groups and pay less attention to the very small ones such as ISCO1 (high-skill) and ISCO6 (technical), since their numbers were very low when computing the dispersion index (see chapter 4.2.3). This is also the case for all occupational classes in Iceland. These two ISCO classes and occupations in Iceland will be less considered in the following description because they do not allow for reliable assumptions. Since high-skill jobs only consists of ISCO 1 and ISCO 2, the following description address the class ISCO 2 when referring to high-skill jobs.

In general, high bars represent closed sectors where a particular degree of education forms an entry requirement. Low bars stand for more open sectors, in which those with different degrees are employed.

Figure 13 reveal that in almost all countries high-skill jobs (ISCO2) are more closed than technical jobs. While the bars for high-skill jobs in most countries vary between 0.5 and 1, the bars within the technical sector are clearly lower (vary between 0 and 0.5 in most countries). This indicates that high-skill jobs are in general more closed by tertiary degrees than technical jobs by VET degrees. The technical sector reveals a more open hiring logic, where different educational groups are considered. As indicating by the bars of Figure 13, university graduates are similarly preferred to VET graduates in occupations with a higher status within the technical sector, such as ISCO3, ISCO4 and ISCO5, revealing the lowest closure in almost all countries. This indicates that next to VET, HE graduates are also a suitable candidate for the technical jobs and that is why

this sector is more open for both degrees. Technical jobs follow the logic of open sectors more strongly, not having particular entry requirement and the job allocation process being dependent on the further characteristics of candidates rather than a strict VET degree.

The high skill sector, on the other hand, is stronger closed and tertiary degrees form an entry requirement for these jobs, closing them for other certificates, such as VET.

In sum, in most countries, high-skill occupations are more strongly closed by HE degrees than technical jobs are by VET degrees. However, this applies more to some countries than to others.

Figure 13: The closure of occupations

The results are based on the entropy-segregation-index of educational degrees (secondary and tertiary) within ISCO main groups. ISCO1-2 = high-skill sector, ISCO3-8 = technical sector, ISCO9 = low-skill sector; Source: own calculations based on weighted data from the Labour Force Survey 2009

This higher closure of high-skill jobs compared to technical ones is most pronounced within most Eastern European countries (CZ, RO, SI, SK, HU, BG) and German-speaking countries (except CH), although Luxembourg reveals high closure of both sectors. While the closure index for high-skill sector (ISCO2) in this country groups is around 1, the closure of technical jobs barely exceeds the value 0.2 (except RO, HU and BG). A similar occupational structure is shown in Italy and partly in Greece. In all these countries, the high-skill sector is predominantly designed for the highly educated, while the technical sector is open to both groups. Northern European countries reveal a similar occupational structure, although the higher closure of high-skill jobs compared to technical ones is less pronounced. While in Northern Europe the ISCO 2 values reach 0.7, technical occupations vary between 0.2 and 0.4. In Baltic (LT, LV, EE, PL) and Western European countries the closure of both sectors is more even, although high-skill jobs show slightly higher closure than technical jobs (except for Ireland). In sum, in all these country groups the closure of high-skill jobs is higher than the technical one; this is strongly the case in German-speaking and most Eastern European countries, and to a certain extent in Nordic countries and also in Baltic countries, although both sectors in the latter group reveal a more even structure. However, an opposite closure structure is displayed in Southern Europe (except IT and GR). Their high-skill jobs are more open for both groups, while technical jobs appear to be more strongly closed (especially PT, CY, MT and partly ES). This suggests that high-skill jobs in Southern Europe are not protected by tertiary degrees and both the secondary and the tertiary educated are hired in this sector. The technical sector is more dominated by VET graduates, although this relates more strongly to ISCO 7-8, which represents jobs with lower skill requirements ('Craft and related trades workers' or 'Plant and machine operators and assemblers').

In sum, the high-skill jobs are more strongly closed than technical jobs. This closure imbalance between high-skill and the technical sector is especially visible in German-speaking and most Eastern European countries, and also in Nordic, Western and Baltic countries, although in the latter groups to a lesser extent. Baltic and Western European

countries show a slight higher closure of high-skill jobs and the occupational structure is more even.

This country pattern regarding the closure of occupations show some associations with the country pattern identified for matching. As described in the section above, HE graduates show matching less often then VET graduates. This is associated with the lower demand for high-skill jobs. However, this disadvantage of university graduates is smaller in German-speaking countries and some Eastern European ones. Not surprisingly, these countries reveal higher closure of high-skill jobs and lower closure of technical ones. High-skill jobs are more protected by HE degrees in these countries, improving the matching chances for university graduates. The opposite is shown for Southern Europe, revealing a high disadvantage for university graduates in matching and the lowest closure of high-skill jobs. In these countries, high-skill jobs are open for groups with different educational background, increasing the risk of overeducation and mismatch for university graduates. In between are the Nordic, Western and Baltic countries, showing both a mediocre disadvantage of university graduates and a more even structure of occupations. This shows that matching is related to the closure of occupations. The higher closure of high-skill jobs is related to higher matching for HE graduates and thus lower disadvantage compared to VET graduates. Whether these country differences regarding the closure of occupations are related to institutional settings is addressed in the next section. This describes the country characteristics regarding the selectivity of higher education, on the one hand, and the specificity of the VET stage compared to the HE stage on the other.

5.1.3 Institutional characteristics

5.1.3.1 Selectivity of higher education
Selectivity addresses the threshold between secondary and tertiary education. It addresses the size of both educational stages where a smaller tertiary education stage compared to VET stage is considered more selective.

In most countries more graduates complete the VET stage, whereas comparably fewer people finish Higher Education. Yet this varies across countries and shows a country pattern comparable to stratification indicators. The country distribution along the **y axis** of Figure 14 reveals that German-speaking and some Eastern European countries such as the Czech Republic, Romania and Slovakia have a stronger selectivity of HE sector. On the other hand, low selectivity appears in Southern Europe. These countries have more HE graduates than VET graduates (ES, PT, MT and partly CY). Italy and Greece seem to show higher selectivity within Southern Europe, although they are relatively low compared to other countries. The lowest selectivity is also in Baltic countries and Bulgaria. Nordic (NL SE FI, except DK) and Western European (IE, FR IS, except BE) countries show an average level of selectivity, placed between German-speaking, on the one hand, and Baltic and Southern Europe, on the other.

These patterns are in line with the descriptions of structural indicators, such as stratification or educational expansion in the literature review. This is not surprising, since selectivity is strongly related to expansion; the low selectivity of tertiary education provokes a high educational expansion.

Figure 14: Selectivity of HE and specificity of VET (vs. HE) stage
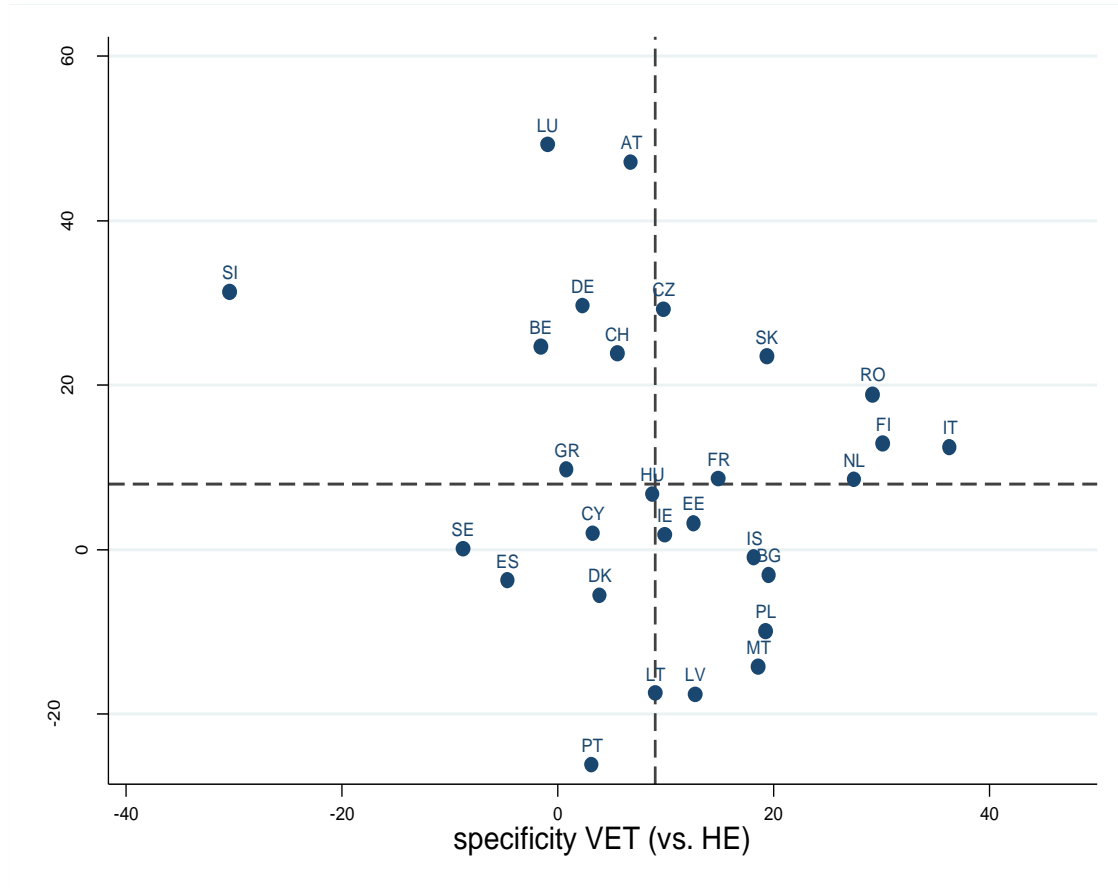
Source: own calculation on the data derived from Eurostat European Statistics Database; the values represent the country average for the time period 1998–2009.

This country pattern reveals a possible association between selectivity and the closure of sectors. As assumed in the theoretical chapter, stronger selectivity enhances the signalling of tertiary degrees and might close high-skill jobs and open technical ones. This is in line for most countries. On the one hand, German-speaking and most Eastern European countries are more strongly selective and show a similar pattern of occupational closure – more strongly closed high-skill jobs and more open technical ones. This is also true for Italy and Greece. On the other hand, most Southern European countries (PT, MT, ES and partly CY) indicate the reverse scenario. They have lower selectivity and reveal smaller closure for high-skill jobs and higher closure of technical ones. This is similar for Baltic countries (LT, LV, PL and partly EE) and Western European countries (except BE), although

the closure of high-skill jobs is higher than for Southern Europe. This brief description is in line with the assumptions made in Hypothesis 1 and Hypothesis 2 – that stronger selectivity closes HE sectors and opens technical ones. These assumptions will be tested in the analytical section of this chapter.

5.1.3.2 Vocational specificity of both educational stages

Selectivity shows a familiar country pattern, one comparable to educational expansion known from the literature overview, since both are strongly related to each other. However, the specificity shows a different country pattern because the measurement in this study is a different from that known from comparative research. The literature review revealed that both stages in German-speaking and Eastern Europe countries, and to some extent Nordic countries, are highly specific, although this is under-investigated for HE. On the other hand, in Southern or Western European countries both stages offer a more generally oriented education. In this study, the specificity of both stages is considered simultaneously whilst being directly compared.

As assumed and indicated by the distribution of countries along the **x axis** in Figure 14, the vocational specificity of VET programmes is, in almost all countries, higher than of HE programmes (except for SI, SE, ES). That is why countries will be further distinguished between having a stronger specificity of VET stage compared to HE stage (the right side of the average line) and having a similar specificity of both stages (the left side of the average line).

The VET stage shows higher specificity compared to the HE stage in most Eastern European countries (especially RO, BG, SK, PL) which inherited the strong specificity of VET stages from the Soviet influence; the post-Soviet expansion of the HE sector apparently led to a broader field offer and a less specific focus. A distinctively higher VET specificity shows also in some Nordic (FI and NL) countries known for specificity of VET stage. Western Europe (IS, FR and partly IE) also shows a higher specificity of the VET stage compared to tertiary education, although it is known from the literature review for relatively general educational programmes.

On the other hand, in German-speaking and Southern European countries both stages are similar specific. Although known for strong vocational programmes and the dual system, in German-speaking countries and Denmark the VET stage is not distinctly more specific than HE stage. It seems that both stages are strongly specific, the VET stage due to the dual system and the HE stage due to a high share of universities of applied science, as described in the literature review. This is why German-speaking countries reveal low differences between both stages. In Southern Europe (ES, PT, CY and GR; except for IT and MT), which is known for general education, VET specificity is not higher than the specificity of the HE stage. Hence, both stages in Southern Europe are comparable general.

In sum, the strongest VET specificity compared to HE reveals most Eastern European countries, especially Baltic countries, and also some Nordic countries (NL; FI), while in German-speaking and Southern Europe specificity of both stages is more similar and the VET stage is not more specific compared to the HE stage.

As assumed in the theoretical chapter, higher specificity of the VET (vs. the HE) stage improves the signalling of VET degrees and might lead to higher closure of technical jobs and lower closure of the high-skill sector. This might be true for Baltic countries, Western Europe and partly Nordic (FI, NL) countries. These countries show stronger specificity, on the one hand, and more even closure of jobs, with only slightly higher closure of high-skill sector compared to the technical one. Descriptions of other countries do not support these theoretical assumptions. Southern Europe especially contradicts this association. Although Southern Europe reveals an occupational structure typical for high specificity, with closed technical jobs and a very open high-skill sector, these countries have the lowest specificity of the VET (vs. the HE) stage within Europe. Nor does South-Eastern Europe (SK, RO, BG) supports this association. Although having high VET specificity, technical jobs are very open and high-skill jobs are strongly closed. Whether the institutional settings are related to closure and individual outcomes will be addressed in the next chapter.

All in all, this descriptive section reveals similar country patterns regarding matching to those identified in the literature review. There is a continuum of transition patterns with German-speaking on the one side and Southern Europe on the other, with other countries distributed in between. The separately considered Eastern European countries are a heterogeneous group. While predominantly landlocked countries show higher outcomes, as they are closer to the German-speaking group, countries around the Baltic Sea show lower outcomes, as they are closer to Southern Europe. However, Nordic countries reveal lower outcomes than shown in the literature review. When considering the differences between both education groups within countries, the tertiary educated have lower matching than VET graduates. This is related to the lower demand for high-skill labour compared to vocational labour. While university graduates have higher occupational status, their chances of a matched job are lower compared to VET graduates. However, this disadvantage of university graduates is less pronounced in countries known for higher educational signalling. The disadvantage of university graduates is smaller in German-speaking or South-Eastern countries, while it is higher in Baltic countries, Nordic and especially in Southern Europe. The first descriptive findings additionally reveal that this disadvantage might be related to the closure of occupations. The disadvantage is lower in countries with a higher closure of high-skill jobs and a more open technical sector (German group, most Eastern European countries). The disadvantage of university graduates is, in turn, higher when countries have a lower closure of high-skill jobs and a higher closure of technical sectors (especially Southern Europe). This reveals that a higher protection of high-skill jobs by HE degrees is associated with a lower risk of overeducation or mismatch for university graduates. This structure of occupations shows, in turn, a stronger descriptive association with selectivity than specificity. In low selective countries the closure of high-skill jobs is stronger than for technical ones and this is related with a lower disadvantage for university graduates in achieving matching. Whether there is multivariate evidence for these descriptively addressed associations between

institutional settings, closure of occupations and individual outcomes addresses the next chapter.

5.2 Multivariate results: The association between institutions and individual labour market outcomes

Education systems differ in quality and structure. This might affect how employers rely on degrees. It is assumed that institutional settings enhance the informational value of education and mediate the closure of labour market sectors by degrees. This, in turn, is understood to affect labour market chances on the individual level. This chapter analyses whether the institutional settings lead to a higher closure of labour market sectors, resulting in higher or lower matching on the individual level. This section starts by addressing the selectivity of higher education (chapter 5.2.1) and its association with the closure of the high-skill sector (Hypotheses 1) and the technical sector (Hypothesis 2). In the following sub-section, the association of vocational specificity (chapter 5.2.2) and the closure of technical jobs (Hypothesis 3), on the one hand, and high-skill jobs (Hypothesis 4), on the other, will be addressed. After describing the possible effect of both institutional settings separately, the assumed effect of specificity will be analysed, depending on the strength of selectivity (Hypothesis 5). All these analyses address the direct association of institutional settings with the chances of matching of both educational groups in particular sectors. This is supposed to provide empirical evidence for the assumption concerning whether institutional settings mediate the closure of occupations leading to higher or lower matching.

5.2.1 The effect of selectivity of higher education

As argued in the theoretical chapter, institutional settings enhance the informational value of degrees. The selectivity of the HE stage addresses the threshold between secondary and tertiary education. It is assumed that a stronger selectivity enhances the signalling of higher educational degrees because having a tertiary degree is associated

with higher performance, since these graduate group has managed to cross the highly selective threshold. Secondary degrees such as VET might signal lower productivity since these graduates finished education at a lower educational level and form the majority of graduates. Since the highly educated are more productive compared to VET graduates this can mediate the closure of both sectors. The following section addresses the assumed effect on the closure of the high-skill sector (Hypothesis 1), on the one hand, and on the technical, on the other (Hypothesis 2).

5.2.1.1 Selectivity and the closure of high-skill jobs

Hypothesis 1 assumes that there will be a higher closure of high-skill jobs with increasing selectivity. The main argument behind this assumption is that higher selectivity of tertiary education enhances the signalling of HE certificates and thus closes high-skill jobs by HE degrees. This has consequences for both educational groups on employment in the high-skill sector. On the one hand, it should enhance the chances[73] for HE graduates of being employed in the high-skill sector, measured by the full and mere vertical match (Hypothesis 1.1 and Hypothesis 1.2, respectively). On the other hand, it hinders VET graduates from entering the high-skill sector and makes a mere horizontal match less likely (Hypothesis 1.3).

Hypothesis 1: *The higher the selectivity of the Higher Education stage, the more closed are high-skill jobs by tertiary degrees and …*

Hypothesis 1.1: … the higher the full match of HE

Hypothesis 1.2: … the higher the mere vertical match of HE

Hypothesis 1.3: … the lower the mere horizontal match of VET

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[73] 'Chances' refer to the *likelihood* or the *probability* when describing the analytical results.

The results[74] suggest that higher selectivity does indeed make employment in high-skill sector more likely for HE graduates and less likely for VET graduates.

In particular, the likelihood for a full match of university graduates clearly increases with rising selectivity. In highly selective systems, the chances for a full match are around 23 percentage points higher compared to low selective ones (Figure 15). The same shows for the mere vertical match for university graduates (Figure 15). The likelihood between low and highly selective systems differs by 30 percentage points. This is assumed due to a higher signalling of tertiary degrees and hence higher closure of high-skill jobs. The closure of high-skill jobs is seen as influencing the outcomes of VET graduates as well. Since tertiary degrees form a strong entry requirement for high-skill jobs, this hinders candidates with other certificates from entering this sector. This assumption is supported by the slopes of VET graduates (mere horizontal match, see Figure 15). With rising selectivity of HE stage, candidates with a VET certificate have lower chances of getting a high-skill job related to own field of education. A mere horizontal match of VET is less likely in highly selective systems, at around 10 percentage points compared to less selective ones (Figure 15). This correlation is less pronounced (lower slope and significance level) than for HE graduates in getting a full match or mere vertical match. This is not surprising since there are less VET graduates in high-skill jobs than HE graduates in general.

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[74] All the plots of this chapter represent the cross-level interaction terms of institution and both groups within each labour market sector (e.g. high-skill sector: full match HE vs. mere horizontal match VET; mere vertical match HE vs. mere horizontal match VET). The plots of these interaction terms are displayed separately because the intercepts are not comparable between VET and HE graduates. This is due to the reference category, which is limited to those with a mismatch and not to the rest of the relevant sample (incl. other matching variables) and that is why the intercept does not allow an intuitive interpretation. Since the mismatch of VET is lower than that of HE, the intercept of VET might be overestimated compared to HE. This is why the interaction plots can give misleading interpretations about the gap between both groups, and thus only the slopes are considered in the interpretation. Sensitivity checks with random intercept models of institutional effect on matching computed for each group separately reveal strongly comparable effects (results not shown) to these cross-level interaction effects.
Further analyses using the same matching variable for both groups (e.g. full match VET and full match HE) within the cross-level interaction term reveal similar findings (results not shown).

In sum, the assumed effects for the closure of high-skill jobs are supported by findings regarding all matching outcomes of both educational groups. Selectivity improves the chances for a high-skill job of university graduates (H1.1: full match and H1.2: mere vertical match), keeping VET graduates away from the high-skill sector (H1.3: mere horizontal match). Since the chances of getting a job within the high-skill sector are enhanced for HE and reduced for VET, there is support for Hypothesis 1, assuming that selectivity strengthens the closure of high-skill jobs.

Figure 15: The correlation of selectivity and matching in the high-skill sector
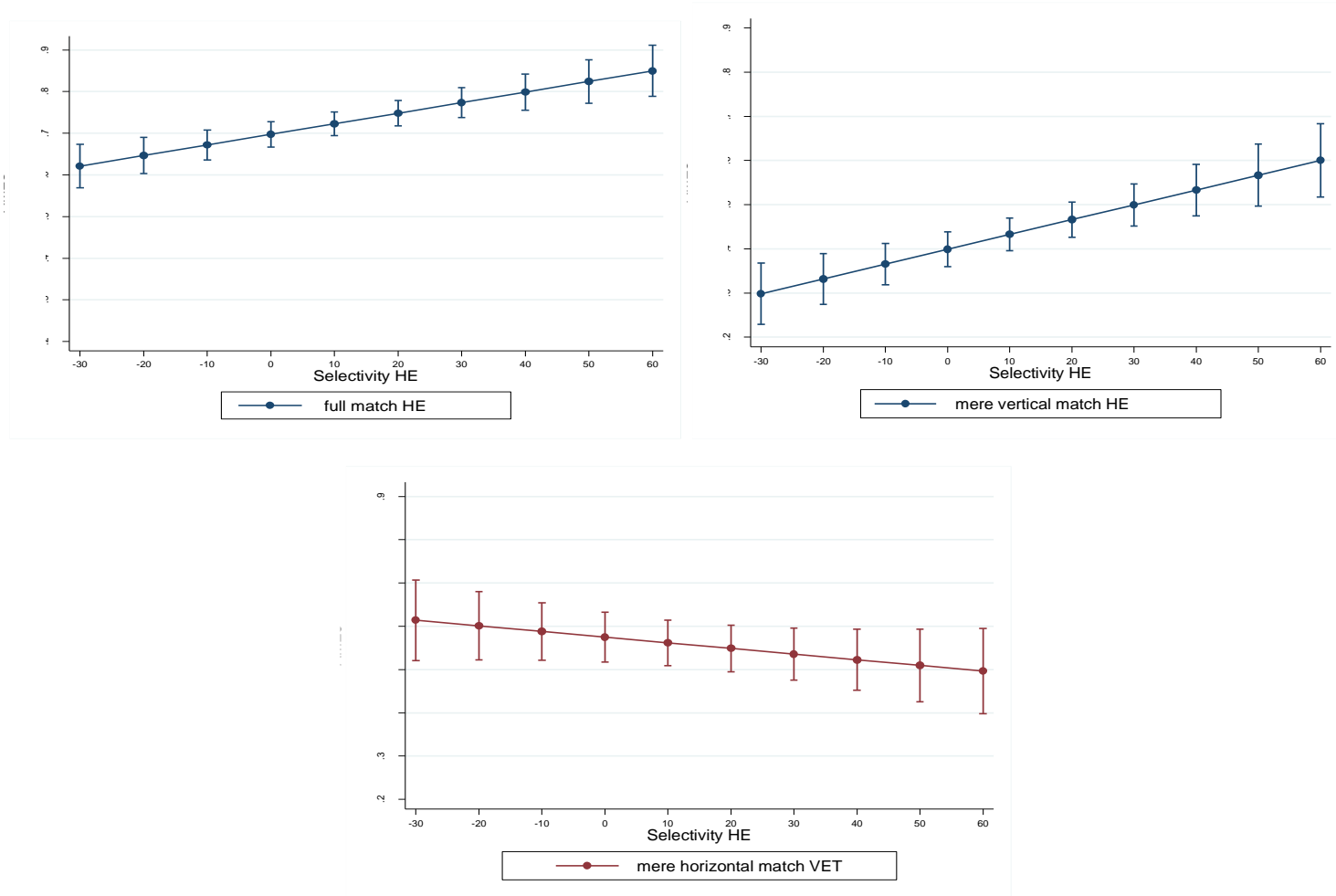
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 6 and table 7.
Data: Labour Force Survey 2009

5.2.1.2 Selectivity and the closure of technical jobs

Next to affecting the closure of high-skill jobs, selectivity is supposed to mediate the closure of technical jobs (Hypothesis 2). Since in strongly selective HE systems university graduates are perceived as more productive than VET graduates, HE degrees might also be valued within the technical sector. This high signalling of HE degrees might lead to a lower closure of technical jobs by VET certificates and influence the labour market chances within this sector of both educational groups. On the one hand, employers are keen to hire university graduates in the technical sector within the right field of education (mere horizontal match of HE). On the other, this might occur at the expense of VET graduates, by reducing their chances for a full and mere vertical match (and enhancing a mismatch).

Hypothesis 2: *The higher the selectivity of the Higher Education stage, the less closed are technical jobs by VET degrees and….*

Hypothesis 2.1: … the lower the full match of VET

Hypothesis 2.2: … the lower the mere vertical match of VET

Hypothesis 2.3: … the higher the mere horizontal match of HE

Figure 16 reveals that higher selectivity might indeed enhance the chances for HE of getting a field-related job within the technical sector (mere horizontal match HE). In highly selective systems, university graduates have a higher likelihood, by 10 percentage points, of a field-related job compared to low selective countries.

Since HE graduates occupy jobs within the technical sector, this should happen at the expense of VET graduates by decreasing their employment in the technical sector, making a full and mere vertical match less likely. This is not supported by the plots (Figure 16). The slopes for VET graduates reveal that selectivity is not negatively associated with the chances either of a full match or of a mere vertical match for VET (the latter is slightly negative, but not significant, see Figure 16). This does not give support for the suppression thesis of VET by HE graduates in the technical sector with stronger selectivity.

There are several explanations for the lack of this correlation with VET outcomes. First, the signalling of HE degrees could improve labour market outcomes of HE within technical jobs at the expense of other educational groups, rather than VET. Degrees like general upper secondary education (ISCED 3a or ISCED 4a) or lower tertiary education (ISCED 5b such as BA) are also designed for the technical sector and could be suppressed by tertiary degrees. Graduates with these degrees have a lower educational level than highly educated (ISCED5a), on the one hand, and lack a specific education compared to VET graduates, on the other. That is why the suppressing effect might affect VET less than other educational groups not considered in this study. Second, and maybe more important, the technical sector might be big enough to accommodate many different groups and that is why both VET and HE (and other) groups might get an education-related job within this sector, without displacing each other. Third, in highly selective systems, high skill jobs are more closed by HE degrees and university graduates might be less often searching for a job within the technical sector because they find one in the high skill sector. Thus, the HE group might form a small group competing for jobs with VET graduates.

Due to the lacking negative correlations between selectivity and matching for VET graduates in the technical sector, there is no convincing support for Hypothesis 2, assuming a lower closure of technical jobs with rising selectivity. Selectivity enhances the outcomes of HE graduates in both the technical (Hypothesis 2.3) and high-skill sector (Hypotheses 1.1, 1.2, 1.3). But this does not occur necessarily at the expense of VET graduates in the technical sector (Hypotheses 2.1 and 2.2).

All in all, selectivity is associated with higher closure of high-skill jobs. This is supported by findings regarding all matching outcomes of both educational groups within this sector. Selectivity improves the chances of a high-skill job for university graduates, keeping VET graduates away from the high-skill sector. However, selectivity does not strongly mediate the closure of technical jobs. It enhances the chances of tertiary graduates for a field-related job in the technical sector, without suppressing VET from this sector. This might

be related to the high demand of the technical sector. It might be big enough to accommodate many different groups and this is why both VET and HE groups might get an education-related job within this sector, without suppressing each other. Additionally, university graduates might apply less often for technical jobs in highly selective systems since they have high chances for getting a high skill job closed by tertiary degrees. Thus, high selectivity leads to a stronger labour market segmentation and both groups are more often hired in the 'right' sector. This indicates that selectivity improves the segmentation of the labour market and groups with different educational level might apply less often for jobs within the same sector.

Figure 16: The correlation of selectivity and matching in the technical sector
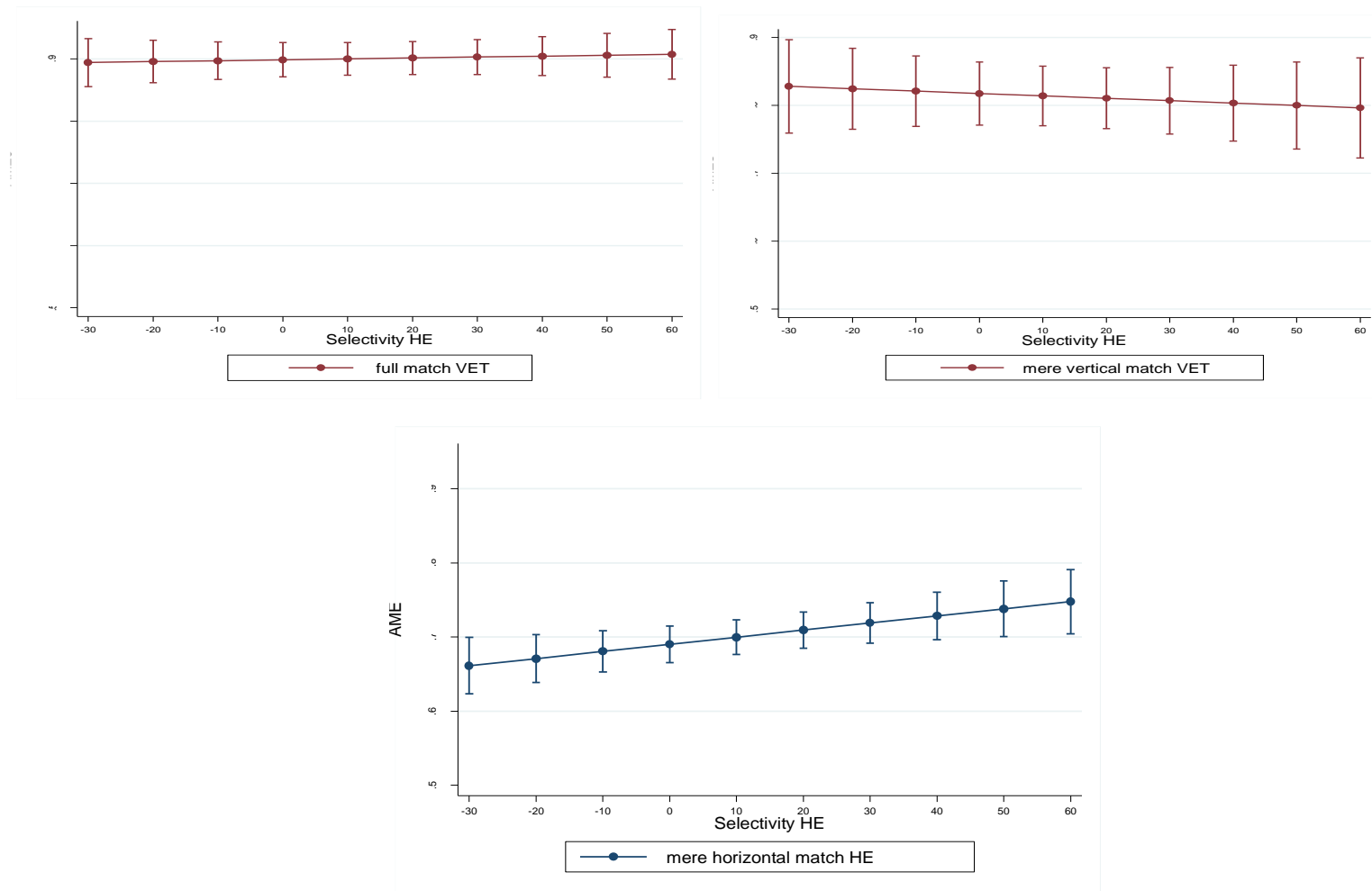
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 8 and table 9.
Data: Labour Force Survey 2009

5.2.2 The effect of vocational specificity

Whereas selectivity apparently strengthens the signalling of HE certificates, specificity is supposed to strengthen signalling of VET certificates, both in the technical and high-skill sector. In general, employers perceive graduates from specific programmes as being more productive due to their highly valued skills and in lesser need of training. Since VET programmes teach more specific skills than HE programmes, this advantage in training should enhance the signalling of VET certificates. This, in turn, is supposed to mediate the closure of labour market sectors.

5.2.2.1 Vocational specificity and closure of technical jobs

As assumed by Hypothesis 3, a higher signalling of VET certificates should lead to the higher closure of technical jobs by VET degrees. This should manifest itself in higher chances of a technical job for VET (full match, mere vertical match) and lower for HE (field-related technical job).

Hypothesis 3: *The more specific the VET stage (compared to HE stage), the more closed technical jobs are by VET degrees and …*

Hypothesis 3.1: … the higher the full match of VET

Hypothesis 3.2: … the higher the mere vertical match of VET

Hypothesis 3.3: … the lower the mere horizontal match of HE

Figure 17 indicates that with increasing specificity, university graduates indeed have lower chances of a job within the technical sector. Their chances for getting a mere horizontal match are lower in context with high specificity than in context with a comparable specificity of both stages (it decreases by about 20 percentage points). Hence, with rising specificity, a field-related job within the technical sector is less likely for university graduates, increasing the risk of a full mismatch for many overeducated university graduates. In short, university graduates are suppressed from field-related technical jobs

(Hypothesis 3.3). Conversely to the assumption, this does not occur due to a beneficial situation of VET graduates. Neither the likelihood of a full match nor a mere vertical match of VET graduates is higher with higher specificity (Hypothesis 3.1 and 3.2, see Figure 17). The correlation of specificity with both outcomes for VET is even slightly negative, although not significant. This is striking because a rising specificity of the VET stage should improve outcomes especially of graduates of this same stage.

There is little support for Hypothesis 3 assuming a rising closure of technical jobs by VET degrees due to higher specificity since the outcomes of VET graduates are not correlated with this institutional setting. Although showing lower chances of HE graduates for technical jobs, there is little support for Hypothesis 3 for higher closure of technical jobs driven by higher specificity.

5.2.2.2 Vocational specificity and closure of high-skill jobs
It was further argued that specificity affects the closure of high-skill jobs (Hypothesis 4). Since a rising VET specificity improves the signal of VET certificates, it opens high-skill sector for VET graduates provoking lower closure by HE degrees. This should manifest in higher horizontal match for VET within the high-skill sector at the expense of university graduates, reducing their chances for a high-skill job (full match, mere vertical match).

Hypothesis 4: *The more specific the VET stage compared to the HE stage, the more open high-skill jobs become and …*

Hypothesis 4.1: … the lower the full match of HE

Hypothesis 4.2: … the lower the mere vertical match of HE

Hypothesis 4.3: … the higher the mere horizontal match of VET

Figure 18 reveals that the chances of a high-skill job for HE graduates indeed decrease with higher specificity. While in a low specific context, university graduates have a higher chance of a full match it is lower by almost 10 percentage points in context with higher specific VET stages. The correlation is even more visible with the mere vertical match: the

chances for university graduates are lower by around 15 percentage points in higher specific VET stages compared to more general VET systems. In short, the chances for a high-skill job of university graduates decrease with the rising specificity of the VET stage (compared to HE stage). However, this is not because VET graduates suppress university graduates from the high-skill sector. The chances of a field-related high-skill job for VET graduates are statistically not related to specificity (Figure 18). Although two sub-hypotheses suggest that specificity opens the high-skill sector by decreasing the chances for matching for the highly educated, this does not occur due to stronger VET signalling and there is no clear evidence for Hypothesis 4.

In sum, the results show that the outcomes of HE graduates decrease with rising specificity, both in the technical and high-skill sector. The results might suggest that specificity opens high-skill jobs and closes technical ones due to decreasing chances for university graduates. In other words, HE is being suppressed from both sectors. But by whom? Since the chances for a high-skill job of VET graduates do not improve with rising specificity, a higher signalling of VET certificates cannot be assumed. This is surprising since the labour market chances explicitly of VET should improve with rising specificity of the VET stage in particular (compared to HE stage).

Although there is evidence for Hypothesis 4, assuming a lower closure of high-skill jobs with increasing VET specificity, the suggested mechanism of higher signalling of VET degrees cannot be assumed. Neither Hypothesis 3 postulating a higher closure of technical jobs nor Hypothesis 4 assuming a lower closure of high-skill jobs mediated by specificity cannot be confirmed.

Figure 17: The correlation of specificity and matching in the technical sector
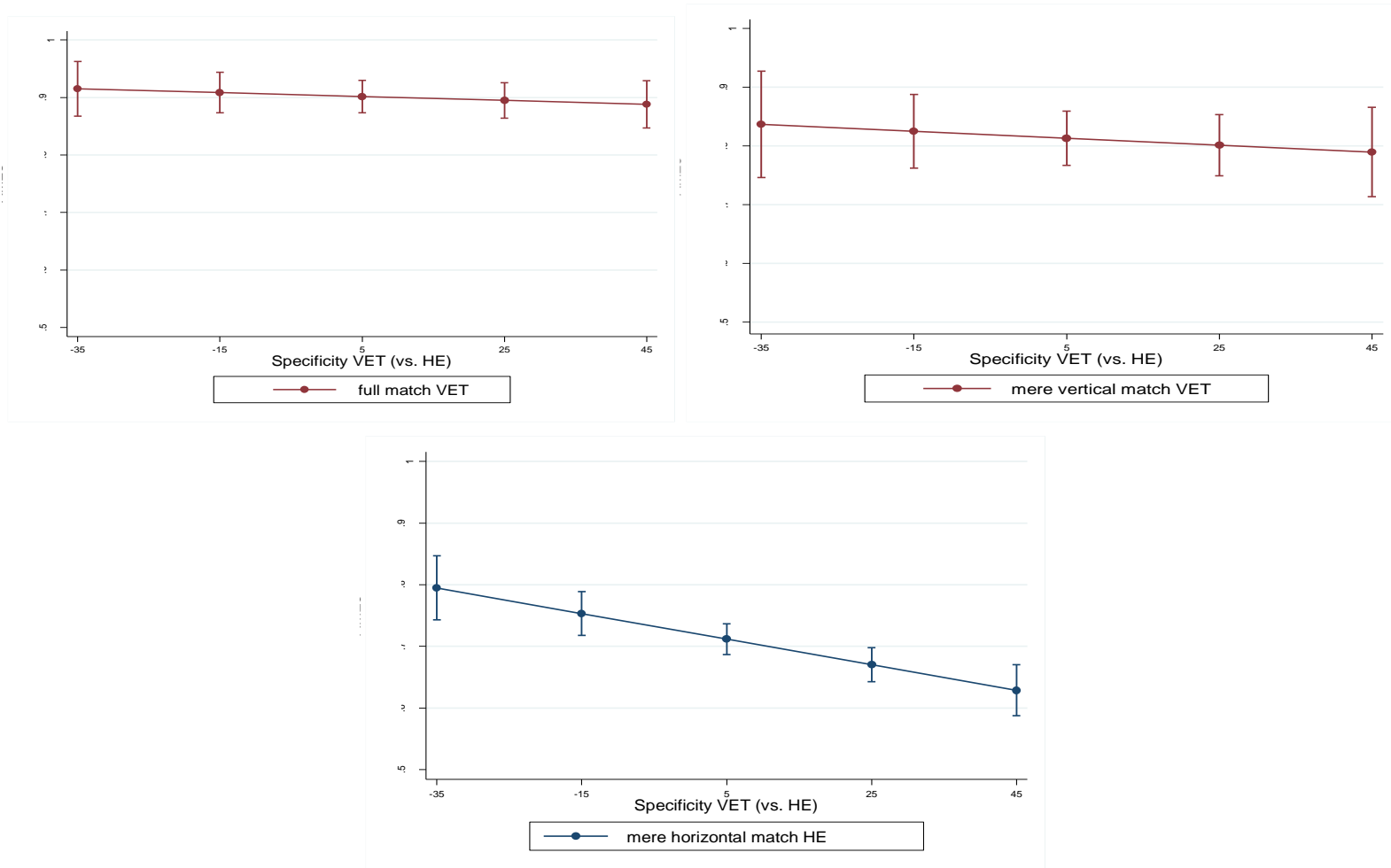
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 8 and table 9.
Data: Labour Force Survey 2009

Figure 18: The correlation of specificity and matching in the high-skill sector
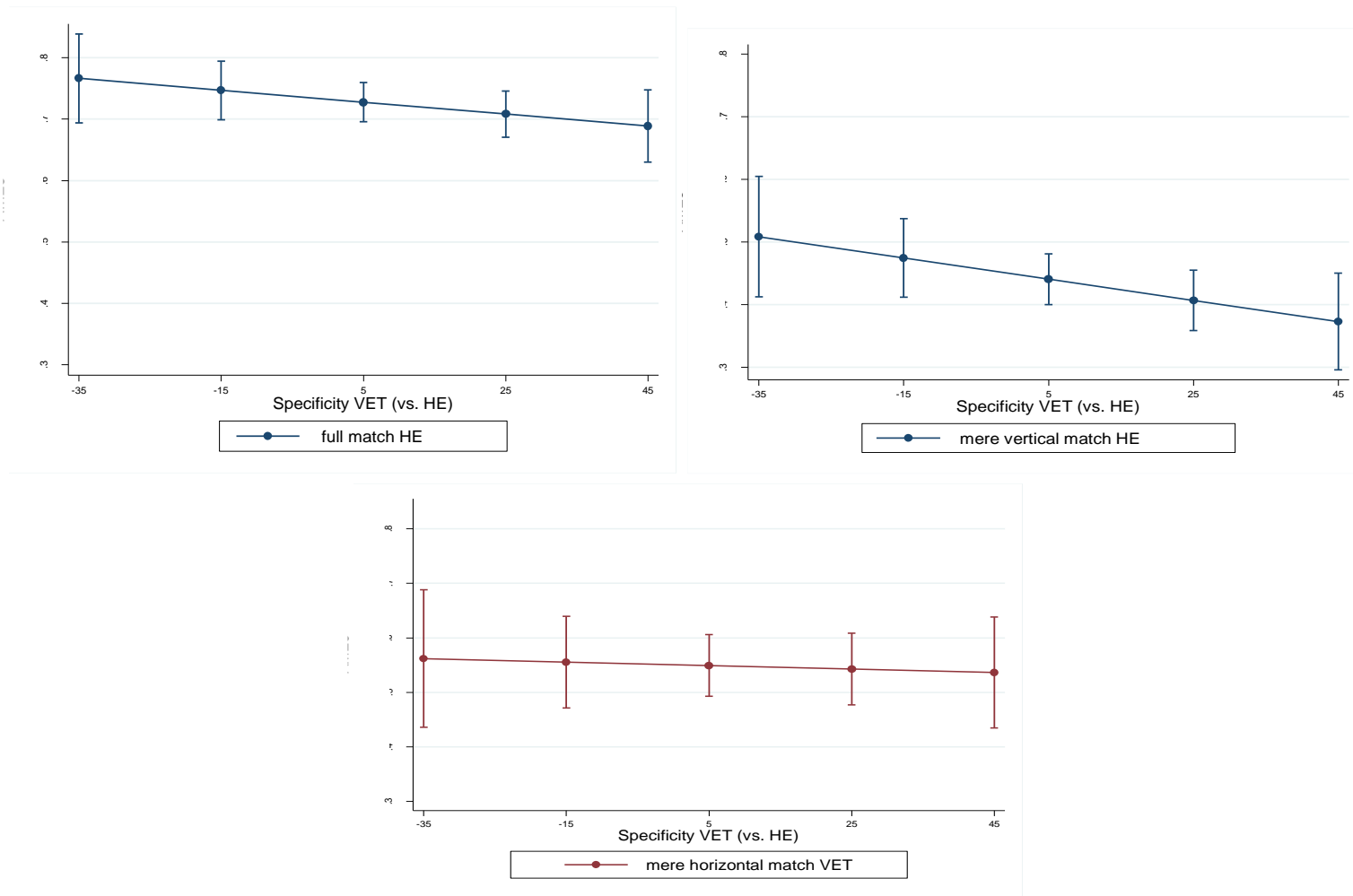
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 6 and table 7.
Data: Labour Force Survey 2009

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This multivariate section describes the correlation of selectivity and specificity and closure of sectors.

There are clear indications that selectivity closes high-skill jobs. This is supported by findings regarding all matching outcomes of both educational groups within this sector. Selectivity improves the chances of a high-skill job for university graduates, keeping VET graduates away from the high-skill sector. However, selectivity does not strongly mediate the closure of technical jobs. It enhances the chances for university graduates of a field-related job in the technical sector, without suppressing VET from this sector. This might be related to the size of technical sectors. The technical sector might be big enough to accommodate many different groups and this is why both VET and HE groups might get an education-related job within this sector, without suppressing each other. This is why technical jobs are more open in general. They are big enough to accommodate different groups which are suitable for these jobs. Additionally, since the high skill jobs are more protected by HE degrees, university graduates have more often a job within this sector and do not need to apply for a technical job. In highly selective systems the competition between both groups is small since they are selected into different sectors, VET to the technical and HE to the high skill sector. This indicates that selectivity improves the segmentation of the labour market and groups with different educational level are strongly selected into different labour market sectors and thus might apply less often for the same jobs.

While selectivity enhances the labour market segmentation, specificity is not associated with the closure of labour market sectors, whether that is the high-skill or the technical one. Although lowering the outcomes of university graduates in both sectors, VET graduates are not affected by rising specificity. That is why higher signalling of VET degrees cannot be assumed. This is surprising since the labour market chances explicitly of VET graduates should improve with rising specificity of the VET stage in particular (compared to the HE stage). It remains unclear what stands behind the association of specificity and lower outcomes of HE. A possible explanation is offered in the next section.

5.2.3 The effect of vocational specificity dependent on selectivity

So far, the effect of these two institutions on signals has been described separately. Selectivity enhances the signalling of HE certificates, where employers rely strongly on the information provided by the level of education. This leads to a higher segmentation of the labour market in which groups of different educational level are selected into different labour market sectors and apply less often for the same jobs. Specificity, on the other hand, was assumed to enhance the signalling of VET certificates, where employers rely on programme orientation in order to choose productive candidates. This might open high-skill jobs and close technical jobs. The results did not support these assumptions. Although specificity lowered the outcomes of highly educated, it did not improve the matching of VET. This chapter proposes an alternative explanation for the lack of a specificity effect when considered solely.

As assumed by Hypothesis 5, the effect of specificity might be conditional on the strength of selectivity, showing a stronger effect within low selective systems than in strong selective ones.

Behind this association stands the assumed hierarchy of signals. The signalling of educational level and programme orientation work on different layers of the labour market. Whereas the level might close whole labour market sectors, the programme orientation closes particular jobs within these sectors. Hence, employers choose candidates upon their educational level in the right sector and then select upon programme orientation into a particular job within this sector. Since selectivity shapes the effect of level of education, and specificity of programme orientation, this shows that both institutional characteristics work on different layers of the labour market. Selectivity closes whole sectors, while specificity closes jobs within these sectors. If selectivity is highly evolved, the effect of specificity is reduced to the job level. Hence, unlike assumed by Hypothesis 3 and 4, specificity does not open sectors but jobs for graduates of the same level. However, if selectivity is less evolved and employers cannot solely rely on educational level, they focus on further characteristics in order to assess the productivity of candidates. This can be a strong vocational programme driven by specific education.

Hence, if sectors are more open for both groups, the specificity of these two groups is more strongly considered and should reveal the effects on jobs within both sectors, as similarly assumed in Hypothesis 4 and 5. The effect of specificity on matching in jobs within both sectors is supposed to be stronger in less selective systems than in highly selective ones.

Hypothesis 5: S*pecificity has a stronger effect in weakly selective HE systems than in highly selective HE systems.*

In order to test these assumptions, the correlation of specificity with matching is shown in countries with highly selective HE systems, on the one hand, and less selective ones, on the other. Again, the effect of specificity is supposed to strengthen the productivity signalling of VET. This is expected to lead to higher matching of VET graduates at the expense of university graduates. In short, specificity is supposed to have a positive effect on VET graduates and a negative effect on HE graduates in all labour market sectors and particularly in less selective systems.

Thus, each labour market outcome is presented in low and highly selective systems separately. Figures addressing the same labour market outcome of both systems are placed one above the other, with highly selective ones above the low selective ones in the high skill sector (Figure 19 & Figure 20) and in the technical one (Figure 21 & Figure 22).

At first glance, these vertically ordered pairs reveal different plots. While in highly selective systems the slopes are negatively or not related to specificity for both graduates groups (Figure 19 and Figure 21), their less selective counterparts reveal a different plot scheme (Figure 20 and Figure 22, respectively). First, as expected, in the low selective systems a rising specificity is negatively related to the outcomes of HE graduates; this correlation is more pronounced than in highly selective systems (Figure 19A vs. Figure 20A; Figure 19B vs. Figure 20B; Figure 21C vs. Figure 22C). Second, as expected, higher specificity positively correlates with the outcomes of VET graduates in less selective systems, while this is not the case in their highly selective counterparts (Figure 19C vs.

Figure 20C; Figure 21B vs. Figure 22B), revealing slightly negative correlations with matching for VET graduates. This this is less true for full match of VET (Figure 21A vs. Figure 22A), where VET matching barely varies in both systems. In short, specificity in less selective systems show the expected positive correlations with matching of VET and negative with matching of HE, while in highly selective ones the associations are either not pronounced or show contradictory results for VET graduates. This is in line with the assumptions of Hypothesis 5, indicating that specificity depends on the strength of selectivity.

All in all, the results of this section reveal that specificity of VET programmes (compared to HE programmes) shows clearer correlations with matching in low selective HE system than in highly selective ones. As assumed, in less selective systems, specificity improves the signalling of VET certificates compared to HE degrees. This is manifested by the higher outcomes of VET graduates and the lower outcomes of HE in both labour market sectors. These correlations barely show in highly selective systems, being even negative for VET graduates.

This supports the assumption that the effect of specificity is conditional on the effect of selectivity. If selectivity is highly evolved, groups of different educational levels are hired in different labour market sectors and less often apply for the same jobs. Hence, the specificity of two different groups does not have an effect, since these two groups are less considered for the same sectors. However, if selectivity is less evolved and the sectors are more open for different candidates, employers focus on further characteristics of candidates in order to assess their productivity. This can be a strong vocational orientation of educational programmes. When the specificity of VET stage is higher than that of the HE stage, a vocational education degree signals higher productivity and vocational graduates are more strongly considered as candidates within both sectors, even the high skill one. This is why the correlation of specificity with matching is stronger in less selective systems than in highly selective ones.

This supports the assumption that both institutional settings work on different layers of the labour market. Selectivity closes whole sectors, while specificity closes jobs within these sectors. The effect of vocational specificity of both educational groups is thus dependent on the effect of selectivity. The specificity effect appears when selectivity is low, indicating that more open sectors allow different candidates to compete for the same jobs, and that this competition can be further regulated by different specificity signalling of different stages.

These assumptions are supported by additional sensitivity checks. The coefficients are robust when excluding single countries from the models, when running multilevel models with other level specifications (the combination of country and graduation year instead of the country level), by running random intercept multilevel models separately for VET and HE graduates, by using the cluster-option instead of the multilevel option, and by using other reference categories than mismatch (results not shown). The most relevant robustness checks are presented in the appendix: they show similar findings when using alternative coding of matching for VET graduates (under and overeducated, see Figure 25 and Figure 26), when using an alternative measure for vocational specificity (work experience; see Figure 29), when considering other educational groups (such as BAs; see Figure 30, Figure 31, Figure 32 and Figure 33) and running linearity checks with quantile coding of institutional settings (see Table 6 to Table 9). All the correlations are controlled for a wide number of other educational or labour market characteristics on the macro level such as size of the high-skill sector (ISCO 1 + 2), countries' yearly unemployment rates, GDP changes and size of low education groups (ISCED 1+2). Table 6 to Table 9 also show how the institutional effect on matching changes when controlling for the index of occupational closure (described in chapter 4.2.3). Findings reveal that on the one hand the effect of selectivity is diminishing when controlling for occupational closure. This is in line with the assumption that selectivity mediates the closure of whole labour market sectors, which in turn influences matching on the individual level. On the other hand, the effect of vocational specificity gets more pronounced when controlling for occupational closure in less selective systems. This in turn is in line with the assumption that the effect

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of specificity is dependent on occupational closure and thus is more strongly expressed when the closure of occupations is accounted for. This gives support for the theoretical assumptions about institutional effects; selectivity mediates the closure of occupations, which in turn shapes the effect of vocational specificity within these sectors.

Figure 19: The correlation of specificity with matching within the high-skill sector in **highly** selective systems
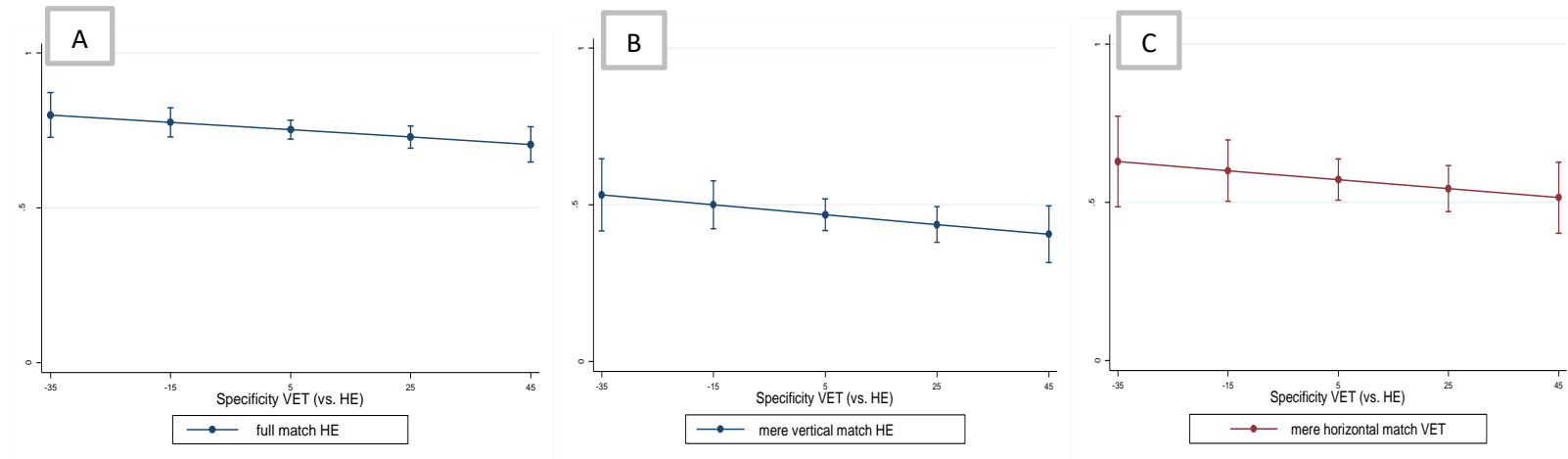
Figure 20: The correlation of specificity with matching within the high-skill sector in **less** selective systems
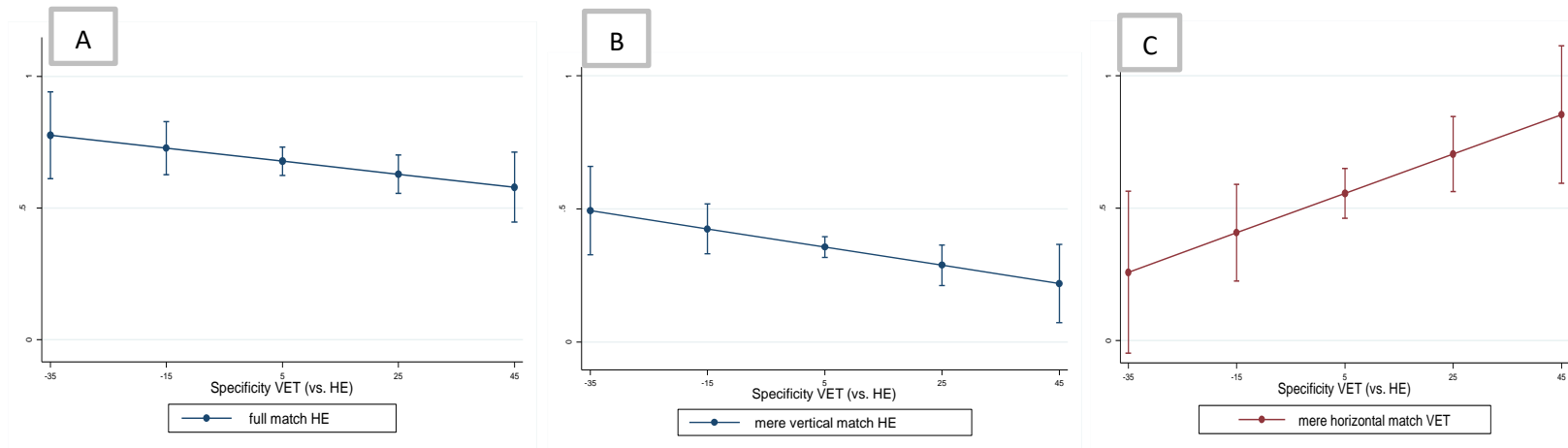
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 6 and table 7. Data: Labour Force Survey 2009

Figure 21: The correlation of specificity with matching within the technical sector in **highly** selective systems
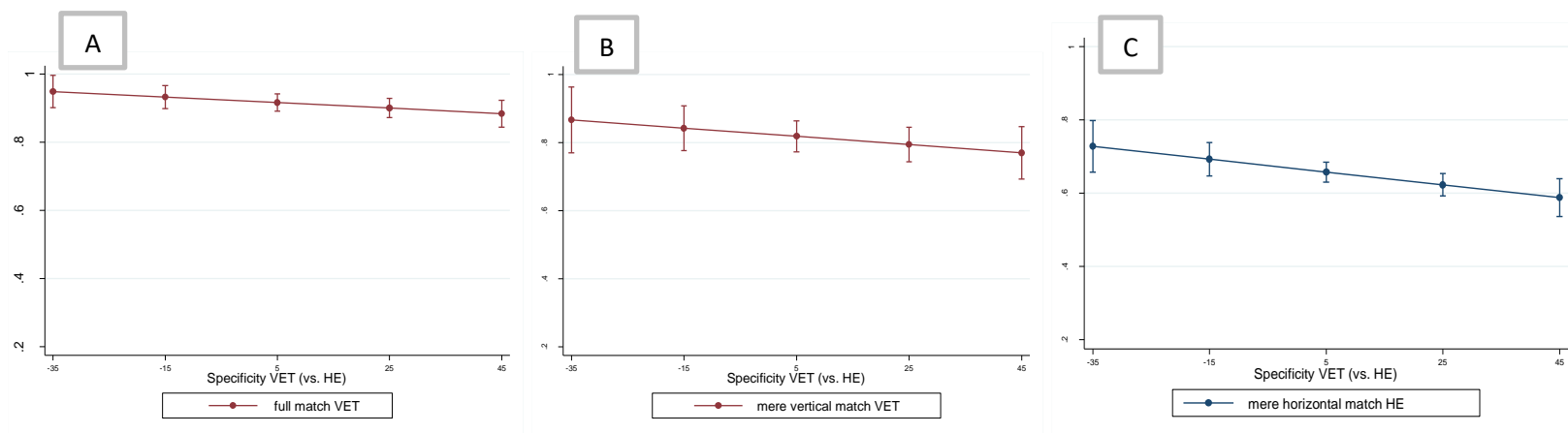
Figure 22: The correlation of specificity with matching within the technical sector in **less** selective systems
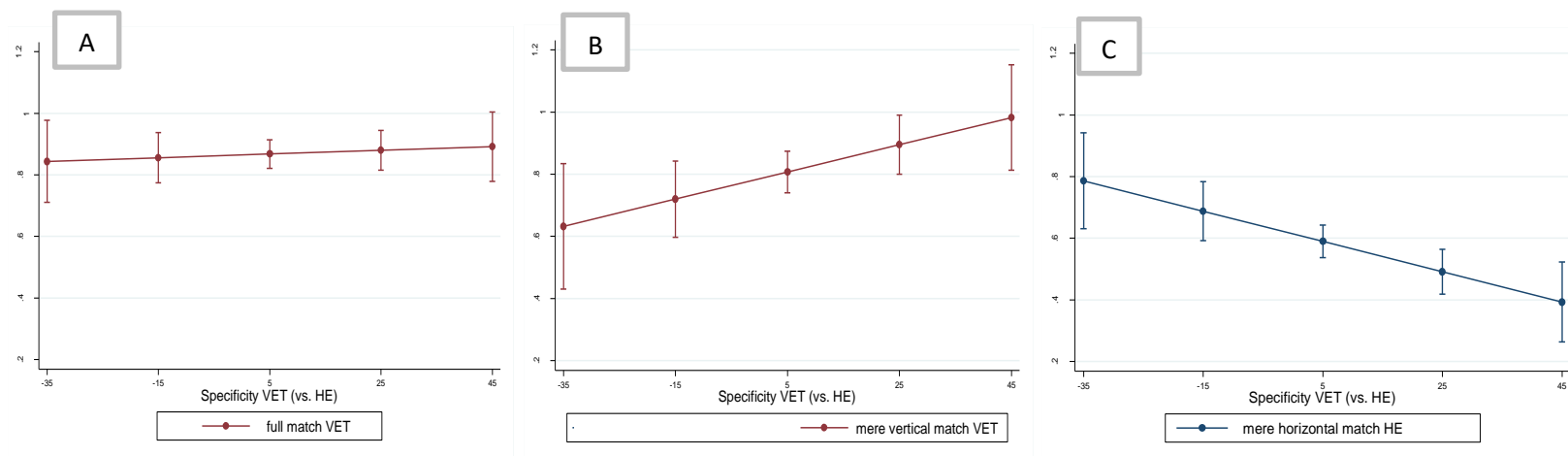
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. For the complete models, see appendix C, table 8 and table 9. Data: Labour Force Survey 2009

5.3 Country clusters

This chapter summarises the results of institutional effects and identifies country groups. So far, the effects of both institutions have been described separately. This has covered selectivity shaping the signalling of level of education (Hypothesis 1 and 2), on the one hand, and specificity shaping the signalling of programme orientation (Hypothesis 3 and 4), being conditional on selectivity (Hypothesis 5), on the other. These conclusions regarding the institutional effects on educational level and programme orientation will be combined in order to identify country-specific patterns. Thus, unlike before, the strength of both signals will be addressed at the same time, depending on the groupings of both institutions shaping these signals. It is generally assumed that both educational characteristics like level and programme orientation (field of education) signal productivity to a certain point in all countries, but in some less than in others, depending on the institutional nature of selectivity and specificity.

The findings suggest that selectivity shows the assumed effect: it closes labour market sectors by educational level, predominantly the high-skill sector. Technical sectors are less affected by selectivity, because they are big enough to accommodate different groups and additionally, university graduates might apply less often for technical jobs in highly selective systems since they have good chances for getting a high skill job. Thus, high selectivity leads to a stronger labour market segmentation and both groups are more often hired in the 'right' sector, thus, do not apply for the same jobs. Vocational specificity, in turn, does not influence the closure of sectors when considered solely: its effect depends on the strength of selectivity. Behind this association stands the assumed hierarchy of signals. The educational level can close whole sectors, whereas programme orientation closes particular jobs within these sectors. Hence, employers choose candidates upon their educational level in the right sector and then select upon programme orientation into a particular job. Thus, graduates of different levels are less considered within the same sector (especially the high-skill sector). This hierarchy is either strengthened or offset by selectivity. It is strengthened in highly selective systems where

the level of education plays a strong role and improves labour market segmentation. Programme orientation, in turn, closes particular jobs within these sectors. This is why the specificity of both educational stages does not show a clear effect on sector closure in highly selective systems because both graduates groups apply for jobs in different sectors.

The picture is different in low selective systems, where the hierarchy of signals is offset and the level is insufficient to close sectors. Since the sectors are more open, graduates of different educational levels are considered for jobs within the same sector. This is why programme orientation influences the productivity of groups with different educational levels in less selective systems. In such systems, both groups more often apply for the same jobs and the direct competition of both is highest. The highly educated always have a small advantage of higher level; VET, in turn, has an advantage of higher specificity, given their program is specific. When VET specificity is less evolved, employers might search for alternative signals other than programme orientation and these signals might be unrelated to education. That is why in less selective HE systems, outcomes differ from countries with high and low specificity, which influences labour market outcomes.

Due to this association, mainly three country clusters arise (Figure 23): highly selective (1) and low selective systems with either high VET specificity (2) or low VET specificity (3).

Figure 23: Country clusters (selectivity and specificity)
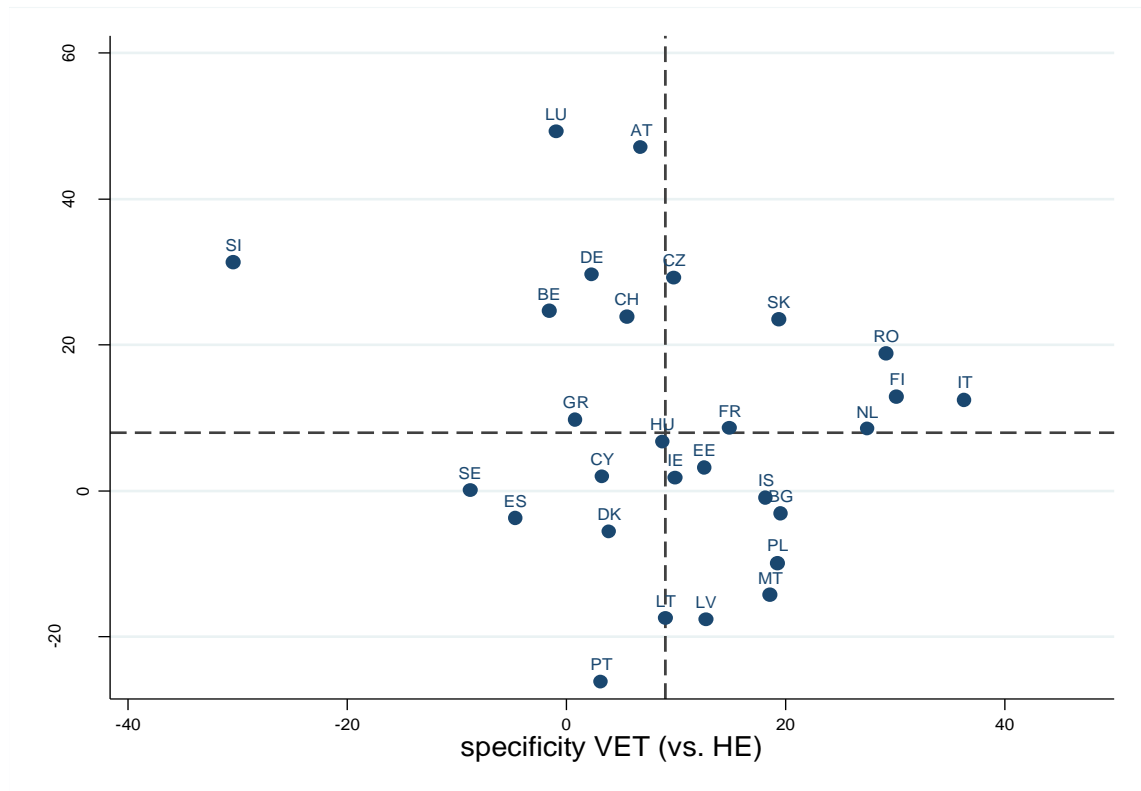
Source: own calculation on the data derived from Eurostat European Statistics Database; the values represent the country average for the time period 1998-2009.

The first country group is the **highly selective cluster** (above the horizontal dash line, see Figure 21). This country cluster consists of German-speaking countries, South-Eastern Europe (CZ, SK, RO, SI) and some Nordic countries (FI and partly NL), together with Belgium and partly Italy. Since the group shows high selectivity, it is not further divided upon vocational specificity since specificity of both stages shows a weak effect on labour market outcomes in these countries.

As assumed, high selectivity enhances the signalling of level and closes high-skill jobs by tertiary degrees. In this systems level is an important signal in the job allocation process and is responsible for the closure of sectors. Other signals, such as programme orientation, are responsible for the closure of jobs within the right sector, since specificity

of both stages did not show a high effect on closure of whole sectors. Hence, the hierarchy of signals is high: getting into the right sector depends on the educational level, but getting into the right job within this sector might depend on the right skills (field of education). This improves the matching of both groups. On the one hand, the strong signalling of level of education improves the chances for an education-job match for university graduates in both sectors, especially the high skill one. VET graduates, on the other hand, have difficulties being employed in the high-skill sector. However, within the technical sector their chances are high. First, they are not suppressed by HE since the sector is big enough to accommodate both groups and university graduates apply less often for this sector because they are more hired in the high skill sector. Second, their programme orientation plays an important role within this sector, improving their chances of a full match. As shown in literature review, secondary education in German-speaking countries, Eastern Europe and Nordic countries is strongly vocational. This should lead to high matching of skills and jobs within the technical sector for VET. As a consequence, both groups have similarly high labour market outcomes. They stand in low competition and do not apply for the same jobs because it is regulated by the closure of sectors and jobs.

These assumptions are in line with the characteristics of the representative countries shown in the descriptive chapter of this thesis. German-speaking and South-Eastern Europe show the highest closure of high-skill jobs. Additionally, the disadvantage in the matching of HE compared to VET is the smallest in Europe, and both groups achieve higher matching than European average.

However, differences *within* this country group should not be neglected. As Figure 23 reveals, German-speaking (especially LU and AT, but also DE and to some extent CH) and to some extent south-Eastern countries (CZ, SK, SI) have highly selective systems, whereas Nordic countries (NL and FI) or Italy show lower selectivity. Hence, level signalling and the closure of high-skill jobs are higher in the first country-group compared to the latter one. This is in line with the descriptive results in which German-speaking or South-Eastern countries show a higher closure of high-skill sectors and higher outcomes compared to Nordic countries (or Italy). In Nordic countries, level signalling might be lower

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and sectors are more open, resulting in lower labour market outcomes than in the highly selective countries; their stronger VET specificity might play a greater role. This resembles the next country group explained below.

The group in the low right corner (Figure 23) is characterised by **lower selectivity and stronger specificity of VET stage**. This group consists mainly of Baltic countries (PL, LV, LT, EE and also BG), Western Europe (IS, IE, FR) and Malta. The relatively low selectivity within these countries makes the signalling of level less reliable and sectors are more open for both groups. Since the specificity strongly differs between both stages, employers can differentiate between candidates upon their programme orientation. In this country group the hierarchy of signals is offset: since level is not an entirely reliable signal and the sectors are more open, programme orientation of groups with different educational level can improve the chances for jobs within both sectors. This leads to strong competition between both groups: VET graduates have the advantage of more specific programme orientation whereas HE graduates have an advantage of higher level of education, although not so strong to close whole sectors, and both characteristic signal comparable productivity. This provokes a lower closure of sectors and a lower education-job match compared to highly selective countries. Whereas in strongly selective countries the closure of jobs is dependent on level, here programme orientation can open or close jobs within both sectors.

The assumptions are in line with the introduced lower closure of (high-skill) jobs and lower labour market outcomes of these country group (Baltic and Western European) compared to other Eastern European or German-speaking countries. The closure of high-skill and technical sector is more even. Both educational groups have lower chances for a match than in the highly selective systems and show a higher disadvantage of university graduates. However, their labour market outcomes are higher than in the following group.

The group in the low left corner (Figure 23) is characterised by **lower selectivity and similar VET and HE specificity**. This country cluster consists mainly of Southern Europe countries (ES, PT, CY and partly GR), together with Denmark and Sweden.

As in the Baltic and Western European countries, the relatively low selectivity makes the signalling of level less reliable and sectors more open. However, unlike in the Baltic and Western European countries, employers cannot rely strongly on the signalling of programme orientation since the specificity of both stages is similar (and general). Since programme orientation provides weak information about productivity differences between candidates, employers need to seek additional signals, which might be less related to education. In this country group the hierarchy of level is offset by other characteristics less related to education. Hence, a relatively weak level of education is accompanied by additional characteristics not linked to education, such as experience, socioeconomic background or social capital. Research shows that in Southern Europe the most common way of finding a job is via family and friends (Bernardi et al., 2000; Gangl, 2001). Information provided via social capital might be more substantial than that provided by certificates. In these countries, education plays the lowest role within Europe. Employers in these countries rely to some extent on the level and additionally on other characteristics not related to education, which can vary by individuals. Sectors are open for both groups, but it is unclear what individual characteristics employers decide are important within the job placement process.

These assumptions are in line with the descriptive results for Southern Europe. These countries reveal the lowest closure of high-skill sector and a high disadvantage of HE compared to VET, and both groups have the lowest labour market outcomes within Europe.

Surprisingly, Denmark shows similar institutional characteristics with Southern Europe. In comparative transition research, Denmark is grouped with German-speaking countries, due to the presence of an apprenticeship system. With regard to specificity, Denmark resembles the German-speaking countries in this study as well, having stages that are both similarly (highly) specific (Figure 23). However, it shows lower selectivity than German-speaking countries. As shown in the literature review, Nordic countries have more expanded systems and thus higher education stage in Denmark is less selective. This is in line with the descriptive results. As shown in the descriptive chapter, Denmark has

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lower closure and lower labour market outcomes than German-speaking countries; however, this is not so disadvantageous as in Southern Europe.

6. Conclusions

6.1 Summary: The transition from vocational and higher education to work

This study addresses the question '*How do educational institutions influence the signalling of higher and vocational degrees and shape labour market outcomes within European countries?*'

This study is motivated by the political pressure towards higher tertiary education rates (Europe 2020). This approach strongly focuses on the highly educated and the key role of higher education for employment and fostering long-term growth. However, other educational groups might be equally relevant for these targets. Vocational Education and Training aims to educate highly specific workers and might thus deserve similar attention. This study hence puts a wider scope on the education system by addressing these two educational groups considered as highly skilled graduates for entering the labour market. The quantitative and qualitative characteristics of its stages are analysed in order to understand the value of both degrees in an interplay of both institutional settings and its consequences for employment.

The literature review introduces two research streams regarding the transition from secondary education, on the one hand, and from higher education on the other. Both research streams identify similar country patterns along a continuum of transition regimes. While German-speaking countries reveal advantageous outcomes for both educational groups, Southern Europe represents the other extreme with clearly lower outcomes. These patterns are associated with particular institutional settings such as stratification or the vocational specificity of education systems. Institutions are assumed to improve the informational value of degrees, which results in higher outcomes. Whereas findings are conclusive for the effect of structural indicators like stratification, this is less the case regarding vocational specificity, which showed both expected and unexpected findings or is under-investigated for university graduates.

All in all, the broad comparative transition research made a significant contribution in explaining how institutions shape individual labour market outcomes. However, the research was conducted separately for VET and HE graduates. Fewer studies focus on different educational groups within countries. They show that the institutional effect shaping educational signalling leads to a higher gap between groups. However, this research concentrated on the effect between groups either different in level or different in programme orientation. Thus, a proper theoretical framework explicitly indicating how two groups such as HE and VET are affected by institutional settings is lacking. Additionally, the findings so far suggest opposed effects of stratification and specificity when considering educational groups such as HE and VET. Whereas stratification improves the outcomes of HE, specificity improves the outcomes of VET. Thus, it suggests that both institutions might offset each other, especially when they are strongly evolved. This study proposes a theory that addresses both educational groups and the interrelation of different institutions at the same time.

In order to understand the institutional effect on the individual labour market outcomes of VET and HE graduates, a three-layer theoretical framework was introduced. Next to the individual and institutional level the occupational level was also considered since both groups match particular occupations. Following the matching argumentation and the perspective of segmentation theories, high-skill jobs are more closed by HE degrees and technical jobs are closed by VET degrees. The three-layer theoretical framework assumed that institutional settings mediate the closure of these labour market sectors, via the signalling of degrees. This, in turn, drives the chances for a match for VET and HE graduates.

Two main institutions have been the focus of this study: the selectivity of the HE stage and vocational specificity of VET (vs. HE) stages. The main assumption is that both institutions work in different directions: whereas selectivity is supposed to close the high-skill sector, and open technical ones, specificity is assumed to have the opposite effect.

The definitions of these two institutional settings consider the characteristics of both educational stages at the same time.

The selectivity of HE systems addresses the threshold between secondary and tertiary education. The higher the selectivity of tertiary education, the higher is the signalling of level of education and holders of HE degrees are considered being more productive than holders of VET degrees. This, in turn, mediates the closure of sectors: it strengthens the closure of high-skill jobs and lowers the closure of technical jobs. Therefore, it was expected that HE graduates achieve higher matching within both sectors, at the expense of VET graduates, increasing their risk of a mismatch. Results from analyses with the cross-section LFS data support the effect of selectivity on the closure of high-skill jobs. However, the closure of technical sector is less affected by selectivity. This might be due to the higher demand for the technical sector compared to the high-skill sector. The bigger technical sector makes it possible to accommodate different educational groups without one group being supressed by the other. Additionally, university graduates might apply less often for technical jobs in highly selective systems since they have good chances for getting a high skill job. Thus, high selectivity leads to a stronger labour market segmentation and both groups are more often hired in the 'right' sector, thus, do not apply for the same jobs.

The second institutional setting addressed the specificity of educational programmes by comparing the vocational specificity of both stages. Not surprisingly, in almost all countries the specificity of the VET stage is higher than the specificity of the HE stage. It was assumed that the higher the specificity of the VET stage (compared to HE stage), the higher the productivity signalling of programme orientation of secondary education, and hence the higher the signalling of VET certificates over HE certificates. This, in turn, should lead to a higher closure of technical jobs and open up high-skill jobs for VET graduates. In short, with rising specificity, VET graduates were assumed to have higher chances for matching within both sectors, at the expense of HE. These assumptions are not supported by the results, since, despite some negative effects for university graduates, VET graduates were not affected by specificity of their own educational stage (compared to the HE stage).

However, additional analyses could further explain the lacking effect of specificity considered solely. The effect of specificity turns out to be conditional on the strength of selectivity. The effects of specificity manifests itself in low selective systems rather than in highly selective ones. This suggests a hierarchy of signals: educational level is responsible for closing whole sectors, while programme orientation accounts for the closure of particular jobs within sectors. Since selectivity strengthens the signalling of level, it is supposed to close whole sectors. Specificity, on the other hand, enhances the signalling of programme orientation and thus is supposed to close jobs within these sectors. These results show a complementarity between both institutions: due to a hierarchy of institutions, specificity complements the effect of selectivity on the job level.

However, in a low selective system educational level has a weaker signal; sectors are more open for different groups and employers decide on further characteristics than solely level. The programme orientation of both groups is more strongly considered, and this is why specificity of VET versus HE stage is demonstrated in less selective rather than in highly selective systems.

In sum, both institutions shape productivity signals on different layers of the labour market. While selectivity closes whole labour market sectors, specificity closes jobs within these sectors. Thus, the specificity of HE affects the job closure within the high-skill sector, whereas the specificity of VET stage affects the closure of jobs within the technical sector. However, when sectors are open for different degrees, the specificity of both groups within sectors has a clearer effect.

These results allow to identify three country clusters. Here they are summarised based upon the complementarity of institutions.

One group consists of German-speaking countries together with South-Eastern (and some Nordic countries). In this country group, not only VET but also HE graduates have the highest chance for a match in Europe, making the gap between both groups small. This is due to high selectivity, where both groups are preselected upon educational level into the right sector and in a further step are evaluated upon skills within these

sectors. Since both educational stages provide strong vocational programme, this should lead to higher signalling of skills on the job level. Thus, specificity of VET and HE stage is not compared because these candidates do not apply for the same jobs and specificity of each stage complements selectivity on the job level and leads to a high match for both groups. This emphasises that both institutional settings do not offset each other when both are strongly evolved but work on different layers of the labour market. These strong effects of institutions show a low competition of both groups because graduates apply for different jobs upon their certificates.

Less selective systems are rather characterised by a weaker signalling of level. This leads to more open sectors where both groups are possible candidates. If they signal different specific programmes, employers can differentiate upon the specificity of both groups. This is the case in the Baltic countries, where selectivity is low and employers cannot solely rely on level of education when choosing a candidate for a sector. Since both stages differ strongly in specificity, employers can additionally differentiate between candidates upon their programme orientation. This is why, next to level, programme orientation is a relevant characteristic. Both groups send signals, HE by level, VET by programme orientation, and this leads to the equalised closure of sectors and a higher disadvantage for university graduates (and lesser matching for both groups) compared to highly selective systems, because the sectors are less driven by level of education.

Also, in Southern Europe the signalling of level is lower and sectors are open for different degrees. However, specificity does *not* provide information on skills since both stages are general and do not provide valuable information on productivity. As a consequence, employers focus on further characteristics in order to differentiate between candidates. That is why in these systems characteristics unrelated to education are stronger considered, or decisions might be driven by the influence of social capital. If employers cannot rely on education because both level and programme orientation does not provide information on productivity, this results in a lower closure of high-skill sectors and a lower labour market segmentation in general. In these countries, education plays the lowest role and returns are least related to education, resulting in the highest

disadvantage of tertiary graduates and lowest outcomes for both groups compared to more institutionalised countries.

All in all, in highly selective HE systems a higher level of education pays off the most. This is why in these systems the highly educated are employed in the high-skill sector, as assumed by the youth-on-the-move-strategy (Europe 2020). However, this is due to their *low* tertiary graduation rates.

Countries with higher rates and thus lower selective systems, such as the Baltic countries, show less favourite educational values. In these countries the programme orientation has a higher meaning for different educational groups. Hence, the target of improving tertiary graduation rates should be accompanied by the improvement of educational programmes in order to secure outcomes from education. Highly expanded systems need complementarity of highly qualitative programmes, otherwise the outcomes on the labour market are least related to education, as in Southern Europe. Additionally, the size of tertiary education can have a different effect, depending on the demand for the highly educated, which varies strongly between countries (10–35% of total labour). As shown in the literature review, an oversupply of the highly educated enhances the risk of overeducation. The balance of the demand and supply should thus be more strongly considered, instead of requiring a fixed quota for tertiary education in all countries.

6.2 *Is higher education really higher and secondary education merely secondary?*

As is known from research or shown in this study, the highly educated achieve higher occupational status or higher earnings than groups with lower educational level, such as VET graduates. However, the pattern is different when considering the match of education and job. The chances of having a job within the right sector are lower for tertiary than for the vocationally educated. In short, university graduates face more often

overeducation or even mismatch than VET graduates. Although having a higher occupational status, the cost in investment in education pays off less for university graduates. This is due to lower labour market demand for university graduates compared to the demand for VET graduates. The high-skill sector covers a smaller part of the labour market (ca. 10–35%), whereas the technical clearly forms the biggest part (ca. 60%–80%). This shows that a smaller labour market demand reduces the opportunities for getting a job within the right sector for the highly educated. VET graduates, in turn, have higher matching due to the extensive demand on the labour market. In sum, although they have a higher occupational status, university graduates face a disadvantage compared to VET when taking matching into account.

However, this disadvantage varies strongly between countries. In German-speaking or most Eastern European countries the gap between both groups is the lowest in Europe; in these countries, the matching shares of tertiary educated are closer to the advantageous shares of VET graduates. On the other hand, university graduates face a greater disadvantage in Baltic countries, Nordic countries and – especially – in Southern Europe. In these countries, university graduates drift from the advantageous situations of VET the most. These country-specific outcomes are, in turn, related to the closure of occupations, especially of high-skill jobs. Whereas in German-speaking and most Eastern European countries the closure is the highest in Europe, it is lower in Western European and Baltic countries and especially in Southern Europe. Thus, the disadvantage faced by university graduates is smallest when high-skill jobs are protected by HE degrees. Technical closure is smaller and vary less between countries. How strongly labour market sectors are protected is, in turn, related to institutional settings. Institutional settings shape the role of degrees as an entry requirement in the right sector. In other words, institutional settings mediate the labour market segmentation. This is especially the case for selectivity and improves the labour market segmentation in general. Countries with the highest closure of high-skill jobs, such as German-speaking and some Eastern European countries, show the highest selectivity at the same time; on the other hand,

Western Europe, the Baltic and Southern Europe show the lowest selectivity and the lowest closure of jobs.

This short descriptive review indicates a link between individual outcomes, the closure of occupations and selectivity at the macro level. Turning it the other way around, countries with highly selective tertiary education show higher closure of high-skill jobs and a smaller disadvantage of university graduates in matching. On the other hand, countries with lower selective tertiary education reveal lower protection of high-skill jobs and higher disadvantage of university graduates. In sum, a selective tertiary education improves the labour market segmentation due to a higher closure of the high-skill sector, and this might lead to a smaller disadvantage for university graduates.

This assumption is supported by empirical results. The findings reveal that selectivity closes high-skill jobs and leads to higher matching within sector. That is why the disadvantage of university graduates is lower in highly selective systems than in lower ones. In sum, the selectivity mediates the closure of occupations, especially the high-skill sector and leads to a smaller gap between both groups. Vocational specificity is also important, but on the job level. Having a specific context improves the signalling of skills and the chances of matching within sectors.

This emphasises that higher level of education is not *higher* in absolute terms measured in education years but that the value of education is relative and depends on the context in which employers make their decision. First, it is due to the occupations designed for both groups. The higher educated are more strongly preferred in the high-skill sector, whereas VET are considered in the technical one and are not necessarily a secondary choice for employers. How strongly these sectors are closed by the right degree is dependent on the institutional settings. High selectivity mediates the closure of whole sectors and leads to higher matching of jobs with educational level. Specificity, in turn, closes jobs within these sectors by programme orientation. This shows that education pays off the most when both institutional settings are strongly evolved. In more strongly selective systems graduates are more strongly selected upon their degrees into the 'right' sectors, which improves their matching with level of education. When, additionally,

systems provide specific education, this enhances the chances of a job that matches their programme orientation and the skills taught in education systems.

6.3 Discussion and outlook

6.3.1 Contribution of the thesis

This thesis contributes to the comparative transition research in several ways. First, it evolves a three-layer theoretical framework explicitly indicating how two groups like HE and VET are affected by institutional settings. So far research proposes generalised statements on how institutions affect different groups within countries.

The three-layer theoretical framework builds on the perspective of the comparative transition research by considering the direct effect of institutions on individual outcomes. However, this macro-micro perspective is supplemented by a meso level in this study. Since both educational degrees are designed for different job sectors, the occupational level has been considered as well. This framework could show that institutional settings at the macro level shape the signalling of degrees and mediate the closure of labour market sectors at the meso level. This, in turn, drives the chances for a matching for VET and HE graduates at the micro level. Several layers of the labour market at once were so far barely addressed for a wide range of countries in comparative transition research.

Second, the thesis proposes an explanation disentangling the effect of two institutions: selectivity and vocational specificity. The findings suggest that selectivity enhances the signalling of level, while specificity improves the signalling of programme orientation. Since level is important for the closure of whole labour market sectors while programme orientation is important for jobs within these sectors, the effect of specificity is limited to the closure of jobs within sectors. This emphasises that both institutional settings do not offset but complement each other on different layers of the labour market.

That is an alternative explanation as to why specificity does not show conclusive effects within the research. The effect of vocational specificity is conditional on selectivity and hence both institutional settings might be considered together in order to understand its impact. As described in the literature review, vocational specificity did not show a

conclusive effect when considered in isolation. Two studies even found a negative effect, particularly on horizontal matching. This might be driven by their country sample. The analysed sample of Wolbers (2003) consists of countries which have highly selective HE systems (Austria, Luxembourg, Belgium, Finland, Netherlands, Italy, Slovenia, and partly France, Greece, Hungary) as opposed to less selective ones (Denmark, Spain, Sweden). The same applies to the study of Levels et al. (2014), which considered highly selective countries (Austria, Luxembourg, Germany, the Czech Republic, Slovenia, Slovak Republic, Belgium, Finland, Netherlands, Norway, France, Greece, Hungary, Italy) rather than less selective ones (Sweden, Poland, Ireland, Denmark, Spain, the UK). As shown in this study, in highly selective systems, specificity has a slightly negative effect on all matching variables for both groups, including VET. Hence, the negative effect of specificity might be due to the country sample characterised by high selectivity, being strongly relevant for the decision-making process. Future research should thus always take into account both institutions since they are often similarly strongly or weakly developed. Thus, when analysing the effect of vocational specificity one should at least control for stratification or selectivity, and vice versa. Additionally, it is important to link particular institutions to the right labour market outcomes, which so far has often been neglected in research. This study showed that selectivity drives the signalling of educational levels. This is strongly associated with vertical labour market outcomes such as the vertical match. The same can apply to other vertical outcomes such as occupational status (ISEI, ISCO) or wages. Specificity on the other hand rather drives horizontal outcomes such as the match between education and jobs. Thus, it is important to consider the right outcomes with the right institutions. The same applies to labour market institutions, which drive outcomes such as the chance of getting and keeping a job or unemployment risks more than matching.

The operationalisation of the dependent variable might provide an additional explanation for the inconclusive effect within the above mentioned studies. Both studies found a negative effect on the horizontal matching, without considering the sector in which these matching takes place. Having a horizontal match within the 'right' sector is a

different outcome than having a horizontal match in the 'wrong' sector. Both Wolbers (2003) and Levels et al. (2014) used horizontal matching without this differentiation and the sensitivity checks of this thesis did not reveal significant effects of specificity on classic horizontal matching either (results not shown). Since a job is characterised by both vertical and horizontal match, a matching dependent variable should imply this combination because both characteristics are driven by different institutions. Hence, further research should consider the sector in which horizontal match takes place, since the sectors are strongly affected by selectivity rather than specificity.

Considering the occupational level within the three-layer framework brought new insights. In general, the two sectors show different segmentation logics. The high-skill sector is more strongly closed by HE degrees, having a strong entry requirement and protecting HE degrees from outsiders, like VET graduates. The technical sector is more strongly open and different degrees are demanded. This might be related to the productivity of the highly educated as a suitable group for both sectors and additionally to the size of the sector, which is large enough to accommodate different groups.

Third, this thesis proposes structural and qualitative indicators addressing characteristics of both educational stages at the same time. While the selectivity of HE stage addresses how both stages differ in quantity, the indicator for quality of education compares the vocational specificity of both stages directly. Comparative transition research focuses rather on characteristics of the secondary stage, while the characteristics of the HE stage were less considered, especially regarding vocational specificity. This gives a more detailed operationalisation of institutional settings considering both stages at the same time and showing expected results. Considering the specificity of both stages revealed how the specificity of two groups with different educational level could complement selectivity at the job level.

Fourth, this study considers a wider range of countries (28) making it possible to verify the identified continuum of transition patterns – first, by providing descriptions of labour market outcomes for a wide country sample at once. Additionally, descriptions of labour market outcomes of both groups at once are provided, addressing differences

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within countries, barely offered in research. Second, the institutional setting for a wider range of countries was described. Former research used different country samples, which might lead to different classifications of those countries. This allowed us to provide descriptions of institutional settings of Western Europe societies and Eastern Europe in a direct comparison, which is less offered within research.

In sum, the continuum of countries identified in comparative research could be confirmed. As is known from transition research, there is a continuum of German-speaking countries having strong institutional settings and Southern Europe lacking these settings and leading to low outcomes. However, Nordic countries reveal lower outcomes than shown in the literature review. Additionally, the country groups are not purely uniform, apart from the heterogeneity of Eastern Europe, smaller countries from Southern Europe, such as Cyprus or Malta as well as Luxembourg within the German-speaking group, reveal higher outcomes than their neighbours. Small countries might show different institutional logics of education systems, being closer aligned with the labour market due to closer linkage of both sides on the regional level.

Considering the direct difference between both educational groups reveals that the highly educated do not necessarily have advantageous labour market outcomes compared to lower educated groups like VET graduates. When considering matching, investment in higher education pays off less than for VET graduates. This is due to the smaller demand for high-skill labour.

6.3.2 Study limitations

Despite this contribution, this study shows several limitations. Cross-sectional data limits the analyses to the first job after graduation, fading out further career development within the transition process and beyond. Longitudinal data would widen the perspective to a proper transition period, being defined in research as five years after graduation or even longer. Considering the institutional impact solely on the first job allows limited conclusions. Research focusing on further career development shows that with time the signalling of education is lower and other signals (like job experience) become more relevant (Gangl, 2001). Some authors even emphasise a trade-off between high outcomes

within the transition period but static further career development. Institutions, especially the vocational specificity of programmes are beneficial within the transition period; however, more general education programmes tend to lead to more favourable labour market positions in the longer run (Gangl, 2003; Brunello & Schlotter, 2011; Brunello & Rocco, 2015; Forster et al., 2016; Hanushek et al., 2017; Verhaest et al., 2018). The generally educated labour has stronger transferable skills while specific skills hinder adaptation to new jobs or new technologies.

Additionally, strong institutionalisation improves the inequality in educational opportunities. Especially the stratification of education systems and its strongly selective effect hinders individuals from lower social backgrounds in achieving higher educational outcomes (Bol & Van de Werfhorst, 2013).

This study also reveals a narrow scope by addressing only few factors at the country level. Countries are complex constructs and a limited number of institutional settings cannot reveal the whole picture.

First, by considering only two indicators for educational systems allows a very limited perspective and further or more convenient indicators for education stages would add more insights. Although official statistics offer a wide range of country indicators suitable for research, comparable indicators for both secondary and higher education stage are scarce – in particular, information on specificity, especially as regards tertiary education. This study only assumes that a higher share of specific fields of education might be related to a higher share of universities of applied sciences in a country and more applicable indicators for specificity would contribute to research. This also applies to indicators addressing work experience during education. Such indicators are barely offered for VET stage, being limited to particular points in time, while indicators regarding higher education are, to my knowledge, not available. A proper contribution towards filling this gap is offered by the project 'European Tertiary Education Register (ETER)',[75] a platform providing data on characteristics of tertiary education institutions in Europe,

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[75] https://www.eter-project.com/#/search

such as size, field offer, programme orientation, etc. However, this platform is still evolving, and so far offers information on a limited number of higher education institutions within European countries.

Second, education systems are not the only relevant context shaping individual outcomes.

Although this study has concentrated on the role of education systems, considering labour market institutions would widen the analytical perspective. As shown in the literature review, labour market institutions such as employment protection legislation or the sustaining employment policies are another relevant context shaping individual outcomes. Besides these institutional settings, the labour market demand and supply imbalance clearly influences individual outcomes.

Apart from these clearly significant contexts at the country level, analyses considering lower analytical levels would provide better insights into how institutions shape individual outcomes. As has been addressed regarding small countries in this study sample, their education systems might be more strongly linked to the labour market on the regional level. More detailed operationalisations of educational linkages with the labour market not only limited to the country level (for an example, see Bol et al., 2019) would contribute to comparative transition research.

Third, besides the context of education system or the labour market, the composition of labour surely plays a strong role and clearly deserves more attention than has been given to it in this study. Labour can consist of different individuals regarding social background, gender or migration status which is related to different labour market outcomes driven by institutional settings (Machin & Puhani, 2003; Kalter & Kogan, 2006; Reimer & Steinmetz, 2007; Gangl & Ziefle, 2009; Triventi, 2011; Bol & Van de Werfhorst, 2013). By considering compositional effects would widen the scope of a comparative perspective. Although this study does barely address compositional effect, it clearly does not neglect its importance.

Lastly, institutions do not determinate individual actions but provide a framework of conditions affecting the actions of both workers and employers in the labour market.

Although transition research contributes to understanding the role of the context in which labour market processes take place, this, on the other hand, does not mean that institutions determine individual actions but can contribute only to the explanation of complex individual processes within countries.

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Appendix

Appendix A: Index of occupational closure

$$M(occ)_j = \sum_j p_{j|g} \log (p_{j|g} / p_j)$$

In order to understand the formula, a stepwise calculation is introduced.

The first two columns identify the main educational and occupational groups. The third column shows the size of educational groups; for example, in Portugal the sample consists of 33% secondary graduates (SE) and 67% university graduates. The fourth column reveals the distribution of educational groups within occupations; for example, in Portugal ISCO 3 occupation consists of 67% HE and 33% SE graduates. The next column computes for each educational group the logarithmic chance of employment in an occupation by considering the educational distribution in general. The final column sums up these chances for both groups within each occupation. If the chances are similar, the number is close to 0; if the chances for one group are higher, the number is relatively higher.

The final measure (F) differs from a purely distribution (D) by comparing the *chances* for both groups of having the occupation. This is due to considering the size of the educational group. We can look at the distribution of both groups within ISCO 2. In both countries, ISCO 2 is dominated by the highly educated: in Austria the figure is 80% and in Portugal 98%. However, different values of closure by degrees arise while considering the size of the educational groups. Considering the smaller rate of HE in the population in Austria (10%) than in Portugal (67%), the closure for high-skill jobs (ISCO2) is higher in Austria (1.1) than in Portugal (0.32). Since the group of the highly educated is smaller in Austria than in Portugal, the absolute distribution of HE in high-skill jobs differs from the relative distribution of HE considered within the dispersion index.

Table 4: The decomposition index for Austria

Education	Occupation (ISCO)	pj	pj|g	pj|g log (pj|g / pj)	∑ pj|g log (pj|g / pj)
HE	1	0.1	0.4	0.6	0.3
SE	1	0.9	0.6	-0.3	0.3
SE	2	0.9	0.2	-0.3	1.1
HE	2	0.1	0.8	1.4	1.1
SE	3	0.9	0.9	0.0	0.0
HE	3	0.1	0.1	0.0	0.0
HE	4	0.1	0.1	0.0	0.0
SE	4	0.9	0.9	0.0	0.0
SE	5	0.9	1.0	0.1	0.1
HE	5	0.1	0.0	0.0	0.1
HE	6	0.1	0.0	0.0	0.0
SE	6	0.9	1.0	0.1	0.0
SE	7	0.9	1.0	0.1	0.1
HE	7	0.1	0.0	0.0	0.1
HE	8	0.1	0.0	0.0	0.1
SE	8	0.9	1.0	0.1	0.1
HE	9	0.1	0.1	0.0	0.0
SE	9	0.9	0.9	0.1	0.0

HE = higher education; SE = secondary education

Table 5: The decomposition index for Portugal

Education	Occupation (ISCO)	pj	pj|g	pj|g log (pj|g / pj)	∑ pj|g log (pj|g / pj)
SE	1	0.33	0.09	-0.12	0.16
HE	1	0.67	0.91	0.28	0.16
SE	2	0.33	0.02	-0.05	0.32
HE	2	0.67	0.98	0.37	0.32
SE	3	0.33	0.28	-0.05	0.01
HE	3	0.67	0.72	0.05	0.01
SE	4	0.33	0.44	0.12	0.03
HE	4	0.67	0.56	-0.10	0.03
SE	5	0.33	0.64	0.43	0.21
HE	5	0.67	0.36	-0.23	0.21
HE	6	0.67	0.22	-0.25	0.42
SE	6	0.33	0.78	0.67	0.42
HE	7	0.67	0.14	-0.22	0.60
SE	7	0.33	0.86	0.82	0.60
SE	8	0.33	0.89	0.89	0.69
HE	8	0.67	0.11	-0.20	0.69
HE	9	0.67	0.09	-0.19	0.73
SE	9	0.33	0.91	0.92	0.73

HE = higher education; SE = secondary education

Appendix B: Full match of HE and VET graduates in Europe

Figure 24: The match between educational level and field with first job
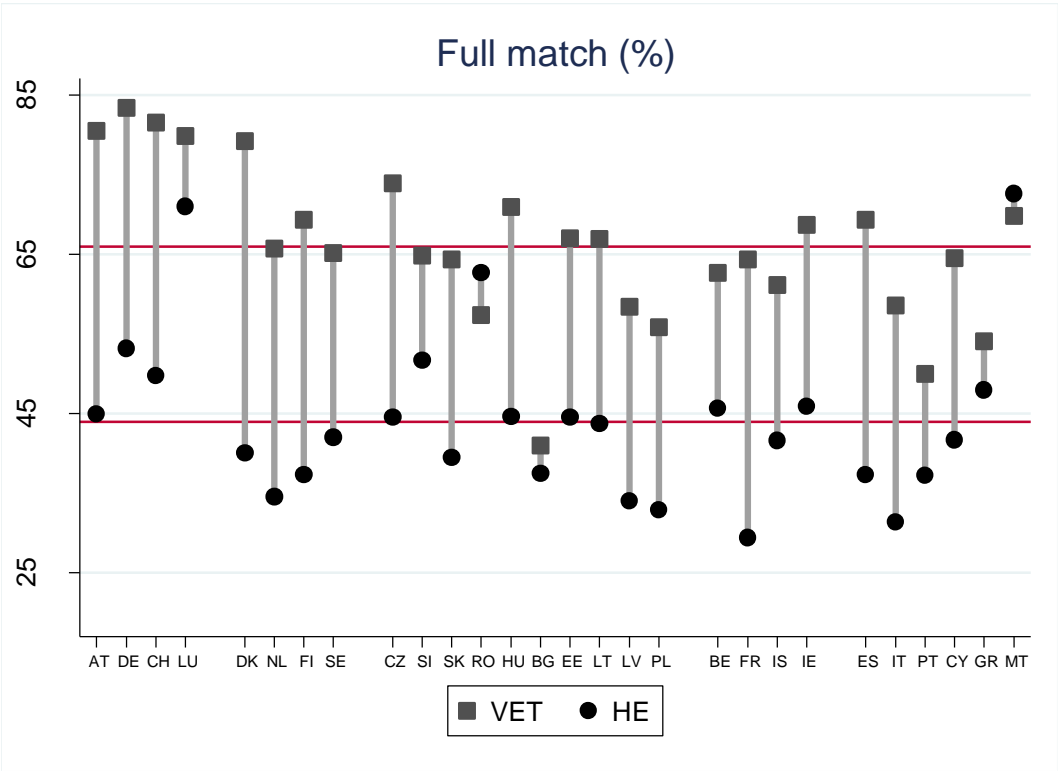
Appendix C: Multilevel regression models

The following tables illustrate the cross-level interaction effects between individual education and *selectivity* (M1 and M2), *specificity* (M3 and *M4)* and *specificity* in either *highly selective systems* (M5 and M6) or *less selective ones* (M7 and M8). These models represent the effects shown by the plots in the analytical chapter (chapter 5.2). Each table addresses different matching variables for both groups within a particular labour market sector, as addressed by the hypotheses (the variables are listed in the table title). Further analyses using the same matching variable for both groups (e.g. full match VET and full match HE) within the cross-level interaction term reveal similar plots (results not shown). In order to check for linearity, the institutional variables are expressed in five quantiles. Additionally, each institutional effect is controlled for the index of occupational closure (described in chapter 4.2.3). Findings reveal that the effect of selectivity is diminishing when controlling for occupational closure (M1 vs. M2) in the high skill sector (Table 6, Table 7) and partly in the technical sector (Table 9). Thus, the macro-micro effect of selectivity is weakening because it is partly explained by the closure of occupations (meso level). This is in line with the assumption that selectivity mediates the closure of whole labour market sectors, which in turn influences the matching on the individual level.

Conversely, the macro-micro effect of vocational specificity gets more pronounced when controlling for occupational closure in less selective systems (M7 vs. M8) in both labour market sectors (Table 6, Table 7, Table8, Table9). This is in line with the assumption that the effect of specificity is dependent on occupational closure and thus is more strongly expressed when the closure of occupations is accounted for.

These brief descriptions reveal that the institutional effects presented in the analytical chapter are rather linear. Additionally, it gives support for the theoretical assumptions about institutional effects; selectivity mediates the closure of occupations, which in turn shapes the effect of vocational specificity.[76]

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[76] Further, the ICC changes strongly in the high skill sector (Table 6) when controlling for occupational closure. This is due to the change of the individual variance, which provokes the change of the country level variance, since both constitute the total variance. The occupational closure diminishes the individual variance because the occupational closure of high-skill jobs is apparently strongly related to the chances of individual matching within this sector.

Table 6: Cross level interaction terms of institutional settings with individual outcomes **(full match HE vs. mere horizontal VET)**

Full match HE vs. mere horizontal VET	M1		M2		M3		M4		M5 highly sel.		M6 highly sel.		M7 less sel.		M8 less sel.	
VET (ref. HE)	-0,08	[0,06]	0,11*	[0,06]	-0,26***	[0,05]	-0,04	[0,05]	-0,19***	[0,05]	0,02	[0,05]	-0,30***	[0,06]	-0,07	[0,10]
FoE (ref. gen progr.)																
Education	0,52***	[0,07]	0,42***	[0,05]	0,51***	[0,07]	0,42***	[0,05]	0,57***	[0,08]	0,46***	[0,06]	0,43***	[0,12]	0,35***	[0,07]
Humanities & arts	0,26***	[0,07]	0,33***	[0,05]	0,26***	[0,07]	0,33***	[0,05]	0,28***	[0,08]	0,35***	[0,06]	0,22+	[0,12]	0,28***	[0,07]
Soc. science, busin. & law	0,56***	[0,07]	0,50***	[0,05]	0,56***	[0,07]	0,50***	[0,05]	0,58***	[0,08]	0,53***	[0,06]	0,55***	[0,12]	0,43***	[0,07]
Science	0,37***	[0,07]	0,37***	[0,05]	0,37***	[0,07]	0,37***	[0,05]	0,42***	[0,08]	0,40***	[0,06]	0,29*	[0,12]	0,31***	[0,07]
Engineering	0,50***	[0,07]	0,45***	[0,05]	0,49***	[0,07]	0,45***	[0,05]	0,52***	[0,08]	0,47***	[0,06]	0,46***	[0,12]	0,40***	[0,07]
Agriculture	0,18*	[0,07]	0,30***	[0,05]	0,18*	[0,07]	0,30***	[0,05]	0,20*	[0,09]	0,31***	[0,06]	0,14	[0,13]	0,27***	[0,08]
Health	0,55***	[0,07]	0,44***	[0,05]	0,55***	[0,07]	0,44***	[0,05]	0,55***	[0,08]	0,45***	[0,06]	0,56***	[0,12]	0,40***	[0,07]
Services	0,28***	[0,07]	0,44***	[0,05]	0,28***	[0,07]	0,44***	[0,05]	0,35***	[0,08]	0,47***	[0,06]	0,1	[0,13]	0,37***	[0,07]
Work experience (ref. no exp.)																
within educ.	0,02	[0,01]	0,01	[0,01]	0,02	[0,01]	0,01	[0,01]	0	[0,01]	0,02*	[0,01]	0,06**	[0,02]	-0,02	[0,01]
outside educ.	-0,06***	[0,01]	-0,02***	[0,01]	-0,06***	[0,01]	-0,02***	[0,01]	-0,05***	[0,01]	-0,02+	[0,01]	-0,07***	[0,02]	-0,03**	[0,01]
Parents tertiary educ.	0,04***	[0,01]	0,01+	[0,00]	0,05***	[0,01]	0,01+	[0,01]	0,04***	[0,01]	0	[0,00]	0,06***	[0,01]	0,01	[0,01]
Female	-0,01	[0,01]	0	[0,01]	-0,01	[0,01]	0	[0,01]	-0,01	[0,01]	0	[0,01]	-0,01	[0,02]	-0,01	[0,01]
Migrant	-0,00***	[0,00]	0	[0,00]	-0,00***	[0,00]	0	[0,00]	-0,00**	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
Married	0,03***	[0,01]	0,02**	[0,01]	0,03***	[0,01]	0,02**	[0,01]	0,03***	[0,01]	0,02**	[0,01]	0,03+	[0,02]	0,01	[0,01]
Still in first job	0,14***	[0,01]	0,05***	[0,01]	0,14***	[0,01]	0,05***	[0,01]	0,14***	[0,01]	0,06***	[0,01]	0,14***	[0,01]	0,04***	[0,01]
high skill sector (ISCO1)	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,01]	0,01+	[0,01]
high skill sector (ISCO2)	0	[0,00]	0,01*	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0,01**	[0,00]	-0,01	[0,01]	-0,02*	[0,01]
UNEMPL.	-0,00*	[0,00]	-0,00*	[0,00]	0	[0,00]	0	[0,00]	-0,01*	[0,00]	-0,00+	[0,00]	0	[0,00]	0	[0,00]
GDP	0,00*	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,00**	[0,00]	0,01*	[0,00]	0,00*	[0,00]	0,01+	[0,00]	0	[0,00]
LOW EDUC.	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
graduation year	-0,01**	[0,00]	-0,00+	[0,00]	-0,01***	[0,00]	0	[0,00]	-0,01***	[0,00]	-0,00*	[0,00]	0	[0,00]	0,01*	[0,00]
SELECTIVITY (ref. 1st quantile)																
2nd	0,08***	[0,02]	0,07***	[0,02]												
3rd	0,11***	[0,03]	0,08***	[0,02]												
4th	0,11***	[0,03]	0,07***	[0,02]												
5th	0,15***	[0,03]	0,06*	[0,02]												
VET (ref. HE) * SELECTIVITY (ref. 1st quantile)																
VET * 2nd	-0,06	[0,06]	-0,07	[0,05]												
VET * 3rd	-0,03	[0,06]	-0,02	[0,05]												
VET * 4th	**-0,11+**	[0,06]	**-0,09+**	[0,05]												
VET * 5th	**-0,21***	[0,06]	**-0,15**	[0,05]				_highly selective_					_less selective_			
occupational closure			0,11***	[0,00]			0,11***	[0,00]			0,11***	[0,00]			0,14***	[0,00]
SPECIFICITY (ref. 1st qantile)																
2nd					-0,03+	[0,02]	-0,02	[0,01]	0,01	[0,02]	0,01	[0,02]	-0,08*	[0,03]	-0,03	[0,02]
3rd					-0,05+	[0,02]	-0,01	[0,02]	0	[0,03]	0,03	[0,03]	-0,09*	[0,04]	-0,04	[0,03]
4th					-0,08**	[0,03]	-0,02	[0,02]	-0,03	[0,03]	0,03	[0,03]	-0,19***	[0,05]	-0,09*	[0,04]
5th					-0,08**	[0,03]	-0,03	[0,03]	-0,05	[0,03]	0,01	[0,03]	-0,13	[0,10]	-0,12	[0,07]
VET (ref. HE) * SPECIFICITY (1st quantile)																
VET * 2nd					0,01	[0,05]	0,01	[0,04]	-0,05	[0,06]	-0,05	[0,04]	0,07	[0,09]	0,1	[0,08]
VET * 3rd					**0,12***	[0,06]	**0,11***	[0,05]	0	[0,07]	0,01	[0,05]	**0,26***	[0,08]	**0,29**	[0,09]
VET * 4th					**0,13***	[0,06]	**0,14**	[0,05]	0	[0,07]	0,04	[0,06]	**0,37***	[0,08]	**0,31**	[0,10]
VET * 5th					**0,10+**	[0,06]	**0,12***	[0,06]	0	[0,07]	0,03	[0,06]	0,13	[0,22]	**0,42+**	[0,25]
Intercept	12,64	[4,28]	5,02	[3,35]	14,46	[3,68]	-0,49	[2,95]	15,04	[4,26]	6,88	[3,75]	0,9	[8,92]	-15,73	[6,19]
Country level (intercept)	0,01	[0,00]	0,04	[0,01]	0,01	[0,00]	0,04	[0,01]	0,00	[0,00]	0,03	[0,01]	0,01	[0,01]	0,05	[0,02]
Country level (slope)	0,01	[0,00]	0,04	[0,01]	0,01	[0,00]	0,03	[0,01]	0,01	[0,01]	0,02	[0,01]	0,00	[0,01]	0,07	[0,04]
Individual level (residual)	0,18	[0,00]	0,08	[0,00]	0,18	[0,00]	0,08	[0,00]	0,18	[0,00]	0,09	[0,00]	0,19	[0,00]	0,06	[0,00]
ICC	0,03		0,3		0,03		0,32		0,02		0,25		0,05		0,47	
N	12721		12721		12721		12721		8602		8602		4119		4119	

Predicted probabilities. The dependent variable expresses the effect of being in a matched job (ref. mismatch), see table title. Data: Labour Force Survey 2009

Table 7: Cross level interaction terms of institutional settings with individual outcomes **(mere vertical match HE vs. mere horiz. VET)**

mere vertical HE vs. mere horizontal VET	M1		M2		M3		M4		M5 highly sel.		M6 highly sel.		M7 less sel.		M8 less sel.	
HighskVMhe																
VET (ref. HE)	0,13+	[0,07]	0,10+	[0,06]	-0,06	[0,05]	-0,02	[0,05]	0,03	[0,07]	0,07	[0,06]	-0,07	[0,07]	-0,11	[0,09]
FoE (ref. gen progr.)																
Education	0,01	[0,07]	0,12*	[0,05]	0,01	[0,07]	0,12*	[0,05]	0,15+	[0,09]	0,21**	[0,07]	-0,19+	[0,10]	0,02	[0,07]
Humanities & arts	0,14*	[0,07]	0,18***	[0,05]	0,14*	[0,07]	0,18***	[0,05]	0,22*	[0,09]	0,25***	[0,07]	0,05	[0,10]	0,1	[0,07]
Soc. science, busin. & law	0,12+	[0,07]	0,15**	[0,05]	0,12+	[0,07]	0,15**	[0,05]	0,25**	[0,09]	0,25***	[0,07]	-0,11	[0,10]	0,01	[0,07]
Science	0,24***	[0,07]	0,22***	[0,05]	0,24***	[0,07]	0,22***	[0,05]	0,38***	[0,09]	0,31***	[0,07]	0,02	[0,10]	0,1	[0,07]
Engineering	0,22**	[0,07]	0,30***	[0,05]	0,21**	[0,07]	0,30***	[0,05]	0,33***	[0,09]	0,38***	[0,07]	0,04	[0,10]	0,20**	[0,07]
Agriculture	0,13+	[0,07]	0,17**	[0,05]	0,12+	[0,07]	0,16**	[0,05]	0,20*	[0,09]	0,23**	[0,07]	0,03	[0,11]	0,07	[0,08]
Health	0,15*	[0,07]	0,21***	[0,05]	0,15*	[0,07]	0,21***	[0,05]	0,30***	[0,09]	0,31***	[0,07]	-0,12	[0,11]	0,07	[0,07]
Services	0,28***	[0,07]	0,31***	[0,05]	0,28***	[0,07]	0,31***	[0,05]	0,39***	[0,09]	0,40***	[0,07]	0,1	[0,11]	0,18*	[0,07]
Work experience (ref. no exp.)																
within educ.	0,03+	[0,02]	0,03*	[0,01]	0,03*	[0,02]	0,03*	[0,01]	0,03	[0,02]	0,03*	[0,02]	0,05	[0,03]	0	[0,02]
outside educ.	-0,02	[0,01]	0	[0,01]	-0,02	[0,01]	0	[0,01]	-0,01	[0,02]	0,01	[0,01]	-0,04+	[0,02]	-0,01	[0,02]
Parents tertiary educ.	0,04***	[0,01]	0	[0,01]	0,04***	[0,01]	0,01	[0,01]	0,04***	[0,01]	0,01	[0,01]	0,03*	[0,01]	0	[0,01]
Female	0,01	[0,01]	0	[0,01]	0,01	[0,01]	0	[0,01]	0,02	[0,01]	0,01	[0,01]	-0,02	[0,02]	-0,01	[0,01]
Migrant	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
Married	0,03*	[0,01]	0,04***	[0,01]	0,03*	[0,01]	0,04***	[0,01]	0,03*	[0,01]	0,04***	[0,01]	0,03	[0,02]	0,01	[0,02]
Still in first job	0,14***	[0,01]	0,07**	[0,01]	0,14***	[0,01]	0,07**	[0,01]	0,14***	[0,01]	0,08***	[0,01]	0,14***	[0,02]	0,05***	[0,01]
high skill sector (ISCO1)	0	[0,00]	0,01+	[0,00]	0	[0,00]	0,01*	[0,00]	0	[0,00]	0,01	[0,00]	0,01	[0,00]	0,03***	[0,01]
high skill sector (ISCO2)	0	[0,00]	0,01***	[0,00]	0	[0,00]	0,01**	[0,00]	0,01	[0,00]	0,02***	[0,00]	0	[0,01]	-0,01	[0,01]
UNEMPL.	-0,00+	[0,00]	-0,00*	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	-0,01+	[0,00]	0	[0,00]
GDP	0,00+	[0,00]	0	[0,00]	0	[0,00]	0,00+	[0,00]	0,01*	[0,00]	0,01*	[0,00]	0	[0,00]	0,01+	[0,00]
LOW EDUC.	0	[0,00]	0,00*	[0,00]	0	[0,00]	0,00*	[0,00]	-0,00**	[0,00]	0	[0,00]	0	[0,00]	0,00*	[0,00]
graduation year	-0,01*	[0,00]	-0,00*	[0,00]	-0,01***	[0,00]	-0,00*	[0,00]	-0,01**	[0,00]	-0,01**	[0,00]	-0,01	[0,01]	0	[0,00]
SELECTIVITY (ref. 1st quantile)																
2nd	0,04	[0,03]	0,05+	[0,03]												
3rd	0,06	[0,04]	0,05	[0,03]												
4th	0,11**	[0,04]	0,08**	[0,03]												
5th	0,19***	[0,05]	0,07+	[0,04]												
VET (ref. HE) * SELECTIVITY (ref. 1st quantile)																
VET * 2nd	-0,05	[0,07]	-0,03	[0,06]												
VET * 3rd	-0,01	[0,07]	0,03	[0,06]												
VET * 4th	**-0,13+**	[0,07]	-0,07	[0,06]												
VET * 5th	**-0,23****	[0,08]	**-0,12***	[0,06]					*highly selective*						*less selective*	
occupational closure			**0,11***	[0,00]			**0,11***	[0,00]			**0,10***	[0,00]			**0,14***	[0,00]
SPECIFICITY (ref. 1st qantile)																
2nd					-0,02	[0,03]	-0,01	[0,02]	0,03	[0,04]	0,03	[0,03]	-0,02	[0,04]	-0,04	[0,03]
3rd					-0,07*	[0,04]	-0,02	[0,03]	0	[0,05]	0,04	[0,04]	-0,03	[0,05]	-0,04	[0,04]
4th					-0,12**	[0,04]	-0,03	[0,03]	-0,06	[0,05]	0,01	[0,04]	-0,09	[0,06]	-0,10*	[0,05]
5th					-0,12*	[0,05]	-0,04	[0,04]	-0,08	[0,05]	-0,01	[0,04]	-0,25+	[0,14]	-0,20+	[0,11]
VET (ref. HE) * SPECIFICITY (1st quantile)																
VET * 2nd					0,01	[0,06]	-0,02	[0,05]	-0,08	[0,07]	-0,08	[0,06]	-0,02	[0,10]	0,05	[0,09]
VET * 3rd					0,11+	[0,06]	0,08	[0,05]	-0,02	[0,08]	-0,02	[0,07]	**0,18***	[0,09]	**0,27****	[0,10]
VET * 4th					0,14*	[0,07]	0,14*	[0,06]	0	[0,08]	0,02	[0,07]	**0,29****	[0,09]	**0,31****	[0,11]
VET * 5th					0,09	[0,07]	0,11+	[0,06]	-0,01	[0,09]	0,01	[0,07]	0,36	[0,26]	**0,47+**	[0,25]
Intercept	12,04	[5,82]	9,35	[4,81]	19,51	[4,83]	8,13	[4,09]	18,12	[5,68]	13,29	[5,02]	13,82	[11,49]	-9,46	[8,67]
Country level (intercept)	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,00	[0,00]	0,00	[0,00]
Country level (slope)	0,01	[0,01]	0,01	[0,01]	0,02	[0,01]	0,01	[0,01]	0,03	[0,01]	0,02	[0,01]	0,01	[0,01]	0,03	[0,02]
Individual level (residual)	0,22	[0,00]	0,13	[0,00]	0,22	[0,00]	0,13	[0,00]	0,23	[0,00]	0,14	[0,00]	0,21	[0,01]	0,10	[0,00]
ICC	0,03		0,06		0,04		0,05		0,04		0,04		0,01		0,05	
N	7156		7156		7156		7156		4968		4968		2188		2188	

Predicted probabilities. The dependent variable expresses the effect of being in a matched job (ref. mismatch), see table title. Data: Labour Force Survey 2009

Table 8: Cross level interaction terms of institutional settings with individual outcomes **(full match VET vs. mere horizontal HE)**

full match VET vs. horizontal HE	M1		M2		M3		M4		M5 highly sel.		M6 highly sel.		M7 less sel.		M8 less sel.	
VET (ref. HE)	0,23***	[0,02]	0,25***	[0,03]	0,17***	[0,02]	0,19***	[0,02]	0,21***	[0,02]	0,24***	[0,03]	0,17***	[0,03]	0,17***	[0,03]
FoE (ref. gen progr.)																
Education	-0,24***	[0,03]	-0,23***	[0,03]	-0,25***	[0,03]	-0,24***	[0,03]	-0,18***	[0,03]	-0,16***	[0,03]	-0,32***	[0,05]	-0,31***	[0,05]
Humanities & arts	-0,32***	[0,03]	-0,31***	[0,03]	-0,32***	[0,03]	-0,31***	[0,03]	-0,30***	[0,03]	-0,29***	[0,03]	-0,33***	[0,05]	-0,33***	[0,05]
Soc. science, busin. & law	0,19***	[0,02]	0,19***	[0,02]	0,19***	[0,02]	0,19***	[0,02]	0,19***	[0,03]	0,19***	[0,03]	0,23***	[0,05]	0,23***	[0,05]
Science	-0,18***	[0,03]	-0,18***	[0,03]	-0,19***	[0,03]	-0,18***	[0,03]	-0,14***	[0,03]	-0,13***	[0,03]	-0,24***	[0,05]	-0,24***	[0,05]
Engineering	0,13***	[0,02]	0,17***	[0,02]	0,13***	[0,02]	0,17***	[0,02]	0,15***	[0,03]	0,20***	[0,03]	0,08	[0,05]	0,10*	[0,05]
Agriculture	-0,11***	[0,03]	-0,09**	[0,03]	-0,11***	[0,03]	-0,09**	[0,03]	-0,07*	[0,03]	-0,03	[0,03]	-0,21***	[0,06]	-0,21***	[0,06]
Health	0,16***	[0,03]	0,16***	[0,03]	0,16***	[0,03]	0,16***	[0,03]	0,18***	[0,03]	0,18***	[0,03]	0,13**	[0,05]	0,14**	[0,05]
Services	0,14***	[0,03]	0,14***	[0,02]	0,13***	[0,03]	0,14***	[0,02]	0,15***	[0,03]	0,17***	[0,03]	0,10*	[0,05]	0,10*	[0,05]
Work experience (ref. no exp.)																
within educ.	0,03***	[0,01]	0,03***	[0,01]	0,03***	[0,01]	0,03***	[0,01]	0,03***	[0,01]	0,03***	[0,01]	0,03*	[0,01]	0,03*	[0,01]
outside educ.	-0,02**	[0,01]	-0,02***	[0,01]	-0,02*	[0,01]	-0,02**	[0,01]	-0,01	[0,01]	-0,01	[0,01]	-0,04***	[0,01]	-0,04***	[0,01]
Parents tertiary educ.	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,01]	0	[0,01]
Female	0,01**	[0,01]	0	[0,00]	0,01**	[0,01]	0	[0,00]	0,01*	[0,01]	0	[0,01]	0,02+	[0,01]	0,01	[0,01]
Migrant	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,01***	[0,00]	-0,01***	[0,00]
Married	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]
Still in first job	0,02***	[0,00]	0,02***	[0,00]	0,02***	[0,00]	0,02***	[0,00]	0,02**	[0,00]	0,01**	[0,00]	0,03**	[0,01]	0,03***	[0,01]
high skill sector (ISCO1)	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
high skill sector (ISCO2)	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0,00+	[0,00]	0	[0,00]	0	[0,01]
UNEMPL.	-0,00**	[0,00]	-0,00**	[0,00]	-0,00**	[0,00]	-0,00*	[0,00]	-0,00**	[0,00]	-0,00*	[0,00]	0	[0,00]	0	[0,00]
GDP	0,00**	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,00**	[0,00]	0,00**	[0,00]	0	[0,00]	0	[0,00]
LOW EDUC.	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
graduation year	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
SELECTIVITY (ref. 1st quantile)																
2nd	0,03	[0,02]	0,03+	[0,02]												
3rd	0,04+	[0,02]	0,04*	[0,02]												
4th	0,04+	[0,02]	0,04+	[0,02]												
5th	0,06*	[0,02]	0,06*	[0,02]												
VET (ref. HE) * SELECTIVITY (ref. 1st quantile)																
VET * 2nd	0	[0,02]	0	[0,02]												
VET * 3rd	-0,01	[0,02]	0	[0,03]												
VET * 4th	-0,03	[0,02]	-0,01	[0,03]												
VET * 5th	-0,04	[0,03]	-0,02	[0,03]					*highly selective*				*less selective*			
occupational closure			-0,06***	[0,00]			-0,06***	[0,00]			-0,06***	[0,00]			-0,05***	[0,01]
SPECIFICITY (ref. 1st qantile)																
2nd					-0,04*	[0,02]	-0,04*	[0,02]	0,02	[0,02]	0,02	[0,02]	-0,11***	[0,03]	-0,11***	[0,03]
3rd					-0,05*	[0,02]	-0,05*	[0,02]	0,01	[0,03]	0,01	[0,03]	-0,10**	[0,04]	-0,10**	[0,04]
4th					-0,10***	[0,02]	-0,10***	[0,02]	-0,04	[0,03]	-0,03	[0,03]	-0,16***	[0,04]	-0,16***	[0,04]
5th					-0,12***	[0,03]	-0,12***	[0,03]	-0,06*	[0,03]	-0,06*	[0,03]	-0,21	[0,10]	-0,22*	[0,10]
VET (ref. HE) * SPECIFICITY (1st quantile)																
VET * 2nd					0,03	[0,02]	0,03	[0,02]	-0,04	[0,02]	-0,04	[0,03]	0,08*	[0,04]	0,11**	[0,03]
VET * 3rd					0,04+	[0,02]	0,04+	[0,02]	-0,02	[0,03]	-0,02	[0,03]	0,11**	[0,03]	0,13***	[0,03]
VET * 4th					0,08**	[0,02]	0,09**	[0,03]	0,02	[0,03]	0,02	[0,03]	0,14**	[0,04]	0,16***	[0,04]
VET * 5th					0,10***	[0,03]	0,12***	[0,03]	0,04	[0,03]	0,05	[0,03]	0,11	[0,12]	0,15	[0,12]
Intercept	1,18	[1,99]	2,66	[2,08]	1,46	[1,74]	2,4	[1,84]	2	[1,99]	3,26	[2,08]	4,87	[5,54]	6,35	[5,73]
Country level (intercept)	0,00	[0,00]	0,01	[0,00]	0,00	[0,00]	0,01	[0,00]	0,00	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]
Country level (slope)	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]	0,00	[0,00]
Individual level (residual)	0,10	[0,00]	0,10	[0,00]	0,10	[0,00]	0,10	[0,00]	0,09	[0,00]	0,09	[0,00]	0,13	[0,00]	0,12	[0,00]
ICC	0,04		0,05		0,04		0,05		0,03		0,05		0,05		0,05	
N	24672		24672		24672		24672		19072		19072		5600		5600	

Predicted probabilities. The dependent variable expresses the effect of being in a matched job (ref. mismatch), see table title. Data: Labour Force Survey 2009

Table 9: Cross level interaction terms of institutional settings with individual outcomes **(mere vertical match VET vs. mere horizontal HE)**
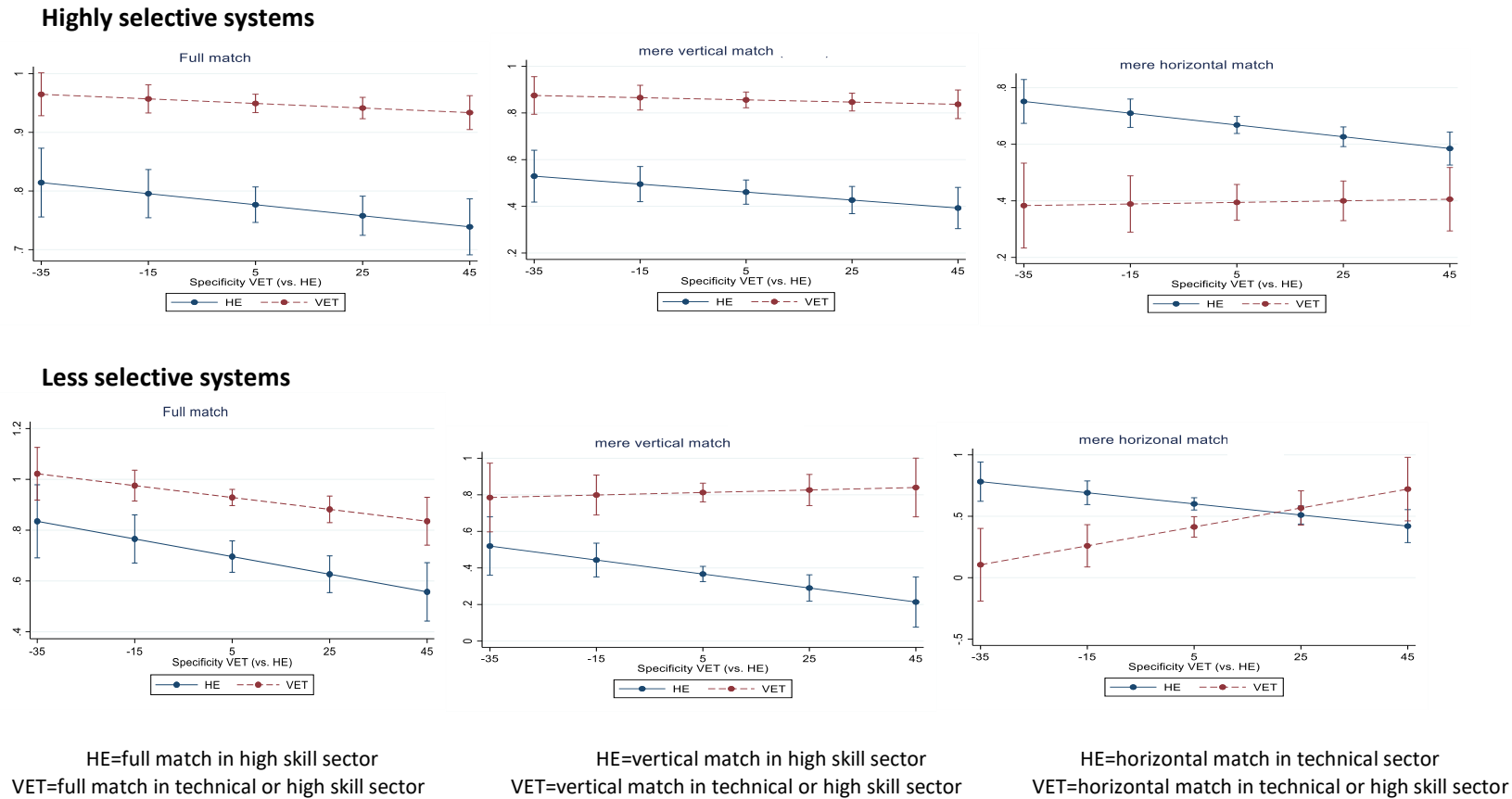
mere vertical VET vs. mere horizontal HE	M1		M2		M3		M4		M5 highly sel.		M6 highly sel.		M7 less sel.		M8 less sel.	
VET (ref. HE)	0,25***	[0,04]	0,30***	[0,04]	0,16***	[0,04]	0,21***	[0,04]	0,20***	[0,04]	0,26***	[0,04]	0,11*	[0,04]	0,12*	[0,05]
FoE (ref. gen progr.)																
Education	-0,22***	[0,04]	-0,24***	[0,04]	-0,22***	[0,04]	-0,25***	[0,04]	-0,16**	[0,05]	-0,18***	[0,05]	-0,28***	[0,06]	-0,31***	[0,06]
Humanities & arts	-0,20***	[0,04]	-0,24***	[0,04]	-0,21***	[0,04]	-0,24***	[0,04]	-0,18***	[0,05]	-0,20***	[0,05]	-0,24***	[0,06]	-0,29***	[0,06]
Soc. science, busin. & law	0,21***	[0,04]	0,17***	[0,04]	0,21***	[0,04]	0,17***	[0,04]	0,19***	[0,05]	0,16***	[0,04]	0,27***	[0,06]	0,22***	[0,06]
Science	-0,11**	[0,04]	-0,15***	[0,04]	-0,12**	[0,04]	-0,15***	[0,04]	-0,08	[0,05]	-0,11*	[0,05]	-0,16**	[0,06]	-0,20**	[0,06]
Engineering	0,01	[0,04]	-0,03	[0,04]	0,01	[0,04]	-0,04	[0,04]	0,04	[0,05]	0	[0,04]	-0,03	[0,06]	-0,08	[0,06]
Agriculture	-0,04	[0,04]	-0,07+	[0,04]	-0,04	[0,04]	-0,07+	[0,04]	0	[0,05]	-0,02	[0,05]	-0,14*	[0,07]	-0,17*	[0,07]
Health	0,14***	[0,04]	0,12**	[0,04]	0,14***	[0,04]	0,11**	[0,04]	0,15**	[0,05]	0,13**	[0,05]	0,14*	[0,06]	0,11+	[0,06]
Services	0,04	[0,04]	0,03	[0,04]	0,04	[0,04]	0,03	[0,04]	0,06	[0,05]	0,05	[0,05]	0,02	[0,06]	0	[0,06]
Work experience (ref. no exp.)																
within educ.	0,03*	[0,01]	0,02*	[0,01]	0,03**	[0,01]	0,02*	[0,01]	0,04**	[0,01]	0,03**	[0,01]	0	[0,02]	0,01	[0,02]
outside educ.	-0,01	[0,01]	-0,02+	[0,01]	-0,01	[0,01]	-0,02+	[0,01]	0	[0,01]	0	[0,01]	-0,04**	[0,02]	-0,05**	[0,02]
Parents tertiary educ.	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0,01	[0,01]	0,01	[0,01]
Female	0,04***	[0,01]	0,02*	[0,01]	0,04***	[0,01]	0,02*	[0,01]	0,04**	[0,01]	0,03**	[0,01]	0,04**	[0,01]	0,02	[0,01]
Migrant	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00***	[0,00]	-0,00**	[0,00]	-0,01***	[0,00]	-0,01***	[0,00]
Married	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0	[0,01]	0,01	[0,02]	0,01	[0,02]
Still in first job	0,03***	[0,01]	0,04***	[0,01]	0,03***	[0,01]	0,04***	[0,01]	0,03**	[0,01]	0,03**	[0,01]	0,05***	[0,01]	0,06***	[0,01]
high skill sector (ISCO1)	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	-0,01+	[0,00]	0	[0,00]	0	[0,01]	0	[0,01]
high skill sector (ISCO2)	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,01]	0	[0,01]
UNEMPL.	-0,00*	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	-0,00+	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
GDP	0,00+	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,00*	[0,00]	0,01**	[0,00]	0	[0,00]	0	[0,00]
LOW EDUC.	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
graduation year	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]	0	[0,00]
SELECTIVITY (ref. 1st quantile)																
2nd	0,04	[0,02]	0,03	[0,02]												
3rd	0,05+	[0,03]	0,04	[0,03]												
4th	0,05+	[0,03]	0,03	[0,03]												
5th	0,07*	[0,03]	0,04	[0,03]												
VET (ref. HE) * SELECTIVITY (ref. 1st quantile)																
VET * 2nd	-0,03	[0,04]	-0,03	[0,04]												
VET * 3rd	-0,03	[0,05]	-0,03	[0,05]												
VET * 4th	-0,06	[0,05]	-0,05	[0,05]												
VET * 5th	**-0,08+**	[0,05]	-0,06	[0,05]					*highly selective*				*less selective*			
occupational closure			**-0,09***	[0,00]			**-0,09***	[0,00]			**-0,09***	[0,00]			**-0,07***	[0,01]
SPECIFICITY (ref. 1st qantile)																
2nd					-0,04	[0,02]	-0,05+	[0,02]	0,03	[0,03]	0,02	[0,03]	-0,12***	[0,03]	-0,12***	[0,04]
3rd					-0,05+	[0,03]	-0,06+	[0,03]	0,01	[0,03]	0,01	[0,04]	-0,11**	[0,04]	-0,12**	[0,04]
4th					-0,10***	[0,03]	-0,11***	[0,03]	-0,04	[0,03]	-0,04	[0,04]	-0,16**	[0,05]	-0,17**	[0,05]
5th					-0,11***	[0,03]	-0,12***	[0,04]	-0,05	[0,03]	-0,06	[0,04]	-0,21+	[0,12]	-0,26*	[0,13]
VET (ref. HE) * SPECIFICITY (1st quantile)																
VET * 2nd					0	[0,04]	0,01	[0,04]	-0,07	[0,04]	-0,07	[0,04]	0,09	[0,06]	**0,13***	[0,07]
VET * 3rd					0,04	[0,04]	0,05	[0,04]	-0,03	[0,05]	-0,03	[0,05]	**0,17***	[0,05]	**0,19***	[0,06]
VET * 4th					**0,10***	[0,04]	**0,09+**	[0,05]	0,01	[0,05]	0	[0,05]	**0,30***	[0,06]	**0,30***	[0,07]
VET * 5th					**0,11***	[0,05]	**0,11***	[0,05]	0,02	[0,05]	0,03	[0,06]	0,24	[0,16]	**0,30+**	[0,17]
Intercept	1,72	[3,92]	4,47	[4,01]	1,02	[3,31]	2,16	[3,38]	2,48	[3,90]	4,41	[4,09]	-0,07	[8,85]	4,33	[8,86]
Country level (intercept)	0,00	[0,00]	0,01	[0,00]	0,00	[0,00]	0,01	[0,00]	0,00	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,01]
Country level (slope)	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,01	[0,00]	0,00	[0,00]	0,01	[0,00]
Individual level (residual)	0,18	[0,00]	0,17	[0,00]	0,18	[0,00]	0,17	[0,00]	0,18	[0,00]	0,17	[0,00]	0,17	[0,00]	0,17	[0,00]
ICC	0,02		0,04		0,02		0,04		0,01		0,03		0,05		0,06	
N	13586		13586		13586		13586		9551		9551		4035		4035	

Predicted probabilities. The dependent variable expresses the effect of being in a matched job (ref. mismatch), see table title. Data: Labour Force Survey 2009

Appendix D: Robustness checks

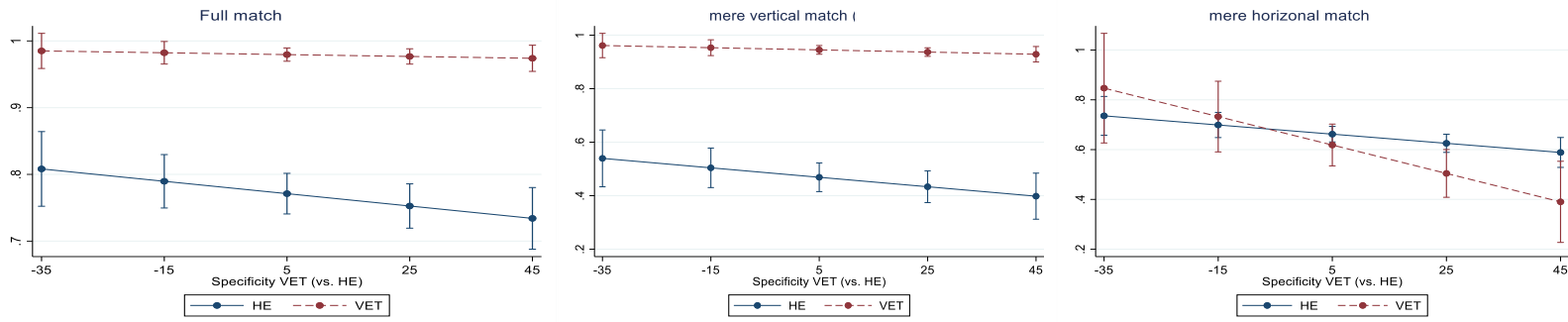## 1. Institutional correlations with matching coded alternatively for VET (underqualified or overqualified)

Figure 25: The correlation of specificity with matching coded as underqualified for VET (VET match = ISCO 1-8 & ref. = ISCO 9)
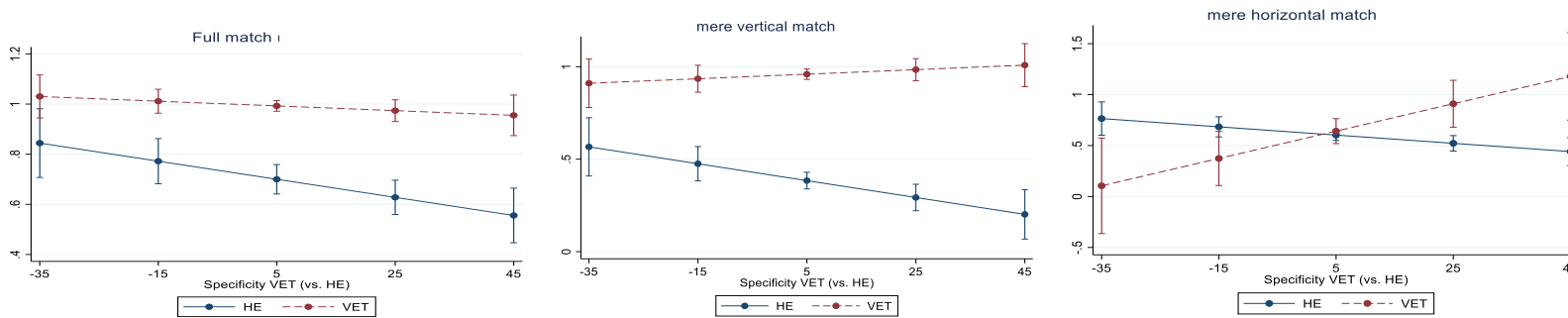
Highly selective systems

Less selective systems

HE=full match in high skill sector	HE=vertical match in high skill sector	HE=horizontal match in technical sector
VET=full match in technical or high skill sector	VET=vertical match in technical or high skill sector	VET=horizontal match in technical or high skill sector

Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009

Figure 26: The correlation of specificity with matching with reference category coded as overqualified for VET (VET match = ISCO 3-8 & ref. = ISCO 1-2)

Highly selective systems

Less selective systems

|		
HE=full match in high skill sector	HE=vertical match in high skill sector	HE=horizontal match in technical sector
VET=full match in technical sector	VET=vertical match in technical sector	VET=horizontal match in high skill sector

Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009

2. Vocational specificity coded as work experience during education

Figure 27: Country patterns addressing work experience of HE and VET students during education
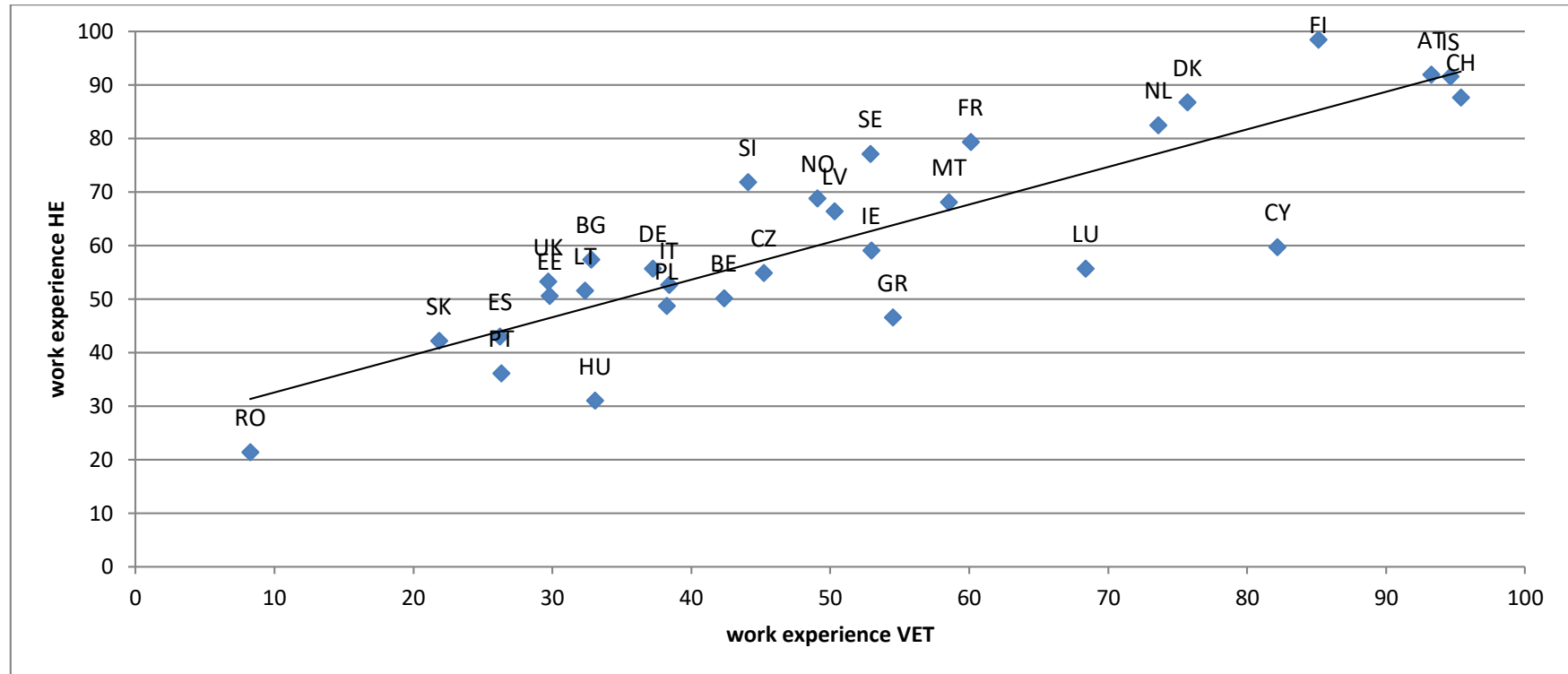
Source: own calculation on the data derived from LFS data 2009.

There is a clearly positive correlation between the work experience of VET and HE students. Especially in most German speaking countries and to some extent in Nordic countries both educational groups work most often, while in Southern Europe and the Baltic countries both educational groups work clearly less.

Figure 28: Country clusters depending on selectivity (Y axis) and vocational specificity or work experience (X axis)
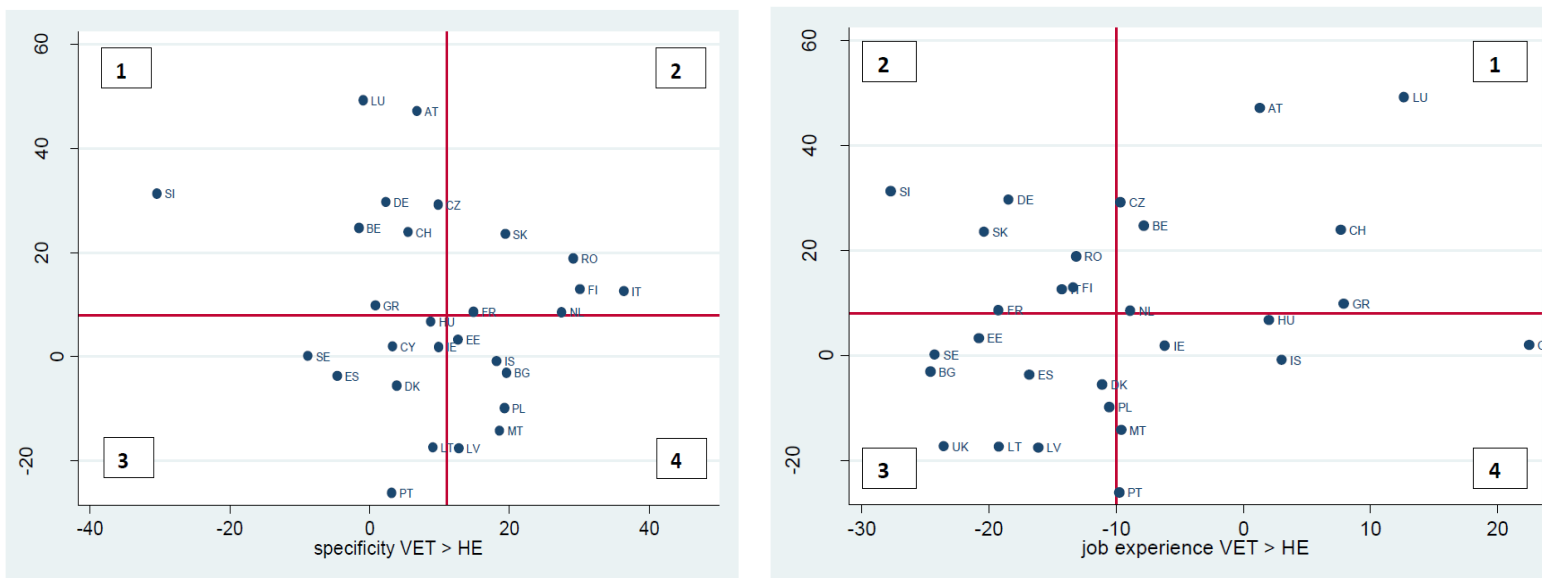
Source: own calculation on the data derived from Eurostat European Statistics Database and LFS data; the values for selectivity and specificity represent the country average for the time period 1998-2009, the values for job experience are derived from LFS data 2009.

The left-hand figure shows the combination of selectivity and vocational specificity and was already presented in the findings section (Fig. 23). The right-hand figure shows the combination of selectivity and work experience of both educational groups. When comparing both figures, different country clusters appear. Within the highly selective systems, the country subgroups are turned around (1 & 2): in most German-speaking countries VET students gain more work experience during education than HE students while their vocational specificity is similar. On the other hand, in Nordic countries the VET programmes are more specific than HE programmes, while the groups do not differ much in work experience during education. This is in line with previous research indicating that German speaking countries show higher work experience of VET (dual system) while in Nordic countries this is less the case and students gain vocation-specific skills within school-based education.

Figure 29: The correlation of work experience during education with matching in highly and less selective systems

Highly selective system

Less selective systems

HE=full match in high skill sector   HE=vertical match in high skill sector   HE=horizontal match in technical sector

VET=full match in technical sector   VET=vertical match in technical sector   VET=horizontal match in high skill sector
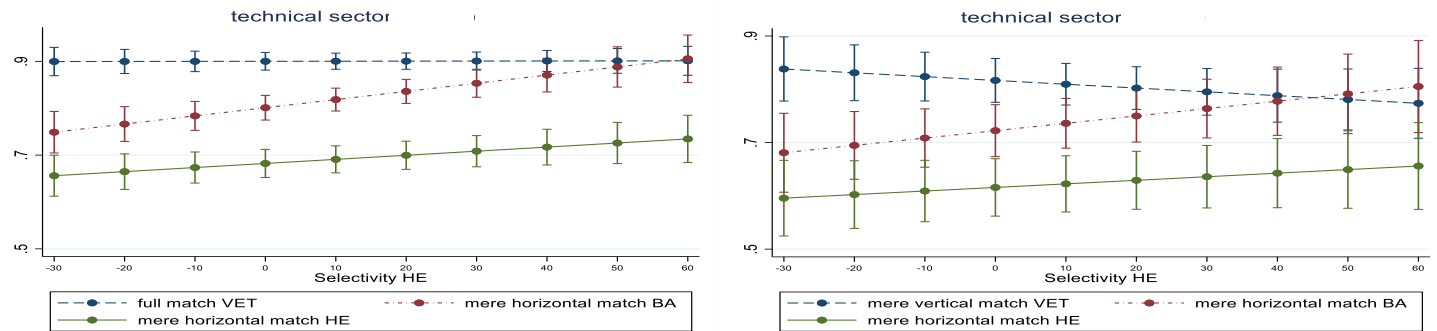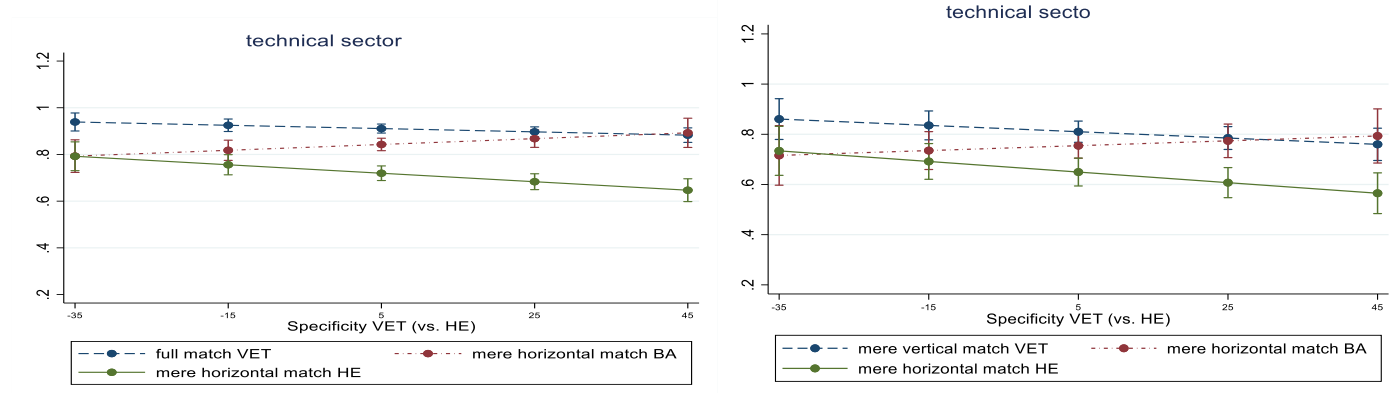
Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009

3. Institutional effects on matching of VET (ISCED 3&4b), BA (ISCED 5b) and HE (ISCED 5a)

Figure 30: The correlation of selectivity with matching in the high skill sector of VET, BA and HE groups
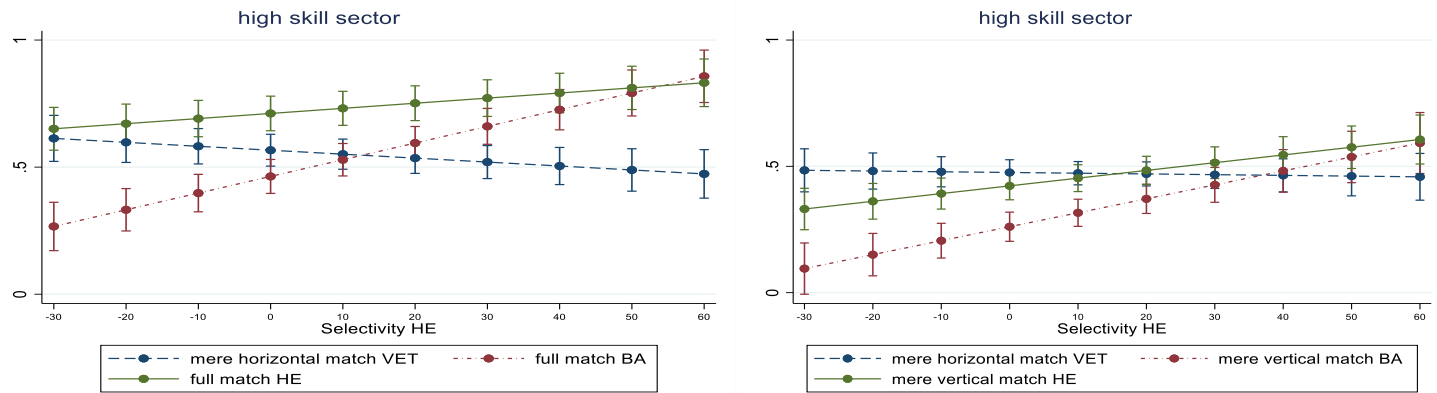
Figure 31: The correlation of selectivity with matching in the technical sector of VET, BA and HE groups

Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009
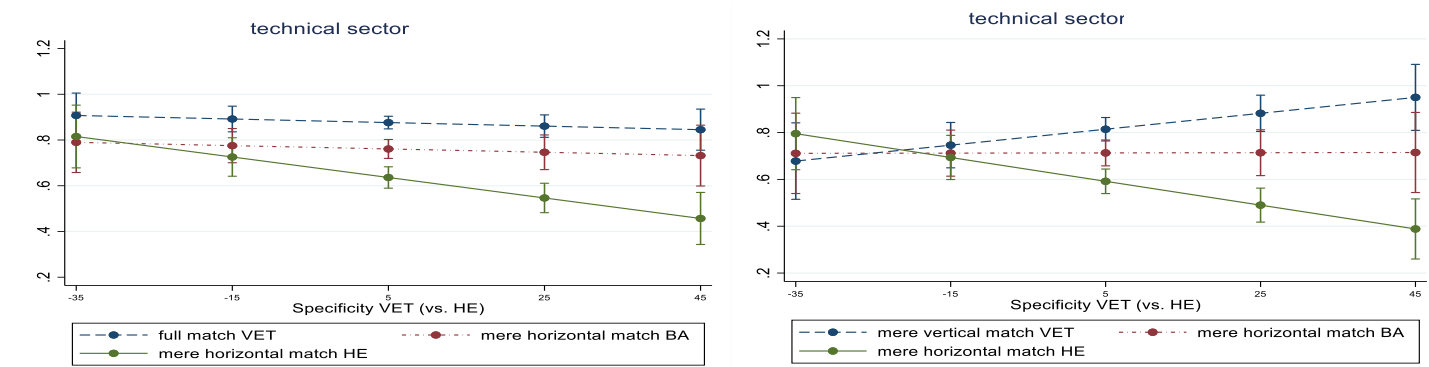
Figure 32: The correlation of specificity with matching in the technical sector of VET, BA and HE (=MA) groups in highly and less selective systems
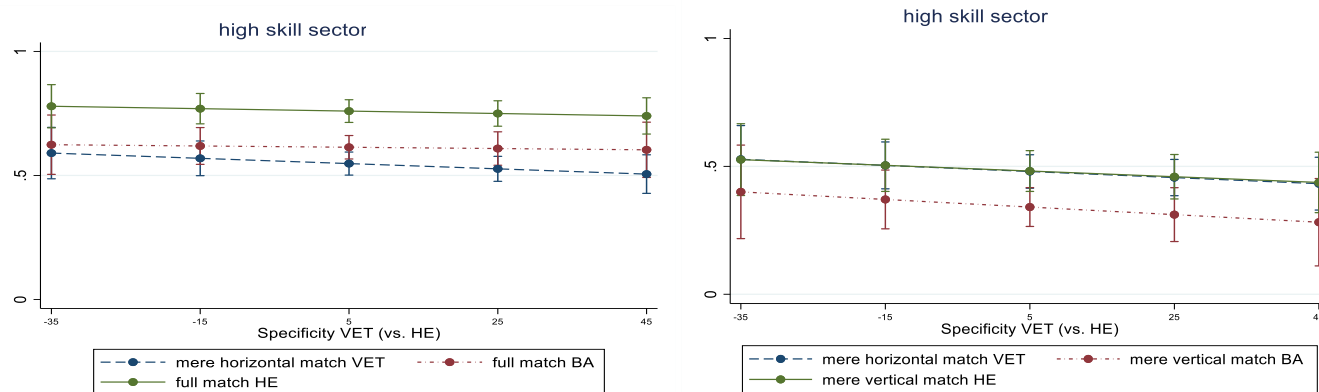
Highly selective systems
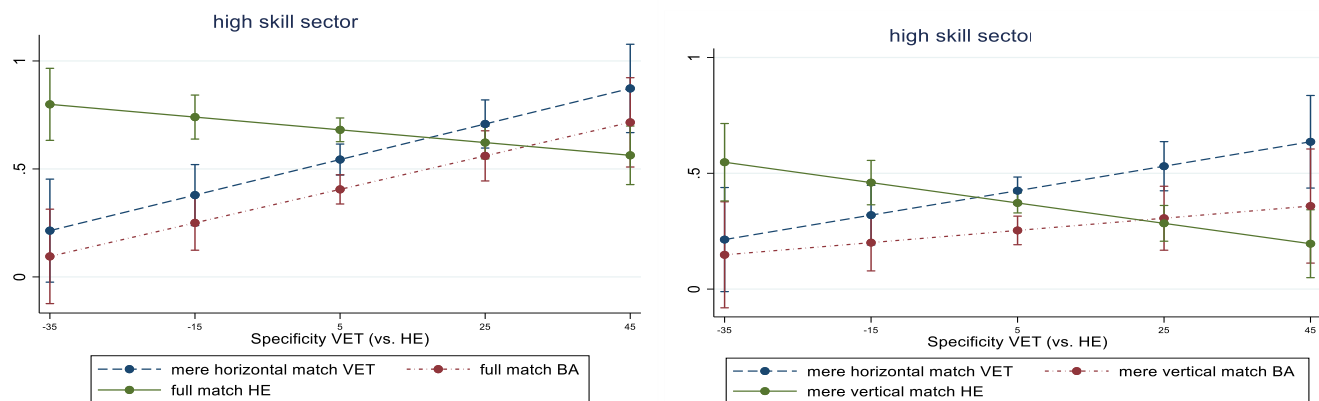

Less selective systems

Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009

Figure 33: The correlation of specificity with matching in the high skill sector of VET, BA and HE (=MA) groups in highly and less selective systems

Highly selective systems

Less selective system

Predicted probabilities (with 95% conf. intervals). The dependent variable expresses the effect of being in a matched job (ref. mismatch). On the individual level, the models control for field of education, working during education, graduation year, parent's education, whether first job is current job, gender, age, whether born in the country and marital status. On the country level, the models control for size of the high skill sector (ISCO1+ISCO2), unemployment rate, GDP change and rates of low education graduates. Data: Labour Force Survey 2009