

# Unravelling Complex Systems: Labour Market Outcomes and Decision-Making in Higher and Continuing Education

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**Unravelling Complex Systems: Labour Market Outcomes and  
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# Summary

This dissertation presents studies in the realms of education and labour market sociology and economics. More specifically, this dissertation contains four empirical articles on higher and continuing education in Switzerland. This summary provides a brief overview of all four articles.

Chapter 2 of this thesis examines how young adults' level of information about different tertiary education options in Switzerland relates to their tertiary education choices. Tertiary education (TE) is becoming increasingly popular worldwide, leading to higher levels of education overall. As a result, some TE systems have become more diverse to accommodate larger numbers of students, resulting in different study programmes with different entry requirements and post-graduation outcomes. Chapter 2 focuses on Swiss vocational education and training (VET) graduates and examines how their TE choices, i.e., the choice between professional education and training (PET) programmes and university study programmes, are related to their level of information about different educational pathways. Using cross-sectional survey data among young adults who graduated from upper-secondary VET, we estimate the relation between the level of subjective information, misinformation on wage benefits of TE and uncertainty about eligibility for TE on their TE choices. The results suggest that young adults take TE decision under misinformation and uncertainty, and that PET is the preferred choice for TE under these circumstances.

Chapter 3 analyses employers' preferences for an applicant's education in hiring processes. Employers' preferences for applicant characteristics play a crucial role in hiring decisions and individual labour market outcomes. However, preferences vary across contexts and employers, and are influenced by social, organisational and institutional factors, as well as employers' own characteristics, education and work experience. Chapter 3 focuses on employer preferences for applicants' education in Switzerland, which has a high share of upper-secondary VET and tertiary PET alongside upper-secondary general and tertiary academic education. The study uses a factorial survey experiment to examine employer preferences for upper-secondary VET or tertiary PET compared to upper-secondary general or tertiary academic education for commercial and IT jobs. The study also examines how employers' familiarity with the education system influences hiring preferences. Our results show that employers in most cases prefer VET/PET to general/academic education, and that employers' familiarity with the education system impacts these preferences.

Chapter 4 analyses the role of different university credentials in hiring processes. The global expansion of higher education has led to the massification and marketisation of universities. In order to remain internationally and nationally competitive, many higher education institutions have incorporated non-formal continuing education courses for a broad target audience. The introduction of new educational credentials has implications for their respective labour market outcomes. Different theories, such as the human capital theory, signalling theory and theories of credentialism, shed light on why different credentials are rewarded differently in the labour market. Chapter 4 focuses on non-formal continuing education at Swiss universities and examines its impact on labour market outcomes for highly educated individuals. Most importantly, it compares the labour market

value of non-formal university credentials relative to formal university credentials. Chapter 4 thereby uses data from a factorial survey experiment with employers in a hypothetical recruitment process. The results show that employers do not differentiate between non-formal and formal credentials when inviting applicants for interviews, but those with non-formal credentials receive a salary premium compared to those with formal credentials. Further tests display that these outcomes are somewhat related to an applicant's work experience, but not the employers' knowledge about the difference between these two types of credentials. Since the applied theories only show limited predictive power, our analysis makes a case for introducing new theories in complex education systems, especially when extending analyses to non-formal education.

Chapter 5 analyses the heterogeneous returns to workers who participate in continuing education and training (CET). The labour market is undergoing significant changes due to technological progress, which is shaping job requirements and the skills needed. Workers need to continuously update their skills to succeed and persist in the labour market, while CET provides a means of acquiring new skills. However, technological change is leading to a division of the workforce, favouring high-skilled jobs over low- and medium-skilled jobs. Previous studies examine the impact of CET on wage growth, and find mixed results. Chapter 5 uses data from the Swiss Labour Force Survey from 2010 to 2020 and contributes to the literature by focusing for one on the heterogeneous effect of CET on wage growth by different durations of CET, and second by focusing on the change in effect of CET on wage growth over time for differently skilled workers. The results show positive effects of CET on wage growth, especially from longer CET courses. Workers with lower educational attainment and in occupations with low



skill demand experience significant wage growth. Changes over time show slight upward shifts for high-skilled workers and downward shifts low-skilled workers.

# Zusammenfassung

Diese Dissertationsschrift bewegt sich im Bereich der Soziologie und Ökonomie der Bildungssysteme und des Arbeitsmarktes. Konkret umfasst die Dissertation vier empirische Artikel zur höheren Bildung und zur Weiterbildung in der Schweiz. Diese Zusammenfassung gibt einen kurzen Überblick über alle vier Artikel.

Kapitel 2 dieser Arbeit untersucht den Zusammenhang zwischen dem Informationsstand junger Erwachsener über verschiedene Bildungsmöglichkeiten und ihrer Entscheidung für eine tertiäre Ausbildung. Die Tertiärbildung wird weltweit immer beliebter und führt zu einem insgesamt höheren Bildungsniveau der Bevölkerung. Infolgedessen haben einige Bildungssysteme ihre Tertiärstufen differenzierter gestaltet, was zu einer grossen Anzahl von Studienprogrammen mit unterschiedlichen Zugangsvoraussetzungen und Arbeitsergebnissen führt. Kapitel 2 untersucht die Bildungsentscheidungen von Schweizer Berufsbildungsabsolventinnen und -absolventen. Genauer wird untersucht wie die Wahl zwischen einer Höheren Berufsbildung und einem Hochschulstudium mit dem Informationsstand über verschiedene Bildungswege zusammenhängt. Anhand einer Querschnittserhebung unter jungen Erwachsenen, die eine berufliche Grundbildung auf Sekundarstufe II absolviert haben, schätzen wir den Zusammenhang zwischen 1) dem Grad an subjektiver Information, 2) der Fehlinformation über Lohnerträge und 3) Unsicherheit über die Zulassung zur Ausbildung und ihre Bildungsentscheidungen. Die Ergebnisse deuten darauf hin, dass junge Erwachsene ihre Bildungsentscheidungen unter

Fehlinformationen und Unsicherheit treffen und dass unter diesen Umständen die Höhere Berufsbildung die bevorzugte Wahl für die Tertiärbildung ist.

Kapitel 3 untersucht die Präferenzen von Arbeitgebenden in Bezug auf die Ausbildung eines Bewerbers oder einer Bewerberin im Rekrutierungsprozess. Die Präferenzen von Arbeitgebenden hinsichtlich der Merkmale von Bewerbenden spielen eine entscheidende Rolle sowohl bei Einstellungsentscheidungen als auch für die Arbeitsergebnisse verschiedener Personengruppen. Die Präferenzen variieren jedoch zwischen Arbeitgebenden und werden von sozialen, organisatorischen und institutionellen Faktoren sowie von persönlichen Eigenschaften, der Ausbildung und der Berufserfahrung der Arbeitgebenden beeinflusst. Kapitel 3 untersucht Präferenzen von Arbeitgebenden in der Schweiz – ein Land, welches neben der allgemeinen und akademischen Bildung auf Sekundarstufe II und Tertiärstufe auch einen hohen Anteil an Personen in der beruflichen Grundbildung und in der Höheren Berufsbildung aufweist. Die Studie verwendet Daten eines Umfrageexperiments mit Arbeitgebenden um die Präferenzen für die (Höhere) Berufsbildung im Vergleich zur allgemeinen oder akademischen Bildung für kaufmännische Berufe und Berufe im IT-Sektor zu untersuchen. In der Studie wird ebenfalls untersucht, wie die Vertrautheit der Arbeitgebenden mit dem Bildungssystem diese Präferenzen beeinflusst. Unsere Ergebnisse zeigen, dass Arbeitgebende in den meisten Fällen die (Höhere) Berufsbildung der allgemeinen/akademischen Bildung vorziehen, und dass die Vertrautheit mit dem Bildungssystem diese Präferenzen beeinflusst.

Kapitel 4 analysiert den Stellenwert verschiedener Hochschulzertifikate im Einstellungsverfahren. Die weltweite Expansion der Hochschulbildung hat dazu geführt, dass sich Hochschulen neuorientieren müssen um international und national wettbewerbsfähig zu bleiben. So haben viele Bildungseinrichtungen für höhere Bildung nicht-

formale Weiterbildungskurse für ein breites Zielpublikum eingeführt. Die Einführung neuer Bildungszertifikate hat jedoch auch Auswirkungen auf die Arbeitsmarktergebnisse der Absolventinnen und Absolventen. Verschiedene Theorien wie die Humankapitaltheorie, die *Signaling*-Theorie und die Theorie des *Credentialism* geben Aufschluss darüber, warum verschiedene Abschlüsse auf dem Arbeitsmarkt unterschiedlich honoriert werden. Kapitel 4 konzentriert sich auf die nicht-formale Weiterbildung an Schweizer Hochschulen und untersucht deren Auswirkungen auf die Arbeitsmarktergebnisse von hochqualifizierten Personen. Von grösstem Interesse ist der Arbeitsmarktwert der nicht-formalen Hochschulbildung im Vergleich zur formalen Hochschulbildung. Kapitel 4 verwendet dazu Daten aus einem Umfrageexperiment, die Arbeitgebende in einen hypothetischen Einstellungsprozess versetzt. Wir stellen fest, dass Arbeitgebende bei der Einladung zu Vorstellungsgesprächen nicht zwischen nicht-formalen und formalen Hochschulzertifikaten unterscheiden, dass aber Bewerbende mit nicht-formalen Hochschulzertifikaten ein höheres Gehalt erhalten würden im Vergleich zu Bewerbenden mit formalen Hochschulzertifikaten. Weitere Auswertungen zeigen, dass sich mit steigender Berufserfahrung der Bewerberin oder des Bewerbers der anfängliche Lohnunterschied schmälert, und dass die Bewertung nicht mit dem Wissen der Arbeitgebenden über den Unterschied zwischen diesen beiden Arten von Hochschulzertifikaten zusammenhängt.

Kapitel 5 fokussiert auf den Effekt von einer Weiterbildungsteilnahme auf den Lohnzuwachs von Arbeitnehmenden. Der Arbeitsmarkt unterliegt erheblichen Veränderungen, insbesondere aufgrund des technologischen Fortschritts, der die Anforderungen an die Arbeitsplätze und die benötigten Qualifikationen verändert. Arbeitnehmende müssen als Konsequenz ihre Qualifikationen ständig aktualisieren, um auf dem Arbeitsmarkt erfolgreich zu bleiben. Jedoch führt der technologische Wandel zu einer Spaltung der

Erwerbsbevölkerung, bei der Stellen mit hoher Qualifikationsanforderung im Vergleich zu Stellen mit geringer und mittlerer Qualifikationsanforderung an Bedeutung gewinnen. Weiterbildungen sind eine Möglichkeit um neue Qualifikationen zu erwerben. Frühere Studien haben die Auswirkungen der Weiterbildung auf das Lohnwachstum untersucht und sind zu unterschiedlichen Ergebnissen gekommen. Kapitel 5 verwendet Daten der Schweizerischen Arbeitskräfteerhebung (SAKE) und leistet einen Beitrag zur Literatur, indem es sich zum einen auf den Effekt unterschiedlicher Weiterbildungsdauer das Lohnwachstum und zum anderen auf die Veränderung des Effekts im Zeitverlauf für unterschiedlich qualifizierte Arbeitnehmende konzentriert. Die Ergebnisse zeigen positive Effekte von der Weiterbildungsteilnahme auf das Lohnwachstum, insbesondere bei längeren Weiterbildungskursen. Insbesondere geringqualifizierte Arbeitnehmende erfahren signifikante Lohnzuwächse. Die Veränderungen im Zeitverlauf zeigen leichte Aufwärtsschiebungen des Effekts für Hochqualifizierte und Abwärtsschiebungen für Geringqualifizierte.

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*Aranya Sritharan  
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*I dedicate the effort behind this thesis to my parents, Sasi and Sritharan, who have crossed continents and risked their own lives to save their children from the wrath of a genocide and to provide them with a future of freedom and self-determination. Something denied to our people to this very day. May the parents of Tamil Eelam one day no longer be forced to leave their homeland to find peace of mind.*





# **Chapter 1**

## **Introduction**



## **1.1 The shifting role of higher education in society**

Since the beginning of the 21<sup>st</sup> century, higher education – i.e., education at the tertiary level – participation rates have increased substantially across the OECD member countries (OECD, 2022). As of 2022, around 47% of adults aged between 25 and 34 in the OECD countries have completed tertiary education. Thus, many countries witnessed a higher education expansion. This expansion of the higher education sector was to some extent unforeseen, as for centuries, higher education, i.e., education at universities, did not target large numbers of students. Higher education historically served to create very specialised occupations, such as religious leaders, lawyers, medical doctors and scholars (Muller & Young, 2014; Schofer & Meyer, 2005; Schofer et al., 2021). Thus, the higher education system did not target professionals, as university education was not considered to have any tangible labour market value (Berg, 1970) and knowledge learnt at universities for long was considered an end in itself (Muller & Young, 2014; Williams, 2016).

In the second half of the twentieth century, however, many industrialised countries observed that their citizens from different social backgrounds increasingly invested in higher education (Becker & Zangger, 2013; Schofer & Meyer, 2005; Trow, 1972). Schofer and Meyer (2005) point out that comparative research concludes that the cause behind this higher education expansion is multifactorial. One driver is that these countries experienced substantial economic growth, such that the most basic needs of their citizens was met, resulting in a shift in priorities (Hadjar & Becker, 2006). Furthermore, there emerged a shift from the production sector to the service sector within many industrialised countries (Pollmann-Schult, 2006), leading to an increased demand for a larger labour force with the adequate skills, because services and products have become more complex (Powell & Solga, 2011). Higher levels of education are one means to ensure that

individuals have the necessary skills to create innovation and foster economic growth, and thus the hoped prosperity for a broader share of the population. Consequently, the status and relevance of universities for the labour market but also for society at large has changed (Smolentseva, 2023; Tight, 2019). For example, research at universities generates spill-over effects to the industry by delivering the knowledge to create new products and services (Beck et al., 2020; Jongbloed, 2010; Schlegel et al., 2022). Schofer et al. (2021) argue that the higher education expansion has now rendered universities and other higher education institutions to be core institutions of society and also the economy.

With an increased higher education participation, the expectations towards higher education institutions have also changed (Tomlinson, 2012; Williams, 2016). As Muller and Young (2014, p. 137) argue, different social actors – especially actors in the labour market – nowadays demand university education to be more practical, innovation-oriented with a stronger focus on “know how” instead of “know that”. Generally, occupation-oriented or applied knowledge gained importance at the expense of universal and theoretical knowledge. With this trend, the discourse around higher education graduate employability has gained momentum (Clarke, 2018; Tomlinson, 2012; Williams, 2016). Higher education institutions now face the expectation to be more labour-market-orientated, rendering the obtainment of knowledge no longer an end in itself (Münch, 2014; Tomlinson, 2012, 2018).

By now, with the tertiarization of the economy and the education system, knowledge – and preferably professional knowledge – is presumably one of the most essential commodities that individuals produce and trade (Paul, 2011; Powell & Snellman, 2004). This phenomenon is often subsumed under the concept of the ‘knowledge society’ (Powell & Snellman, 2004), where technological (and other)

innovation is the primary goal. Thus, the demand for a workforce who first, has new and up-to-date specialised and advanced knowledge and second, is able and willing to regularly acquire new knowledge has increased (Goldin & Katz, 2009; Powell & Snellman, 2004). Especially with newly emerging technologies, certain tasks can be automated, while others require the acquisition of new skills (Autor, 2013). These processes encourage shifts in the human capital investments of the workforce: to prevail in such a society, individuals fare best if they update and acquire new knowledge and skills throughout their life course (Deming, 2022). Higher education, thus, has become an almost necessary trajectory for most (Hadjar & Becker, 2006).

Yet, irrespective of macrosocial and macroeconomic transformations, it is worthwhile to reflect which private benefits an individual can expect when pursuing higher education. On an individual level, scholars distinguish between market and non-market benefits of higher education (McMahon, 2009; Smolentseva, 2023). There are several non-monetary returns, which improve an individual's wellbeing substantially. These benefits are e.g., improved health, larger social and cultural capital, increased political understanding and participation, gender equality, stronger democracies, and so on (Hannum & Buchmann, 2005; Mühleck & Hadjar, 2023). These factors all contribute to higher education being an investment into an improved livelihood, and are therefore also desirable for societies as a whole.

From a labour market perspective, the monetary returns and other labour market outcomes of completing education have the foremost relevance. Education equals human capital and individuals invest in human capital with the expectation of reaping monetary and other types of returns (Becker, 1993). Indeed, a large variation of differences in labour market returns can be explained by differences in human capital (Deming, 2022;

Heckman et al., 2018). Returns to higher education have even increased over the last decades and since the beginning of the 21<sup>st</sup> century (Gunderson & Oreopolous, 2020; Psacharopoulos & Patrinos, 2018), potentially due to the high demand of highly-skilled workers. This development was predicted by scholars who formulated the skill-biased technological change hypothesis (e.g. Acemoglu, 2002), which states that the highly-skilled are labour market winners. Consequently, individuals invest in higher education as long as they can expect high private returns.

For certain individuals, completing higher education means maintaining their high social status and their privileges. Thus, social and cultural reproduction are one core motive for individuals from privileged socioeconomic backgrounds (Bourdieu & Passeron, 1990). From a meritocratic perspective, higher education provided a means for social upwards mobility and an otherwise unlikely opportunity to enter influential realms in society for individuals from challenged socioeconomic backgrounds (Boliver, 2017; Brown, 2013). For underprivileged social classes, education was hailed as the primary motor for social mobility. However, the empirical evidence provides reason to believe that educational attainment alone does not alleviate socioeconomic inequality (Hannum & Buchmann, 2005; Thomsen et al., 2017), and that disparities in access and successful completion of higher education still persist (Neugebauer, 2015; Oppedisano, 2011; Triventi, 2013).

From a sociological perspective, there are further distinct benefits of completing higher education. Not all of them serve individuals to achieve better labour market outcomes, some are rooted in how individuals perceive themselves in society. Max Weber ([1946] in Arum et al., [2010]) highlights the abstract and cultural value an educational credential possesses. Achieving higher levels of education does not only result in higher

incomes, but also in higher prestige. Hence, while individuals do aim to secure the best livelihood for them in terms of occupational positions and monetary returns, they are likely to also value other components of completing education, i.e., the acknowledgement from others, the social prestige, and so forth (Weber [1948] in Tomlinson [2018]).

Schofer et al. (2021, p. 14) state that “In every social sector, the schooled people have won out”. Indeed, ongoing investments in human capital have become somewhat of an imperative. Nonetheless, what could be some the adverse consequences if large shares of a given population acquire higher education? Beck (1993) introduced his concept of the “elevator effect” precisely to describe some less desired long-term ramifications of this trend: with the educational expansion, the average level of education has increased. And with the proliferation of educational credentials circulating in the labour market, their unique value becomes contested (Bills, 2003; Brown, 2001; Hirsch, 1976). Therefore, while originally higher education might have been a distinctive marker, it more and more becomes a necessity to even participate in the labour market, without even assuring entry to highly rewarding jobs (Boudon, 1974; Collins, 1979; Trow, 1972).

On the contrary, competition among graduates might increase, and other factors, such as the specific institution they graduated from or their social networks, might gain relevance for job entry (Tomlinson, 2012). In turn, individuals without higher education are almost excluded from the labour market (Hadjar & Becker, 2006). Furthermore, the risk of vertical and horizontal educational mismatch increase, raising the question if all individuals profit from the same type of higher education (Heckman et al., 2018).



## 1.2 Diversification at the tertiary education level

Marginson (2016) argues that a massified and uniform higher education system cannot satisfy the different needs of all of its students with their diverse backgrounds. Thus, how can a society prevent a process scholars frequently call ‘credential and educational inflation’ (Collins, 1979)? What would an ideal higher education system provide such that all persons with their individual abilities and interests are well taken care of? Here, the Swiss<sup>1</sup> education system provides a noteworthy alternative to other higher education systems. Most commonly, higher education is associated with academic and university education, which mostly fosters theoretical knowledge and abstract thinking, with flexible and adaptive skills (Goldin, 2001). Some education systems, such as the Swiss, show that higher – or rather tertiary-level education – can be designed differently and still ensure favourable labour market outcomes for its graduates (Aepli et al., 2021; Cattaneo, 2011; Sander & Kriesi, 2019).

Next to traditional academic universities, there exists a different type of universities at the tertiary education level. Universities of applied sciences (UAS) are cantonal<sup>2</sup> institutions, which were founded at the end of the twentieth century. Ever since, their enrolment numbers have risen substantially, such that around a third of tertiary education diplomas stem from UASs (CSRE, 2014). UASs, just like traditional academic universities, require a baccalaureate for entry, but a different type: the federal vocational baccalaureate is a type of baccalaureate, which almost exclusively graduates from upper-secondary vocational education and training (VET) acquire. Thus, UASs mainly target

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<sup>1</sup> Other European countries, such as Austria, Germany or the Netherlands, also provide opportunities for professional education at the tertiary education level.

<sup>2</sup> With two privately organised UASs.

prospective students with an upper-secondary VET diploma and therefore provide a direct pathway to university education for individuals with a vocational background.

Despite awarding their graduates bachelor's and master's degrees<sup>3</sup> and the subjects of the study programmes at the UASs being similar to those of traditional academic universities, they are different as they include more occupation-related content and often require students to have some amount of work experience before university entry (CSRE, 2023). Furthermore, universities of teacher education also belong to the UASs sector, and many applied arts and music subjects are almost exclusively found at UASs (CSRE, 2014).

By now, UASs (and comparable higher education institutions outside of traditional academic universities) are well-established in several European countries (Lepori & Kyvik, 2010). As the UASs evolved, they have become more and more similar to traditional academic universities, in terms of education and research. Thus, it is worthwhile to look at the third and non-academic type of tertiary education in Switzerland: the professional education and training system (PET; located at the International Standard Classification of Education – or ISCED – levels 6-8).

The creation of the PET sector allowed the introduction of a non-academic tertiary education pathway with an even stronger linkage to the employment system (CSRE, 2023). Within the PET sector of the tertiary education system, social actors – i.e., actors in the labour market but also the education system – are strongly involved in creating the curricula of the different educational programmes (CSRE, 2023). Thus, the strong occupation-oriented content of VET can be continued at the tertiary level. PET equips its

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<sup>3</sup> The awarding of doctoral degrees in Switzerland is at the discretion of traditional academic universities.

graduates with the skills necessary to become specialists in their occupation and climb the career ladder to jobs with more responsibilities and improved labour market outcomes.

PET programmes are different to university and UAS education in several respects. PET students are usually employed with a high workload, and do not need a baccalaureate to enter. Thus, PET requires less schooling, and in turn emphasises the work experience of their students. PET programmes lead to three types of diplomas<sup>4</sup>, which nowadays make up for around a third of all issued diplomas at the tertiary level – a share above the OECD average (CSRE, 2023). The empirical evidence for Swiss tertiary education graduates shows that labour market outcomes for PET are comparable to those of academic/university education (Backes-Gellner & Geel, 2014; Cattaneo, 2011; Sander & Kriesi, 2019).

Thus, as there are stronger societal expectations towards individuals to pursue tertiary education, it is only rational from a policy perspective to offer different educational options, as individuals differ strongly in their interests and their life circumstances. Nonetheless, the PET sector faces the challenge to withstand a growing interest in academic education (CSRE, 2023). With the internationalisation and the tertiarization of the labour market and the education system, university education might become the default option for tertiary education.

The previous sections were mostly concerned with tertiary and thus formal education. Against the backdrop of the omnipresent concept of ‘lifelong learning’, continuing education and training has also gained importance (Allmendinger et al., 2019).

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<sup>4</sup> Federal examinations (leading to a Federal Diploma or Advanced Federal Diploma of Higher Education) and colleges of higher education (leading to an Advanced Federal Diploma of Higher Education) are part of the PET sector.

Continuing education and training is said to counteract the more adverse ramifications of structural changes, such as globalisation or skill-biased technological change (Goldin & Katz, 2009). Thus, actors in the labour market expect workers to adjust to the changes by learning new skills continuously throughout their lives to remain employable (Billett, 2010). Therefore, education nowadays continues after reaching the highest level of formal education and after labour market entry.

This thesis attempts at not only highlighting the different labour market outcomes of different educational types and options, but also the results of information asymmetry in (educational) decision making. Thus, the following sections explain the motivation behind this thesis at large, summarise the four individual chapters and conclude by identifying this thesis' contribution to the empirical literature in education and labour market sociology.

### **1.3 Motivation for research on higher and continuing education**

The motivation behind this thesis is twofold. For one, it is pivotal to analyse the role of information when individuals decide between different types of education (Barone et al., 2016; Ehlert et al., 2017; Kerr et al., 2020). Be it prospective students or employers – navigating a complex and diversified education system can be challenging, leading to oversimplified decisions (Abbiati & Barone, 2017; Forster & van de Werfhorst, 2020). Individuals try to take their most optimal decision, which requires them to be sufficiently knowledgeable about all different options. Second, when navigating a diversified education system, individuals also undertake cost-benefit considerations (Breen & Goldthorpe, 1997). Therefore, it is essential to outline labour market outcomes of different educational types and programmes, also relative to one another.

Consequently, three of the following four chapters focus on decision-making in different settings. Three chapters further analyse the labour market outcomes of different types of education. Table 1.1 gives an overview on the different topics and thematic overlap of the chapters.

**Table 1.1:** Thematic overlap of chapters

<b>Content of chapters</b>	<b>Chapter 2</b>	<b>Chapter 3</b>	<b>Chapter 4</b>	<b>Chapter 5</b>
Labour market outcomes	(x)	x	x	x
Decision-making	x	x	x	
Information	x	x		
PET versus university	x	x		
Continuing education and training			x	x
Employer perspective		x	x	
Student / worker perspective	x			x
Observational data	x			x
Quasi-experimental data		x	x	

*Notes:* own table.

The labour market outcomes and general benefits but also the complexity of higher and continuing education should be of broad societal and research interest. Ideally, this thesis provides evidence in favour of creating a well-differentiated higher education system to provide different educational options for differently skilled individuals.

## **1.4 Summary of chapters and contribution to the literature**

Chapter 2 of this thesis highlights the role of incomplete information in educational decision making. This chapter is co-authored with Ladina Rageth (Swiss School of Public Governance at ETH Zürich). Rational choice theories in education research (e.g. Breen & Goldthorpe, 1997) emphasise the role of complete information in decision-making. We rely on the notions of bounded rationality theories (Kahneman, 2003; Simon, 1991), as we argue that even important decisions such as educational decisions are taken under incomplete information, and that individuals most likely choose what they are most familiar with, without engaging in extensive information gathering. We use cross-sectional

survey data of young adults in Switzerland that already chose or are about to choose an education at the tertiary level. We thereby regress the choice for professional education and training (relative to university education) on three variables that measure an individual's level of information. We analyse VET graduates' level of information on tertiary education in terms of i) the subjective assessment of their own knowledge, ii) their knowledge of their eligibility for different educational types, and iii) their knowledge of graduate wages. We estimate the effect of these three variables on the likelihood of VET graduates choosing PET over university, conditional on a rich set of covariates.

Our probit regression results show that young adults indeed choose under misinformation and uncertainty, and defer to the educational option that they are most familiar with. The findings also show that misinformation about tertiary education wage benefits and uncertainty about eligibility, especially in terms of university education, correlate with the choice for PET, thus confirming bounded rationality theories. Moreover, we find that VET graduates' information levels about university education are different from their information levels about PET.

This analysis contributes to the empirical literature by providing evidence that the choice for an educational path is dependent on an individual's information about the different options within an education system. Moreover, while many previous studies include measures for information on eligibility or wage benefits, they mostly do not consider eligibility criteria or the subjective assessment of information. Our results show that tertiary education choices correlate significantly with uncertainty and misinformation, and that they strongly correlate with what individuals think they know about the education system. Consequently, a diversified education system might have the advantage that there exist different options for differently skilled individuals, but our evidence suggests that

to ensure optimal allocation of individuals within the education system, detailed information on the different options is invaluable.

Chapter 3 also focuses on comparing vocational and professional education and training to general and academic education, but from the perspective of recruitment-experienced employers. This chapter is co-authored with Ladina Rageth. Using data from a factorial survey experiment amongst employers in Switzerland, we investigate whether employers prefer applicants with vocational and professional or general and academic education for open positions in commerce and IT. Our results show that for entry-level positions employers prefer applicants with an upper-secondary vocational education and training (VET) degree to those with a general education degree. For high-level positions, we see that the preference for either type of education depends on the position: employers prefer tertiary professional education and training (PET) graduates to university graduates for the high-level position in commerce, but not for the high-level position in IT. We furthermore show that employers who are more familiar with VET and PET mostly exhibit even stronger preferences for applicants with these degrees.

The results of chapter 3 show that within a diversified education system such as the Swiss system, employers who fill vacant positions highly appreciate applicants with a VET or PET background. Employers in many cases even seem to prefer those applicants to applicants with a general or academic education background. This preference is less pronounced for employers who are not very familiar with the Swiss education system, or more precisely with VET and PET in Switzerland. This finding again indicates the relevance of information provision – in this instance to hiring employers – such that all groups of graduates face favourable outcomes in the labour market.

Chapter 4 focuses on a specific type of education at Swiss universities, i.e., non-formal continuing education and training. This chapter is co-authored with Ladina Rageth and Ursula Renold (Chair of Education Systems at ETH Zürich). With the higher education expansion, there emerged a trend to a massification and also marketization of the higher education sector (Tomlinson & Watermeyer, 2022). This shift has implications for the strategic positioning of higher education institutions, which now compete for resources and students in an increasingly international and competitive landscape (Jongbloed, 2002). To adapt to these challenges, many higher education institutions have expanded their offerings to include continuing education courses, attracting students with diverse backgrounds. These new educational credentials, however, have societal consequences, which become visible in labour market settings.

Using data from a factorial survey experiment on hiring decisions of employers, we investigate the effect of non-formal continuing education at universities on the hiring probabilities and recommended salaries relative to formal, i.e., traditional university education. Our results indicate that employers do not differentiate between applicants with non-formal and formal university education when inviting candidates for job interviews. However, applicants with a continuing education credential receive a salary premium, defying some predictions of well-established theories. We provide first evidence of the effect of non-formal continuing education from universities on labour market outcomes. Our paper contributes to the literature by showing that if universities decide to diversify their programme offers, the different university credentials need a clearer positioning in the educational landscape and the labour market.

Chapter 5 analyses the effect of continuing education on wage growth for differently skilled workers. This chapter is a single-authored chapter. The labour market is



constantly changing due to technological advancement. Research shows that there emerges a concentration of higher-skilled jobs while middle-skilled and lower-skilled jobs decline (Oesch & Rodríguez Menés, 2011). Due to these newly emerging jobs roles and tasks, individuals face the expectation to constantly invest in new skills. Continuing education and training (CET) is one means to adapt to changing skill requirements, serving various purposes, including job re-entry, mobility, career development, and also lifelong learning. Empirical studies show that although CET enhances job security, its impact on wages and job mobility varies, with more pronounced effects for lower-skilled individuals.

Using data from the Swiss labour force survey (SLFS) from 2010 to 2020, this study explores the effect of CET on a worker's wage growth, with one focus on heterogeneous effects based on different course lengths. The study also examines how the relation between CET and wage growth changes over time, particularly for workers with different skill levels. I use two different measures to approximate a worker's skill level: first, their education level and second the type of occupation they work in. According to the skill-biased technological change (SBTC) hypothesis, highly-skilled workers should increasingly benefit from CET over time. The OLS regression results reveal a positive effect of CET on wage growth, which is mainly driven by longer CET courses. Lower-educated workers or workers in occupations with lower skill demand also experience significant wage growth. Over time, there is a slight upward trend of the effect of CET on wage growth for highly-skilled workers detectible, and a slight downward trend for lower-skilled workers, depending on the skill proxy used.

The last chapter of this thesis highlights the effect of technological change on outcomes of continuing education and training. While previous empirical evidence

already documented heterogeneous returns to CET depending on several individual characteristics, this study provides first evidence on how this effect heterogeneity has changed over time, and that the length of a CET course matters. Thus, when promoting CET, policy makers should create targeted and in-depth courses for workers.

My contributions to the individual chapters are as follows: For Chapter 2, I drafted the survey questionnaire together with the project team, but I was solely responsible for its implementation and conduction as well as for the cleaning of the raw data. Regarding the data analysis, I provided initial empirical analyses, refined them together with my co-author, and carried out several robustness tests. My co-author and I created the theoretical and conceptual framework. I provided the first draft of the manuscript, while my co-author and I equally contributed to revising it. I presented this chapter at several conferences and workshops.

For Chapter 3, I was partly involved in drafting the factorial survey, while my co-author mostly constructed the experimental design of the survey, conducted the survey, and cleaned its data. I performed the empirical analyses, as well as the robustness and validity tests. I carried out the literature review and drafted the theoretical concept. Moreover, I wrote the first draft of the manuscript, while my co-author and I equally contributed to revising it. I presented this chapter at several conferences and workshops.

For Chapter 4, the data collection, cleaning, and analysis followed a similar process to that in Chapter 3. My co-authors had the conceptual idea, and I provided first ideas for the theoretical framework. I was responsible for writing the first draft of the manuscript, to which my co-authors regularly contributed and provided feedback. I presented this chapter at several conferences.

Chapter 5 is a single-authored chapter. The data stem from the Federal Statistical Office in Switzerland. While I was responsible for all parts of this chapter, Thomas Bolli (Chair of Education Systems at ETH Zürich), Ladina Rageth (Swiss School of Public Governance at ETH Zürich) and Andrin Spescha (KOF Swiss Economic Institute at ETH Zürich) provided vital coaching and feedback. I presented this chapter at several conferences.

## **1.5 In conclusion**

This thesis provides empirical evidence on higher and continuing education in Switzerland. A diversified education system can result in favourable outcomes not only on an individual but also a societal level – if designed appropriately – but can also entail complexity and therefore more difficult choices. This thesis provides evidence that there exists information asymmetry on the side of prospective students and employers regarding the different types of higher and continuing education. It is worthwhile to reflect on targeted policies to reduce this lack of accurate information. Furthermore, the different trajectories and their (dis-)advantages should be communicated to prospective students, such that students can foster and enrich their individual skills set.

However, as I only focus on one country, the scope to which these results are externally valid is limited. Moreover, the analyses provide causal evidence in only two cases, which in turn are hypothetical survey experiments. Nonetheless, in many respects, this thesis taps into rather under-researched fields within the realms of labour market and education sociology. I would encourage other researchers to provide more evidence, also from other contexts, to solidify some of the knowledge that emerges through this thesis.

## Chapter 2

# **Decision-Making under Information Asymmetry: How do Misinformation and Uncertainty Affect Tertiary Education Choices?<sup>5</sup>**

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<sup>5</sup> Co-authored with Ladina Rageth.



## 2.1 Introduction

Tertiary education (TE) has become increasingly popular among young adults worldwide (Marginson, 2016). According to Becker and Zangger (2013) individuals across all socio-economic backgrounds remain in education over longer periods, resulting in higher societal education levels on average. At the same time, TE systems have become more differentiated to accommodate more prospective students, with many study programmes, varying in entry requirements and different post-graduation returns, for example in terms of salaries (Barone et al., 2016; Reimer & Jacob, 2011). Moreover, some Western European countries such as Austria, Germany, the Netherlands and Switzerland have different yet well-established types of education at the upper-secondary and tertiary education levels. At the tertiary education level, these countries differentiate between university (or academic) education and professional education and training (PET) (CSRE, 2023).

This variety results in complex education systems that are difficult to understand for prospective students (Guri-Rosenblit et al., 2007). Evidence shows that the more types of TE exist, and the more individual study programmes exist within these types, the more difficult it is for young adults to be adequately informed about the education system (Forster & van de Werfhorst, 2020; Piepenburg & Fervers, 2021). This study analyses the TE choices of young adults who have completed an upper-secondary vocational education and training (VET) in Switzerland and how these choices depend on their level of information about the different TE options.

Our theoretical framework builds on bounded rationality theories, which emphasise that individuals do not extensively engage in information search and consequently take decisions with incomplete or even inaccurate information (Kahneman, 2003; Simon, 2000). With education systems becoming more complex, we argue that young adults are

increasingly making choices under uncertainty and misinformation, and hence choose the option they are more familiar with.

We contribute to the literature on the relation between information and educational choices in four ways. First, we focus on a country with a highly diversified education system that offers several pathways to TE. Thus far, research has shown little evidence on the relation between information about the education system and TE choices in Western countries with diversified education systems (Barone et al., 2016; Sander & Kriesi, 2021).

Second, in many countries, VET serves as a ‘safety net’ for students who perform poorly at school due to the lack of opportunities for further education at the tertiary education level for these graduates. However, in Switzerland, VET is the most widespread upper-secondary education choice for youth. One of the reasons for the popularity of VET are the different options for VET graduates to continue their formal education at the tertiary education level. Our study provides evidence that this diversification is often used and that PET, which is the most closely related extension of VET, is the most familiar option for VET graduates.

Third, to comprehensively measure young adults’ level of information about the Swiss education system, we use three different assessments of their information level. This analysis combines a frequently used objective measure – individuals’ information about returns to education – with a measure on individuals’ subjective information level, and a measure of uncertainty, i.e., their knowledge about their eligibility to different educational options, and examines the individual relation between these measures and TE choices. By including these three measures, we apply a more holistic approach than most of the literature on the role of information in educational choice-making.

Fourth, we focus on young adults' knowledge about the education system in general, whereas most previous studies using that measure primarily analysed this type of knowledge from the parents' perspective (Forster & van de Werfhorst, 2020; Grodsky & Jones, 2007).

Analysing cross-sectional data that stems from an online survey conducted among VET graduates aged 18 to 35, we find that higher levels of misinformation on the benefits and uncertainty about eligibility significantly correlate with young adults' probability of choosing PET rather than university. However, variables disaggregated by type of TE show heterogeneous effects. Most importantly, misinformation and uncertainty about university education positively affect the choice for PET, whereas the effect of misinformation and uncertainty about PET is less clear.

The remainder of this chapter is organised as follows: first, we elaborate on the theoretical framework of educational choices, from which we derive our hypotheses, and give an overview of the relevant empirical literature. Second, to further explain our hypotheses, we describe the Swiss TE system. Third, we describe the data and analytical strategy. Fourth, we present the findings of our analyses. Fifth, we conclude with a discussion of our results, limitations and policy implications.

## **2.2 Theoretical Foundation and Empirical Evidence**

The sociological literature uses the rational choice paradigm as one of the main theoretical frameworks to explain educational choices (Holm et al., 2019). Rational choice theory argues that individuals invest in education according to the expected returns, the anticipated costs and the probability of successful completion (Breen & Goldthorpe, 1997). However, these assumptions require that individuals be well informed about their options and the respective costs, benefits and probability of successful completion of each option



(Stocké, 2012). Only then are individuals able to make optimal choices in terms of their educational careers (Oreopoulos & Petronijevic, 2013). However, empirical evidence shows that most individuals do not possess accurate information about their educational options or the benefits thereof (Abbiati & Barone, 2017; Barone et al., 2016; Kristen et al., 2008). Therefore, to study the role of information in educational choice-making, we rely on analytic frameworks from bounded rationality theories.

Bounded rationality theories (Kahneman, 2003; Simon, 2000) argue that individuals do not have full information and do not extensively engage in information search, especially in complex contexts, and are more likely to rely on heuristics – simplified concepts of reality meant to facilitate and accelerate the decision-making process. By relying on heuristics, individuals save time by foregoing rigorous information search and are more likely to rely on informal sources, such as friends and family. The shortcomings of relying on one's own social environment when making educational choices is that the emerging heuristics are often inaccurate, subjective and outdated (Abbiati & Barone, 2017). Consequently, the outcome of decisions based on heuristics may not be fully rational and therefore not optimal (Forster & van de Werfhorst, 2020).

Several studies have investigated the role of information about education in decision-making processes in different contexts. In line with bounded rationality theories, empirical evidence indicates that individuals do not usually possess perfect information when making educational choices, resulting in outcomes that can be less favourable to them (Barone et al., 2016; Briggs & Wilson, 2007; Grodsky & Jones, 2007). The literature has measured an individual's information level about an education system in different ways.

A first information level measure that only a few studies use is the subjective information level, i.e., how well individuals think that they are informed on the education system or certain aspects of it. Abbiati and Barone (2017) study prospective university students' assessment of the profitability of investing in university education. While they are primarily interested in these students' knowledge about costs and returns to university education and their assessment of the probability of successful completion, they also show that the students have a low confidence in their estimations of the benefits and costs of studying at a university.

A second – and more prominent – measure captures the level of information about monetary returns to graduates of a certain education (Breen & Goldthorpe, 1997). Multiple recent studies find that accurate information about the wages of TE graduates plays a role when individuals face the choice of post-compulsory education. Schweri and Hartog (2017) find that health care apprentices are more likely to enrol in university if their TE wage estimations are high. Kristen et al. (2008) use the degree of familiarity with the occupational returns associated with university education versus VET in Germany to show that lower familiarity with VET translates into a less favourable perception of the VET system, making the choice for university education more likely.

To highlight the importance of information about post-TE wages, several scholars carried out experiments within which information about TE costs and post-TE wages was provided to students who were about to enter TE (Barone et al., 2016; Bettinger et al., 2012; Kerr et al., 2020). These scholars observe that providing correct information about returns to education has an effect on students' educational choices. Bettinger et al. (2012) and Kerr et al. (2020) provide evidence that having correct information increases participation in TE. Barone et al. (2016) discover that the choice of the specific field of study

changes when students receive accurate post-TE wage information. Moreover, these authors find that prospective TE students tend to systematically overestimate university graduate wages and hence become oblivious to alternative TE choices.

A third possibility to measure an individual's level of information about the education system is to examine their knowledge about different options within the education system and the eligibility criteria for each option. This knowledge is especially important given there exists a variety of paths to TE, as it is the case in countries with both general and vocational education at the upper-secondary and tertiary education levels. However, thus far, there is also not much literature on prospective students' knowledge of different options within an education system.

In their survey among Dutch students, Forster and van de Werfhorst (2020) include questions on parents' knowledge on the type of education or degree that qualifies students for different occupations or further education. They then show that parents' knowledge matters when students transition to TE institutions. As the Netherlands also have a tradition of both academic and vocational education, Forster and van de Werfhorst (2020) argue that navigating these options can be a source of non-optimal choice-making in education. Piepenburg and Fervers (2021) analyse the knowledge of prospective college students who generally choose a small number of well-known study programmes. They argue that these students have limited information when deciding for college majors and introduce a counselling intervention. They show that counselling changes participants' intended college major choices to lesser-known majors, especially for students with low levels of information prior to the counselling.

As we are interested in providing a holistic view of information, we combine all three measures in our analysis. We argue that educational choice-making is a result not

only of cost-benefit considerations but also of individuals' information level according to i) their knowledge about different options within their respective education system, ii) their knowledge about the specific eligibility criteria that these options have and iii) their overall subjective level of information. This argument is especially crucial for countries with more than one prominent way of accessing TE (Forster & van de Werfhorst, 2020; Schindler & Reimer, 2011).

### **2.3 PET or University? The Swiss Tertiary Education System**

Switzerland provides a unique setting for analysing the educational choices of young adults considering TE, as many other countries do not have a comparable TE system in terms of diversification (Sander & Kriesi, 2021). While the country's upper-secondary education system largely includes VET, it also offers diverse options for TE other than traditional academic universities. In 2020, around 62% of upper-secondary graduates had obtained a VET degree, while the remaining 38% graduated from general upper-secondary education, which prepares them for traditional academic universities (FSO, 2021d). While those who completed general upper-secondary education predominantly choose TE at traditional academic universities, VET upper-secondary graduates display more heterogeneous choice patterns (FSO, 2018c).

With the establishment of the universities of applied sciences (UAS) in the 1990s, university education has become a more prominent option for VET graduates (Becker & Zangger, 2013). After upper-secondary VET and additional one to two years of schooling, which are completed with a federal vocational baccalaureate, VET graduates can transition to a bachelor's programme at a UAS. With even more additional schooling, typically organised in a one-year course (called the 'university aptitude test'), they may acquire an academic baccalaureate and are eligible to study at a traditional academic university.

UASs are similar to traditional academic universities, because 1) they offer bachelor's and master's degrees according to the Bologna system and 2) admission to their studies requires a baccalaureate. While upper-secondary general education graduates with some work experience may also enter UASs, UASs target mainly VET graduates. After attaining a bachelor's degree, UAS graduates have the possibility to enter a study programme at a traditional academic university.

Moreover, in addition to university education, VET graduates may also choose from a broad offering of PET programmes (Sander & Kriesi, 2021). PET, first, requires a certain number of years of work experience, depending on the level of the programme and the field of occupation. Second, PET programmes require only a VET diploma and are usually conducted as part-time studies, allowing the students to work while studying. PET thus opens up pathways to high-skilled occupations with a larger scope of responsibilities. The European Qualifications Framework (EQF) ranks PET at ISCED-levels<sup>6</sup> 5/6-8 (SERI, 2015), i.e., identical to a traditional academic university or UAS education. PET programmes aim at individuals who wish to continue with vocational education at the tertiary education level, i.e., pursuing a part-time and occupation-oriented education while staying employed.

PET diplomas made up for 31% of all TE diplomas in 2019 (FSO, 2020). Moreover, about a third of a cohort of VET graduates completes a PET programme (Sander & Kriesi, 2021), while about a quarter completes a federal vocational baccalaureate with the aim to enter a university. However, despite enrolment in PET being more frequent among VET graduates (FSO, 2021c), enrolment numbers over the past two decades make evident that

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<sup>6</sup> The International Standard Classification of Education (ISCED) of the UNESCO classifies educational programmes into levels and makes education systems across the globe more comparable in terms of competences that graduates acquire on each level.

the UAS increasingly attracted students at the expense of PET (CSRE, 2018, 2023). While the ratio of PET diplomas to university diplomas was five to one in 2002, it declined to one and a half to one in 2016.

## 2.4 Hypotheses

Drawing on bounded rationality theories, we state that individuals do not extensively engage in information search before opting for a specific TE choice, but instead use heuristics to facilitate their educational choice-making process (Kahneman, 2003; Simon, 2000). Thus, we argue that individuals choose the option that is most prevalent and familiar to them. In Switzerland, vocational and professional education and training is more prevalent among upper-secondary graduates than general or academic education. First, VET graduates with professional experience can directly access PET without any further education, while they need to acquire a baccalaureate to enrol in a university. PET is still more common among VET graduates, and does not require additional entry requirements in terms of schooling. These programmes likely constitute the most intuitive choice for VET graduates when enrolling in TE.

Consequently, we argue that individuals who do not extensively engage in information search, and therefore have lower levels of information on the different TE options, defer to PET as their TE choice. Hence, our main hypothesis reads as follows:

**H1:** VET graduates with lower levels of information about the TE system and its different aspects are more likely to opt for PET than university education.

Considering that we integrate all three measures used in the literature to comprehensively measure individuals' level of information on the TE system, we formulate the following three sub-hypotheses:

**H1a:** Higher levels of the subjectively assessed level of information on TE negatively relate to a choice for PET over university education.

**H1b:** Higher levels of uncertainty about eligibility for TE programmes positively relate to a choice for PET over university education.

**H1c:** Higher levels of misinformation about the wage benefits of TE positively relate to a choice for PET over university education.

## **2.5 Data and Methods**

### **2.5.1 Sampling strategy**

Our data stem from an online survey conducted in 2019 among VET graduates in the German speaking part of Switzerland. Thanks to a cooperation with Yousty AG, a private company offering job-matching assistance for young professionals, we were able to distribute our survey among our target group of VET graduates. Yousty AG provides one of the largest job- and apprenticeship matching platforms for prospective and former VET students in Switzerland. The firm's outreach and strong social media presence allowed us to contact VET graduates from the different industry sectors and regions. We thus used a convenience sampling approach, with social media as a means to distribute our survey among possible respondents – a method adequate for a large and hard-to-reach target group (Stupnisky et al., 2019). Furthermore, we focus our analysis on young people, who are relatively more active on social media.

We restricted survey participation following two criteria: first, we only surveyed VET graduates aged 18 to 35, meaning that participants outside of this age range were excluded. This age restriction serves to identify young persons, who are at the beginning of their professional career. Second, graduates from general upper-secondary education are also excluded from the analysis. We excluded general education graduates because they almost exclusively opt for university education (CSRE, 2018, 2023), thus there is not enough variation to exploit. As it is mainly VET graduates choosing between university and PET, we only focus on TE choices of VET graduates. Furthermore, PET does not target individuals with an upper-secondary general education.<sup>7</sup> Moreover, in Switzerland, about two third of each cohort opt for VET instead of upper-secondary general education, thus we analyse a highly relevant part of the youth population.

Furthermore, we include only those survey respondents in our analysis who are or were concerned with a TE choice. Thus, respondents who stated that they have neither started nor were planning to start a TE were also excluded from the analysis. To account for a potential selection bias in terms of motivation to start a TE, we conduct a Heckman selection regression analysis (Table A.11 in Appendix A), which confirms our analytical strategy.

After applying these exclusion criteria, our final estimation sample for this study consists of 180 observations. Table A.1 in Appendix A shows that the analytical sample is largely representative of the population of VET graduates (in 2018) in several characteristics. The analytical sample has a comparably larger share of women, Swiss nationals, respondents with tertiary educated parents and from central Switzerland.

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<sup>7</sup> Graduates of upper-secondary general education have the option to enter PET, but only after several years of work experience. Nonetheless, this educational path is not very common.



### 2.5.2 Data

We use a binary dependent variable called ‘Tertiary education: PET’, which captures if a VET graduate is currently in a PET programme or if they intend to start a PET programme within the next two years. We assign the zero value to those who are currently in a university programme or are planning to start a university programme<sup>8</sup>, including current and prospective baccalaureate students. The university type most represented in our data are UASs, with a smaller share of traditional academic or teacher universities.

Our estimations include three explanatory variables, capturing VET graduates’ information level on the education system with different measures. The following sections describe these three variables in more detail.

Furthermore, Cattaneo (2022) shows that different demographic groups have different knowledge on the returns to TE in Switzerland. Thus, it is crucial to highlight potential heterogeneity in the uncertainty and misinformation about TE options depending on other respondent characteristics. To see whether this heterogeneity exists in our sample, we analyse mean values for each explanatory variable by the following covariates: gender, parents’ education, country of birth, employment status and age. Table A.25 in the Appendix A displays these heterogeneity analyses.

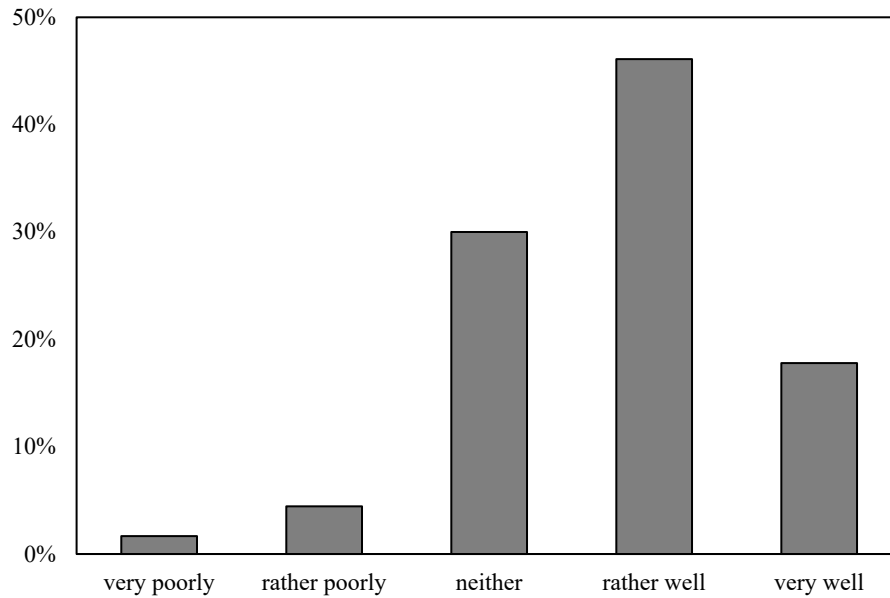
Our first information variable, – which we label ‘subjective information level’ – measures VET graduates’ subjective assessment of how well they are informed about TE programmes in general. We asked them to indicate their answer on a scale from 1-5, where the value 1 stands for “very poorly informed”, and the value 5 stands for “very

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<sup>8</sup> Note that next to the UAS, we include traditional universities, federal institutes of technology and universities of teacher training in the zero-category. Only a small number of participants indicate to have opted for these types of education. When excluding those two types of general education programmes in our dependent variable, the results do not change qualitatively (except for our first explanatory variable ‘subjective information level, which has a larger effect size when excluding other university types).

well informed”. With an average value of 3.7, our study participants indicate to be rather well informed. Figure 2.1 displays the distribution of this variable.

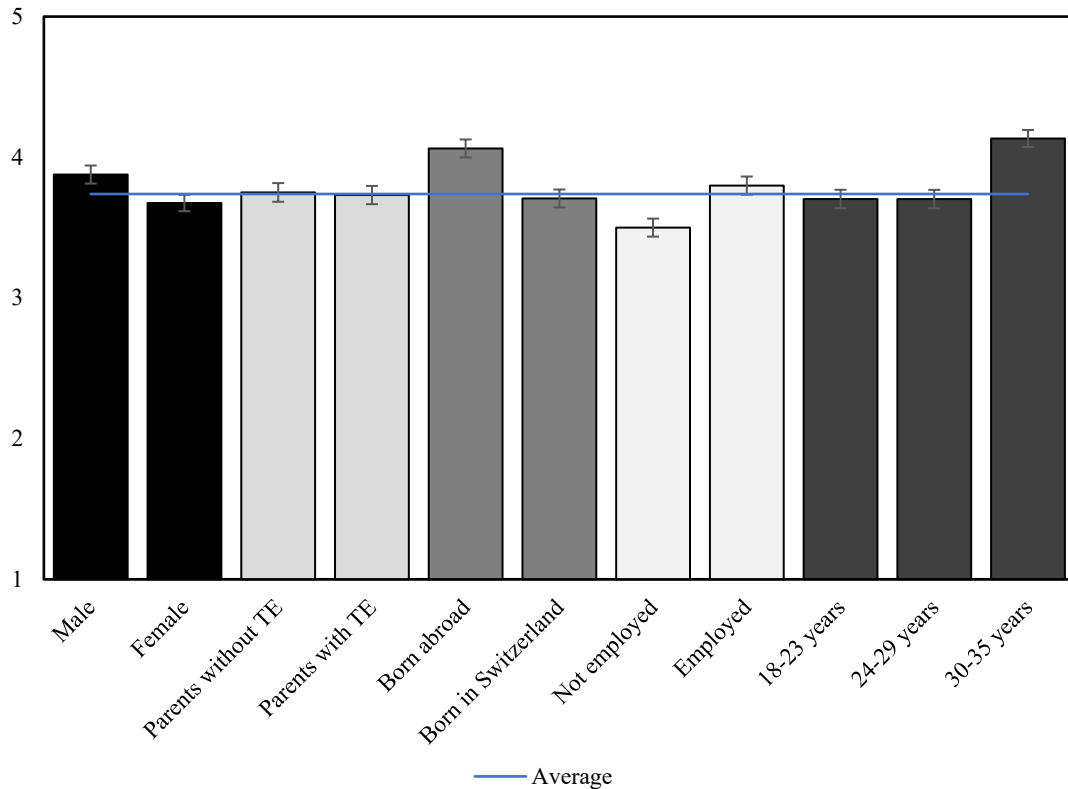
**Figure 2.1:** Distribution of the variable ‘subjective information level’



*Notes:* Figure displays shares of respondents for each answer option the variable ‘subjective information level’. N=180.

For this explanatory variable, we see that respondents who are male, were born abroad, are employed and are aged thirty and above have a higher subjective information level. We do not find differences by the parents’ education. However, we see that only the difference between employed and unemployed respondents is slightly significant. Figure 2.2 displays the mean of the first information variable by a selection of covariates we use in the models.

**Figure 2.2:** Means for variable ‘subjective information level’ by covariates

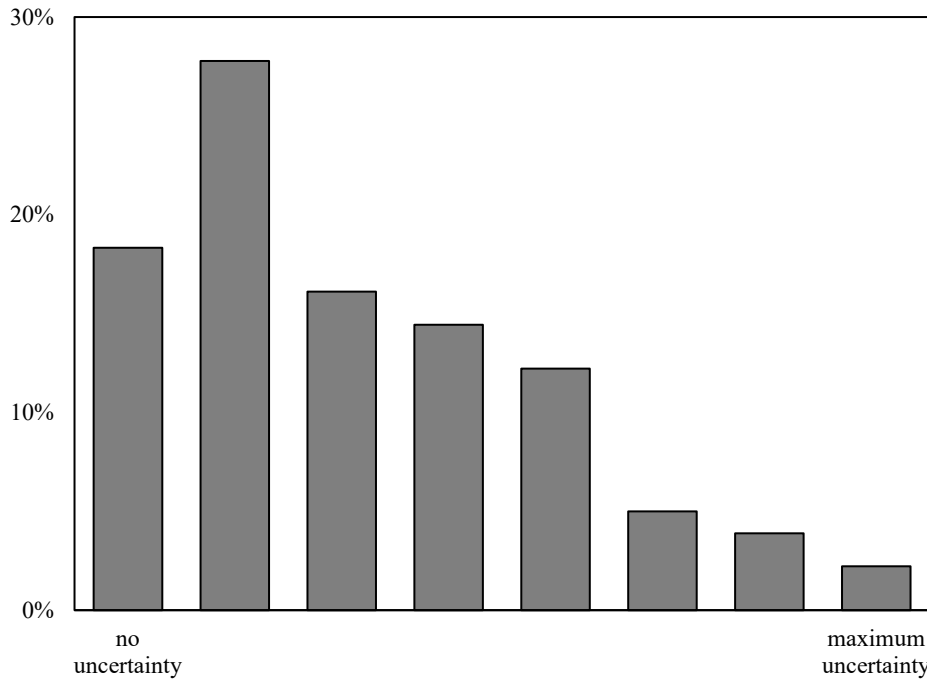


*Notes:* Figure displays means and standard errors for the variable ‘subjective information level’ by a selection of covariates. N=180.

Our second explanatory variable and our measure of uncertainty is whether the participants are knowledgeable about their eligibility for different individual TE programmes. We asked them to indicate for seven different TE programmes whether they are eligible to start that programme at the time of the survey, without fulfilling any additional requirements. This question allowed the answers “yes”, “no” and “not sure”. Relying on how many times participants were uncertain about their eligibility, we generated the variable ‘uncertainty about eligibility for TE: overall’. By adding the number of “not sure”-answers per respondent, we create a score ranging from 0 to 7, where a value of 7 indicates maximum uncertainty about eligibility. To gain more detailed information, we differentiate between answers for PET programmes – resulting in the variable ‘uncertainty about eligibility: PET’ – and for university programmes, resulting in the variable

‘uncertainty about eligibility: university’. Figure 2.3 shows the shares of respondents for each value of the score.

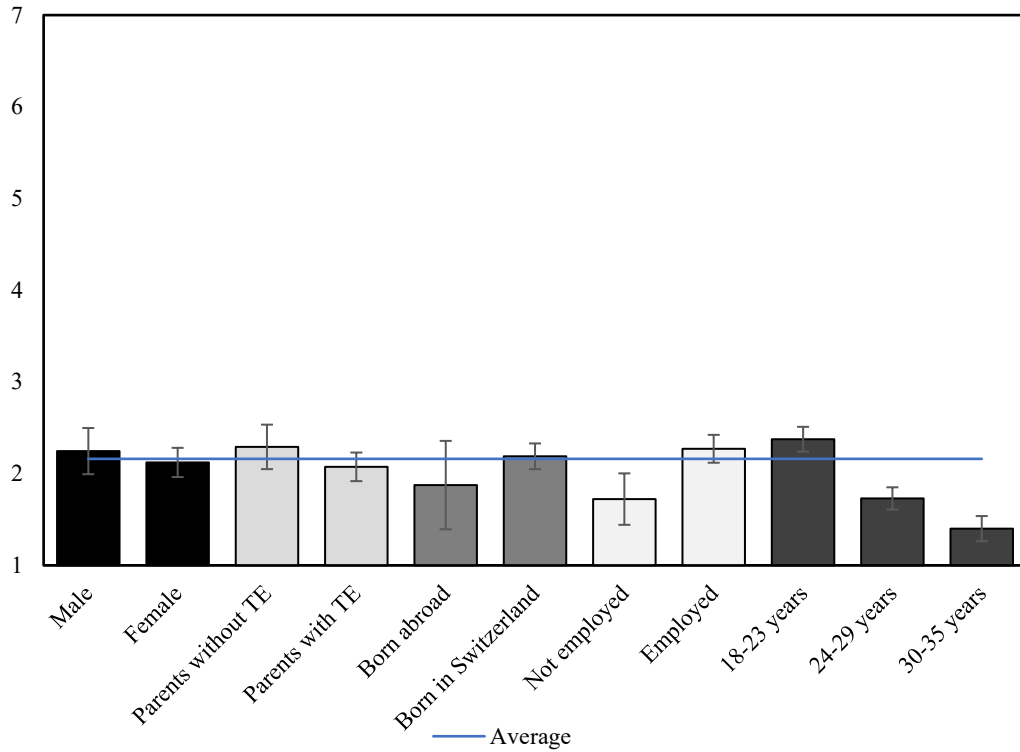
**Figure 2.3:** Distribution of the variable ‘uncertainty about eligibility for tertiary education’



*Notes:* Figure displays shares of respondents and their score on the variable ‘uncertainty about eligibility for TE: overall’. N=180.

As Table A.25 in Appendix A shows, respondents who are male, have parents without TE, were born in Switzerland, are employed and are between the ages 18 and 23 indicate higher uncertainty. Nonetheless, only the differences regarding employment status and holding a baccalaureate are significant. Figure 2.4 displays mean values of this variable by a selection of covariates.

**Figure 2.4:** Means for variable ‘uncertainty about eligibility’ by covariates

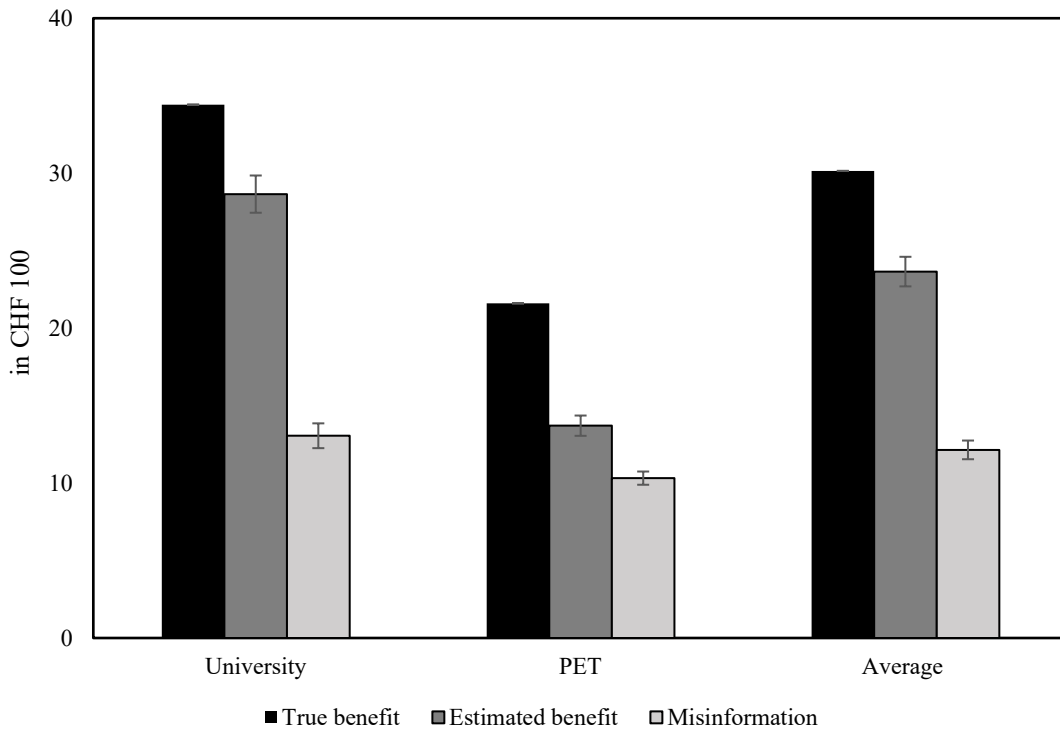


*Notes:* Figure displays means and standard errors for the variable ‘uncertainty about eligibility’ by a selection of covariates. N=180.

Our third explanatory variable and objective measure of VET graduates’ information level is their information about wage benefits of TE. Analysing individuals’ ability to correctly estimate graduate salaries is common in similar studies (Abbiati & Barone, 2017; Schweri & Hartog, 2017). We asked participants to give an estimate of monthly wages of different types of graduates, precisely of VET graduates, PET graduates, graduates from universities of applied sciences and graduates from traditional universities. The latter three estimates were subtracted from the estimates they indicated for VET graduates to generate the ‘estimated benefit of TE’. By generating the difference between our study participants’ wage benefit estimations and the true wage benefits for each TE, which stem from the biennially conducted Swiss Earnings Structure Survey (FSO, 2018a), we generate the variable ‘misinformation on wage benefits of TE’. The larger the

gap between the estimated benefit and the true benefit, the higher the level of misinformation. Figure 2.5 displays the average true wage benefit of TE and the average wage benefit of TE estimated by our survey respondents for PET, university, and on average, respectively.<sup>9</sup>

**Figure 2.5:** Estimated benefits, true benefits and misinformation on benefits of TE in CHF 100



*Notes:* Figure displays estimated wage benefits of TE from our survey respondents assessed against true wage benefits of TE, and the resulting misinformation (in CHF 100), with standard deviations (vertical brackets). Note that ‘misinformation’ does not capture the difference between ‘true benefit’ and ‘estimated benefit’, as it uses the deviation in absolute and thus positive values. Numbers for ‘true benefit’ stem from the Swiss Earnings Structure Survey (FSO, 2018a). University wage benefits include both UAS and traditional universities. N=180.

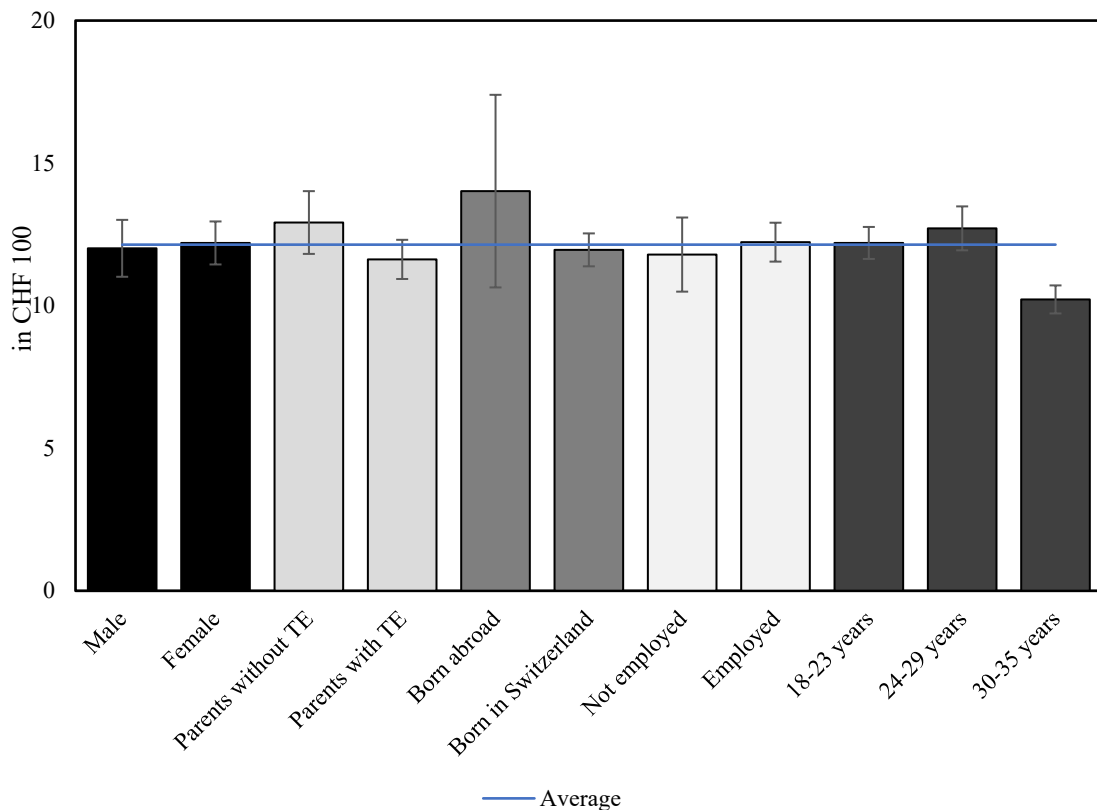
We use both, a variable that captures the average over all three relevant answers, and two variables that capture the disparities only for PET graduate wages and only for

<sup>9</sup> As we asked the respondents about their knowledge on the average wage by education, we also take the average for the calculation of the true benefit. We phrased the question in this way to reduce complexity and extensiveness of the survey. However, we acknowledge that wages differ by many characteristics, such as age, gender, nationality etc., but we cannot consider these differences in our analyses.

university graduate wages. This procedure results in three variables, ‘misinformation on wage benefits of TE: average’, ‘misinformation on wage benefits: PET’ and ‘misinformation on wage benefits: university’. Appendix A describes the process of how we generated these variables in more detail.

Respondents who have parents without TE, were born abroad, are employed and are below age thirty show a higher misinformation in wage benefits. There seems to be no difference between men and women. Yet, none of these differences are statistically significant. Figure 2.6 displays the means by a selection of covariates.

**Figure 2.6:** Means for variable ‘misinformation on wage benefits’ by covariates



*Notes:* Figure displays means of ‘misinformation on wage benefits of TE’ and standard errors by a selection of covariates. N=180.

To complete our regression models, we stepwise include three vectors of control variables. These covariates capture the following characteristics of the respondents:

- 1) gender, age, education of parents (Boudon, 1974), holding a baccalaureate (i.e., whether they have a federal vocational baccalaureate and/or an academic baccalaureate or not), intention to enrol in TE (i.e., whether they are already enrolled or just planning to enrol) (Saar et al., 2014), country of birth (Bolli & Rageth, 2022),
- 2) employment status, living status (whether they live with family members), financial obstacles (Saar et al., 2014), peer and family effects, i.e., friends/family members with university education (Brooks, 2003), friends/family members with PET education, residence region in Switzerland (Abbiati & Barone, 2017), type of completed VET programme (arts, business, engineering, health and welfare, science) (Kristen et al., 2008),
- 3) the relevance of official and informal information sources in the decision-making process<sup>10</sup> (Simões & Soares, 2010), duration of the decision-making process, a five-scale Likert-scale item on how difficult the decision-making process was ('difficulty of the decision-making process'), and a list of reasons that speak for or against enrolling in TE.

The literature shows that these variables influence educational choice-making, justifying the inclusion of these control variables in our estimations. Moreover, including these controls enhances the precision of our main estimate, i.e., the individual's level of information. We include the control variable vectors stepwise in the models.

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<sup>10</sup> Official information sources encompass web pages of education providers or of educational counsellors, flyers or leaflets, magazines or newspapers, social media accounts of education providers, counselling appointments, fairs and information events of education providers. Informal information sources include family, friends, colleagues and employers. The respondents indicated how relevant each of these information sources were when getting informed about different educational options. We aggregated the individual items to two factors after a principal-factor analysis.



Table A.2 in Appendix A gives an overview on the summary statistics of the main and control variables included in our analysis. The values for our explanatory variables make evident that there exists larger misinformation and uncertainty concerning university education than PET on the part of the respondents, further validating our hypotheses.

### 2.5.3 Analytical Strategy

Due to the binary nature of the outcome variable, we use a probit regression to estimate the relation between our explanatory variables and VET graduates' information level on their TE choice, namely if they opt for PET over university education.

We control for a rich set of covariates that the literature shows to have an effect on TE choices. We hence estimate the following probit model with robust standard errors:

$$PET_i = \beta_0 + \beta_1 Subjective_i + \beta_2 Uncertainty_i + \beta_3 Misinformation_i + \gamma_1 X_i + \varepsilon_i, \quad (1)$$

where  $PET_i$  is a binary variable that indicates whether a VET graduate chooses PET. The variable  $Subjective_i$  captures the subjective information level of an individual on a scale from 1 to 5.  $Uncertainty_i$  stands for the knowledgeableability of individuals about whether they are eligible for TE, and is measured by a score that ranges from 0 to 7.  $Misinformation_i$  indicates an individual's misinformation on wage benefits of TE (in steps of 100 CHF).  $X_i$  comprises a vector of control variables, as described in Table A.2 in Appendix A. To confirm the absence of multicollinearity of the explanatory variables, Table A.5 through Table A.8 in Appendix A display the results of the corresponding tests. They show that there is no issue of multicollinearity, hence allowing us to include all explanatory variables in the same model simultaneously.<sup>11</sup>

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<sup>11</sup> Table A.9 and Table A.10 in Appendix A display results of a principal-factor analysis to show that the explanatory variables load onto two factors. While our misinformation measure and our uncertainty measure load onto the first factor, our subjective measure loads onto the second factor. This analysis shows that our subjective variable measures a different concept relative to the other two variables. We

Drawing on our theoretical framework, we follow the argument that individuals comprise information about different types of TE through different channels. Consequently, we estimate a second model for which we disaggregate the objective information variable and the measure for uncertainty into four variables, each capturing the information level about PET and university education separately, as described in the section ‘Data’. The subsequent model hence includes  $UncertaintyPET_i$  and  $UncertaintyUni_i$  respectively to distinguish between information on eligibility to PET and eligibility to university education. Similarly, we distinguish between misinformation on wage benefits for PET and for university with the variables  $MisinformationPET_i$  and  $MisinformationUni_i$ . Note that such a differentiation is not possible for the variable ‘subjective information level’, which is based on a question on the overall education system and not on individual TE types.

As in equation (1), we include a control vector  $X_i$  and robust standard errors  $\varepsilon_i$ .

$$\begin{aligned}
 PET_i = & \beta_0 + \beta_1 Subjective_i + \beta_2 UncertaintyPET_i + \beta_3 UncertaintyUni_i + \\
 & \beta_4 MisinformationPET_i + \beta_5 MisinformationUni_i + \gamma_1 X_i + \varepsilon_i
 \end{aligned}
 \tag{2}$$

In addition, we need to consider that VET graduates pursuing TE are a selected group in terms of ability (Willis & Rosen, 1979). While we do not have any data on ability, we have information on motivation of the study participants and use this information to test whether in our sample VET graduates who choose TE differ from VET students who do not choose TE in terms of motivation. To further proxy an individual’s ability, we include the parental educational background as a control variable, to assess

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nevertheless include all three variables separately, as different tests (see Appendix A) indicate that the three explanatory variables are not collinear. Nevertheless, when including them separately in the full models, we find almost identical results.

primary effects of social origins that determine ability to a great part (Schindler & Reimer, 2010). We further investigate the existence of a second selection mechanism, i.e., whether there is a difference in the choice between the two TE types in terms of availability of information on TE. We present the results of these tests in a later chapter with robustness tests.

## **2.6 Results**

### **2.6.1 The Relation between Information Level and TE Choice**

Table 2.1 displays the results of probit estimations with average marginal effects and robust standard errors in parentheses. The results illustrate the relation between our explanatory variables and the choice for PET throughout four different models, while we stepwise include more control variables. Due to the restricted sample size, M1 only includes the participants' gender, age, parents' educational background, whether they are eligible for university education as controls. M2 further accounts for the fact that not all VET graduates are already enrolled in TE (some only plan to enrol in TE), their monetary restrictions, country of birth, living situation, employment status and friends' education ('additional control variables I'). M3 further includes regions of residence and type of completed VET programme ('additional control variables II'). M4 is our main model and additionally includes the relevance of official and informal information sources, a list of items concerning reasons for and against TE, the duration of the choice making process, and the difficulty of the decision-making process ('additional control variables III').

**Table 2.1:** Baseline estimations with aggregated explanatory variables

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.064 (0.040)	0.056 (0.040)	0.079** (0.040)	0.036 (0.038)
Uncertainty about eligibility: overall	0.039** (0.019)	0.033* (0.018)	0.029 (0.018)	0.034** (0.017)
Misinformation on wage benefits: average	0.007* (0.004)	0.008** (0.004)	0.012*** (0.004)	0.012*** (0.004)
Female	0.014 (0.073)	0.080 (0.074)	0.133 (0.093)	0.190** (0.090)
Age	0.026*** (0.009)	0.014 (0.011)	0.015 (0.010)	0.009 (0.010)
Parents' tertiary education	-0.229*** (0.061)	-0.206*** (0.062)	-0.229*** (0.057)	-0.231*** (0.055)
Holding a baccalaureate	-0.297*** (0.100)	-0.235** (0.099)	-0.169* (0.099)	-0.143 (0.094)
Additional control variables I	no	yes	yes	yes
Additional control variables II	no	no	yes	yes
Additional control variables III	no	no	no	yes
<b>N</b>	180	180	180	180
<b>Pseudo R<sup>2</sup></b>	0.15	0.21	0.26	0.36
<b>Log-Likelihood</b>	-104.01	-97.30	-90.70	-79.06

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. Control variables I include intention to enrol, monetary restrictions, born in Switzerland, living with family, employed, friends with university and friends with PET. Control variables II include control variables I, region in Switzerland and type of apprenticeship. Control variables III include control variables II and relevance of official information sources and relevance of informal information sources, duration and difficulty of decision-making process, and a list of reasons for or against enrolling in TE. Table A.3 Appendix A reports the full results of these baselines estimations.

Our first explanatory variable, ‘subjective information level’, positively affects the choice for PET over university education. However, this estimate is only statistically significant in M3. In addition, when including a list of items concerning reasons to take up TE, the effect size declines remarkably. The main driver of this decline is a variable that captures the reason ‘interest in TE programme’, which itself is highly positively significant in its effect on the choice for PET. This result may indicate that individuals give more weight to intrinsic motivation than to their subjective their information level when choosing TE. However, as the estimate is positive in all four models, i.e., an increase in the subjectively assessed information level increases the likelihood of choosing PET, we find no evidence to support H1a.

Our second explanatory variable, ‘uncertainty about eligibility for TE: overall’, also positively affects the choice for PET over university, indicating that VET graduates with higher uncertainty are more likely to choose PET. The estimate is significant, yet moderate, with an increase in the probability of choosing PET of 3 to 4 percentage points (depending on the specification) with each additional point of uncertainty. As the coefficient is positive in all four models, we find evidence to support H1b that higher uncertainty about eligibility increases the probability of choosing PET.

The third explanatory variable, ‘misinformation on wage benefits of TE’ is positively and significantly related to TE choice in all four models. Thus, the less informed VET graduates are about the wage benefits of TE, the more likely they are to choose PET over university education. Moreover, this effect size increases with the inclusion of additional control variables. In M4, misestimating the wage benefits by CHF 100 increases the probability of choosing PET over university education by 1.2 percentage points. We therefore also find evidence to support hypothesis H1c, i.e., that higher misinformation on the wages benefits of TE increases the probability of choosing PET education.

As VET graduates’ level of information on education can differ depending on the type of TE, we additionally differentiate our measure for misinformation on wages and the measure for uncertainty for eligibility in terms of information about university and information about PET. Hence, we replace the two aggregated measures with four disaggregated measures, capturing uncertainty and misinformation on PET, or university, respectively. Additionally, we use Wald-tests to assess whether the coefficients for uncertainty about and misinformation on PET significantly differ from the coefficients of the variables referring to university education. Table 2.2 displays the results of our

estimations with disaggregated explanatory variables and the heterogeneous effect estimations.

**Table 2.2:** Heterogeneity estimations with disaggregated explanatory variables

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.065* (0.039)	0.057 (0.039)	0.088** (0.039)	0.053 (0.037)
Uncertainty about eligibility: university	0.091*** (0.021)	0.083*** (0.021)	0.081*** (0.020)	0.083*** (0.020)
Uncertainty about eligibility: PET	-0.069** (0.035)	-0.059* (0.033)	-0.067** (0.034)	-0.056* (0.030)
Difference uncertainty PET vs. university	14.72***	12.89***	13.87***	13.79***
Misinformation on wage benefits: university	0.009*** (0.003)	0.010*** (0.003)	0.012*** (0.003)	0.012*** (0.004)
Misinformation on wage benefits: PET	-0.012* (0.006)	-0.011* (0.006)	-0.009 (0.006)	-0.011* (0.006)
Difference misinformation PET vs. university	6.44*	6.84*	7.21*	7.68*
Female	0.074 (0.071)	0.122* (0.070)	0.179** (0.087)	0.254*** (0.087)
Age	0.025*** (0.009)	0.014 (0.010)	0.016 (0.010)	0.012 (0.010)
Parents' tertiary education	-0.231*** (0.060)	-0.210*** (0.061)	-0.231*** (0.056)	-0.238*** (0.052)
Holding a baccalaureate	-0.229** (0.097)	-0.174* (0.095)	-0.103 (0.093)	-0.070 (0.094)
Additional control variables I	no	yes	yes	yes
Additional control variables II	no	no	yes	yes
Additional control variables III	no	no	no	yes
<b>N</b>	180	180	180	180
<b>Pseudo R<sup>2</sup></b>	0.21	0.26	0.32	0.41
<b>Log-Likelihood</b>	-96.86	-91.32	-84.03	-72.34

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. 'Difference misinformation' and 'Difference uncertainty' report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET. Control variables I include intention to enrol, monetary restrictions, born in Switzerland, living with family, employed, friends with university and friends with PET. Control variables II include control variables I, region in Switzerland and type of apprenticeship. Control variables III include control variables II and relevance of official information sources and relevance of informal information sources, duration and difficulty of decision-making process, and a list of reasons for or against enrolling in TE. Table A.4 in Appendix A reports the full results of these heterogeneity estimations with disaggregated explanatory variables.

Overall, we see that both uncertainty about eligibility and misinformation on wage benefits of TE have a different relation to TE choices depending on whether the variable refers to university education or to PET. For the variable 'uncertainty about eligibility', a higher level of uncertainty about PET reduces the probability of choosing PET education,

while a higher level of uncertainty about university increases this probability. Interestingly, the variable ‘uncertainty about eligibility to university’ has a stronger and more consistent coefficient over all models than uncertainty about PET eligibility. The Wald-tests show that in all four models, the difference between the two coefficients is significant at the 1%-level.

Regarding misinformation on wage benefits, the results show similar patterns. While higher misinformation on wage benefits of university enhances the probability of choosing PET, higher misinformation on wage benefits of PET reduces that probability. The coefficient for the variable ‘misinformation on wage benefits: university’ is highly significant and largely independent of the inclusion of further control variables, whereas the coefficient for ‘misinformation on wage benefits: PET’ differs in effect size and significance when including additional control variables. Again, the two coefficients differ in all four models with slight significance, as evidenced by the Wald tests.

These results show that a lack of information about eligibility for university and the wage benefits of university education make the choice for PET more likely. Moreover, young adults with a high uncertainty about PET eligibility and misinformation on wage benefits of PET are less likely to opt for PET, although these effect sizes are not stable over the different models.

### **2.6.2 Robustness Tests**

To verify that our findings for the relation between our explanatory variables and TE choice are generalisable, we need to inspect whether VET graduates in our sample who choose to enrol in TE are a selected group in terms of motivation (Li et al., 2000). To address the issue of possible sample selection, we additionally carry out a Heckman selection probit regression. As an exclusion restriction, we use the variable “no motivation

for further education”. We argue that this variable has no effect on the choice for or against PET, while it does have a significant effect on the choice for TE. We empirically confirm this assumption (see Table A.11 in Appendix A). Our findings show that the computed inverse mills ratio (included as a covariate to correct for selection bias) from the selection equation for models with both aggregated and disaggregated explanatory variables is insignificant in the two outcome equations. We also observe that the Heckman selection probit regressions qualitatively yield the same results as the presented probit regressions. Hence, we consider the probit results as our main results.

We carry out a second Heckman selection probit regression, where we use the variable “no adequate information on TE found” to investigate whether there is a difference in accessibility of information between the two TE types. This instrument is again significant in our selection equations, whereas the computed inverse mills ratios are insignificant in our outcome regressions. This result indicates that there is no selection into the different types of TE programmes based on availability of information. Moreover, the results do not change qualitatively compared to the presented probit results (see Table A.12 in Appendix A).

Additionally, we carried out several tests to assess the robustness of our specifications. For example, we exclude individuals who are merely pursuing or planning to pursue a baccalaureate of any given type from our dependent variable. While the main purpose of baccalaureates is to study at a university later, not all individuals who acquire them do eventually enrol in TE, while some might even choose PET. Table A.13 and Table A.14 in Appendix A show that the results generally do not qualitatively change when excluding this sub-sample. One exception is the variable ‘uncertainty about eligibility: PET’, which has a positive coefficient in these estimations, but is not significant. However, we need



to consider that excluding the sample of (prospective) baccalaureate students drastically reduces the sample.

Theories in sociology of education argue that parents' education is a strong influence on an individual's educational choices and success (Boudon, 1974). Not only does this factor act through an individual's ability but also through secondary effects, such as information on different educational possibilities. Thus, we additionally test whether parents' education mediates the explanatory variables and their relation with the choice for or against PET (Forster & van de Werfhorst, 2020). We first test if there exists a correlation between whether at least one parent has a tertiary education and each of our explanatory variables separately using bivariate OLS. In these regressions, we observe no significant relationship, as Table A.21 in Appendix A shows.

Nevertheless, we additionally compute KHB models to decompose possible mediation effects (Breen et al., 2013), and present their results in Table A.22 through Table A.24 in the Appendix A. For non-linear probability models, the KHB method is more appropriate to identify the direct, indirect, and total effects in case of mediation. These estimations confirm that there is no statistically significant relationship between parents' tertiary education and the explanatory variables, i.e., there is no indication of a mediation effect of parents' tertiary education on the effect of the explanatory variables on choosing PET over university. Parents' tertiary education does, however, reduce the propensity of choosing PET, as shown in both our main models and the KHB models. Interestingly, differentiating between parents with PET and parents with university education, Table A.15 through Table A.16 in the Appendix A show that parents with PET have a significantly negative effect on the choice for PET, compared to parents with university education, throughout all models.

Within our survey, we include respondents between 18 and 35 years. Naturally, this is a rather broad age bracket with very different individuals, especially in terms of educational decisions. Thus, we conduct two robustness tests where we first only include respondents younger than 26 (Table A.17 and Table A.19), and then only respondents younger than 30 (Table A.18 and Table A.20). For the baseline estimations, we see that the effects are only similar to the effects in the main models for the variable ‘misinformation on wage benefits’, and qualitatively comparable for the variable ‘subjective information level’. For the heterogeneous effect estimations, the results are more similar, except for the variable ‘subjective information level’, which displays a different effect size for respondents younger than 26 years, potentially due to the reduced sample size.

## **2.7 Discussion and Conclusion**

Since global trends such as digital transformation and internationalisation affect the skills demand in the labour market, tertiary education (TE) for VET graduates becomes more and more pertinent. This study analyses the under-researched case of an education system with more than one viable option for TE. Diversified education systems, such as the Swiss TE system, offer a variety of TE options, but also make it more difficult to navigate these options. Thus, young adults choosing TE often take their decisions under misinformation and uncertainty.

Our results indicate that choices between types of TE are indeed affected by misinformation and uncertainty. Despite our study participants indicating that they are rather well informed about the different TE options, they show systematically biased information or uncertainty about relevant aspects of TE. We find that higher levels of misinformation on the benefits and uncertainty about eligibility significantly increase young adults’ probability of choosing PET instead of university education. However, variables

disaggregated by type of TE display heterogeneity in their relation to TE choices. Importantly, misinformation about PET wage benefits dissuades young adults from pursuing PET, but misinformation about university wage benefits and uncertainty about university eligibility is positively associated with choosing a PET. Our study provides evidence indicating that individuals take relevant decisions with incomplete or inaccurate information, and hence supports bounded rationality theories over rational choice models.

This study faces different limitations. While this dataset includes different measures of an individual's information level regarding the Swiss education system combined with a rich set of control variables, it is only cross-sectional. Therefore, we cannot gauge causal effects due to unobserved heterogeneity. One aspect thereof is ability (measured in school grades or otherwise), which is one main driver of educational choices, but is lacking in our data set. However, we restrict our sample to VET graduates, who are in TE or are planning to pursue TE, meaning that we expect a relatively homogeneous group in terms of ability. Moreover, this analysis allows us to shed light on the relation between choices and subjective perceptions, which experimental studies usually do not include. Exploratory analyses of this type are helpful to uncover hitherto unknown relations.

Next to cost- and benefit considerations, rational action theories further rely on the probability of success when explaining educational decisions. This survey does not include any information that proxies the probability of successfully completing an education. Furthermore, while we have data on the highest completed education of both parents as a proxy for socio-economic status, there is no information on neither the income nor the current occupation of the parents. However, we can control for whether the survey participants indicate a lack of financial resources for TE as being a possible obstacle.

The focus of this study is the choice between university and PET, a choice that predominantly concerns VET graduates, while PET is an option only for few graduates of general upper-secondary education with many years of work experience. As this survey does not include young adults who graduate from general upper-secondary education, future research could investigate the role of information for these graduates, especially concerning PET as an alternative to university education.

Furthermore, we analyse a sample consisting of adults aged 18 to 35, who are in different situations in their lives. However, we argue that this large age range is nonetheless reasonable, as the permeability of the Swiss system allows for younger and older adults to enter the desired type of education. Thus, we are interested in providing an analysis for a larger age bracket. Yet, our sample comprises of mostly youth aged 18-24 (75% of the estimation sample). Therefore, this choice potentially concerns mostly adults within this age range. Nonetheless, our robustness tests show that excluding survey participants above age thirty changes the main coefficients only slightly.

We acknowledge that our convenience sampling strategy has its shortcomings in terms of representativity. However, distributing an online survey via social media provides a valid alternative for large and hard-to-reach target groups (Stupnisky et al., 2019), especially for young people who are well-represented on different social media channels. Furthermore, our sample is largely representative of VET graduates in 2018, as our sample comparison in Appendix A shows.

Regarding our explanatory variables, there might emerge concerns about reverse causality. Theoretically, it remains unclear whether individuals are well informed because they have already made their educational choice or if it should be interpreted the other way around. However, our descriptive analyses clearly show that on average, our study

participants are not well-informed, meaning that they did not extensively gather information before making their choice.

It is crucial to mention that the variable ‘uncertainty about eligibility’ is possibly endogenous in our models. Unlike wage benefits, this type of information is more specific and probably mainly known to those who already engaged in information search about this matter. However, since the coefficients for uncertainty about eligibility to PET are not significant over all models, this concern might only be true for uncertainty about eligibility to university education. The Swiss PET system is complex with its numerous programmes and requirements, making it relatively more difficult to be well-informed. We furthermore measure the concept of uncertainty only specifically in relation to eligibility criteria, but do not directly measure an individual’s confidence in their decisions as a personality trait.

Our unique explorative analysis compares two viable alternatives for TE within a diversified and well-performing education system. By comprehensively measuring different aspects of young people’s level of information on the education system, this study provides evidence that young adults who are planning to enrol in TE are not adequately informed about their options, and that they are generally better informed about PET than university education. We find evidence to support bounded rationality theories as we show that important decisions are taken with imperfect or inaccurate information. While we are not able to explain choices for TE entirely with the available data, we nevertheless show that uncertainty about eligibility and misinformation on wage benefits of TE affect young peoples’ choices. Hence, to ensure optimal allocation of individuals within the TE system, policy makers should address a possible need of systematic provision of information to young adults.

## Chapter 3

# **How does Familiarity with the Education System Shape Employers' Hiring Preferences? Evidence from a Factorial Survey Experiment<sup>12</sup>**

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<sup>12</sup> Co-authored with Ladina Rageth.



### **3.1 Introduction**

As employers are gatekeepers to employment, identifying their preferences for applicant characteristics in hiring decisions is essential to understanding individual labour market outcomes (Bills et al., 2017; McDonald, 2019). These preferences can include both applicant characteristics indicating productivity, e.g. work experience or education (Imdorf et al., 2017; Oswald-Egg & Renold, 2021), and other characteristics, e.g. age, gender or nationality (Finkelstein et al., 1995; Stoll et al., 2004). Moreover, as such preferences vary across contexts and employers, they depend not only on the social, organisational, and institutional contexts in which the hiring process takes place (Bills et al., 2017), but also on employers' characteristics, including their education and work experience (Deros & Ryan, 2019).

Particularly in the early stages of the recruitment process, employers have limited information about applicants and therefore base their decisions on easily observable characteristics, such as an applicant's educational degrees. Signalling theory (Spence, 1973) posits that educational degrees serve to signal an applicant's innate productivity-related skills to potential employers. However, how employers interpret these signals also depends on their beliefs about the degrees' validity (Bailly, 2008; Cai, 2013). Moreover, Konietzka and Kreyenfeld (2001) argue that employers can only respond to the signals of educational degrees if they are familiar with the different types of degrees. As predicted by signalling theories, employers learn about educational degrees if they are exposed to workers holding such degrees and thus grow more familiar with them (Bailly, 2008). Following this argumentation, we reason that employers' preferences for or against different types of education also result from differences in their familiarity with those educational degrees.



Especially in diversified education systems with no dominant type, Shavit and Muller (2000) argue that different types of educational degrees send different signals. Several European countries have education systems with general and academic education existing alongside vocational and professional education and training (VET or PET; Cedefop, 2021). For example, in Austria, Germany, the Netherlands and Switzerland, students can complete one of these two types of education at both the upper-secondary and tertiary education levels, depending on their interests and abilities.

Only few studies have investigated employer preferences for VET or PET over general and academic education. For Switzerland, McDonald and Korber (2023) show that while employers prefer applicants with upper-secondary general education to those with VET, they prefer professional education and training (PET) to academic degrees at the tertiary education level. Moreover, Shavit and Muller (2000) find that in countries with a well-functioning secondary VET system, employers are more likely to prefer applicants with VET degrees.

Empirical studies show that employers' unfamiliarity with certain educational degrees affects their hiring preferences. For example, after interviewing recruiters in different European countries, Hippach-Schneider et al. (2013) find that some recruiters who are unfamiliar with VET do not even consider applicants with such degrees. To the best of our knowledge, their qualitative study is the only one considering employers' unfamiliarity with different types of educational degrees acquired in the same country. Other relevant studies investigate employers who compare applicants with a migration background with domestic degrees to applicants with a migration background with foreign degrees, and find a preference for domestic degrees, with which employers are usually more familiar (Arbeit & Warren, 2013; Argue & Velema, 2022; Lancee & Bol, 2017).

We contribute to this literature by investigating employers' preferences regarding VET/PET degrees compared to general or academic degrees. Additionally, we investigate whether these preferences are influenced by the employers' degree of familiarity with VET/PET in Switzerland. While some studies provide evidence on employers' preferences for different types of education, the question of how employers' familiarity with such educational degrees affects their preferences has so far received little attention. By analysing employers' familiarity – or lack thereof – with certain applicant characteristics, scholars can develop a more comprehensive understanding of the factors influencing employers' hiring decisions. Consequently, educating employers about the validity of different educational qualifications and enhancing their familiarity with them could improve the labour market allocation of individuals with a wide range of educational backgrounds.

This chapter studies employers' preferences for applicants' education in the first stage of the hiring process. We use Swiss data for two reasons: First, Switzerland has a high percentage of students in both upper-secondary VET and tertiary PET. VET in Switzerland combines a large share of practical education in a firm or organisation with a smaller share of classroom education. PET helps professionals specialise in their field and offers a formal educational degree that strongly builds on the labour market needs. Moreover, VET and PET have a comparably high standing in Switzerland and are completed by students from different socio-economic backgrounds (FSO, 2015). Second, the literature shows that there is heterogeneity in Switzerland regarding the beliefs about, experience with and exposure to VET and PET, i.e., familiarity with VET and PET (Abrassart et al., 2020; Busemeyer et al., 2011; Muehleemann et al., 2007).

Using data from a factorial survey experiment, we investigate whether employers in Switzerland prefer applicants with VET or PET to those with general or academic

education for positions in commerce and IT. Specifically, we ask employers to choose – in hypothetical hiring situations – between qualified applicants for a job interview for specific positions. Each of the 2,384 respondents evaluated eight randomly displayed fictional applicants for two hypothetical vacancies in either commerce or IT: four applicants for an entry-level position and four applicants for a high-level position.

We additionally investigate whether employers' familiarity (or lack thereof) with VET and PET affect their hiring preferences. We approximate the concept of familiarity by a range of employer attributes, for which we argue that they influence their exposure to different educational degrees and experience with them. These employer attributes are related to either their employment situation or their biography.

We structure the remainder of this chapter as follows: After outlining the context of the Swiss education system, we introduce the theoretical foundations, our hypotheses, and the empirical evidence on the role of education in hiring processes. We then provide an overview on our analytical strategy, including the data and estimation method, followed by the results of our analyses. To conclude, we discuss these results, also in terms of their limitations and policy implications.

### **3.2 The Swiss Education System**

Many European countries, such as Austria, Germany, the Netherlands and Switzerland, offer VET and PET as alternatives to general and academic education at the upper-secondary and tertiary education levels (Cedefop, 2021). Allmendinger (1989) argues that, in highly standardised educational systems, employers receive clearer signals about an individual's job-relevant productivity from degrees alone. More specifically, highly diversified systems with well-established VET or PET (or both) generally have nationally harmonised competence standards and a strong labour market orientation (Andersen &

Van de Werfhorst, 2010; Bolli et al., 2018). For our analysis, we focus on the Swiss case. At both the upper-secondary and tertiary education levels, the Swiss education system includes different types of education. To illustrate the high diversification of the Swiss education system, we present some key figures.

Each year, 38% of upper-secondary graduates complete a general education degree, while 62% complete a VET degree (FSO, 2021d). Upper-secondary general education programmes focus on teaching advanced general skills, and award students with an academic baccalaureate after its completion. These programmes allow direct access to traditional academic universities, which constitute the primary tertiary education choice of these graduates (FSO, 2018c). Nevertheless, Aepli et al. (2021) show that 75% of individuals with an upper-secondary general education as their highest educational degree are active in the labour market, while Korber and Oesch (2019) demonstrate that their employment rates and earnings are high over the life course.

Upper-secondary VET programmes differ in one core aspect from general education: they combine the teaching of occupation-specific skills with a smaller part of general education by providing practical training in firms or organisations alongside classroom education. Combined school- and work-based (dual) VET is the most popular mode for young adults to pursue a VET programme in Switzerland (FSO, 2021d). While socioeconomic status plays a significant role when choosing upper-secondary education, VET in Switzerland – compared to many other countries – has a comparably high standing. Not only do students from a broad spectrum of competencies select into VET (Bolli & Rageth, 2022), but the data also show that – depending on the programme – between a quarter and a third of VET students have tertiary educated parents (FSO, 2015).

Moreover, competencies test results show that there exists a large overlap of competencies between the two educational types (CSRE, 2018).

After successful completion of a VET programme, graduates can directly enter the labour market or enrol in tertiary education by choosing among diverse types and programmes. Salvisberg and Sacchi (2014) provide evidence that job entry requirements for vocationally educated workers have risen, such that further education has become a pertinent matter for VET graduates. After acquiring additional work experience, VET graduates may enter tertiary education through a PET programme (allocated at the tertiary education levels 6-8; SERI, 2021). PET programmes help professionals specialise in their field and offer a formal degree. PET is strongly geared towards labour market needs due to professional and trade associations defining these programmes' contents (ODEC, 2022). The Swiss education system provides a wide array of PET programmes from different domains and sectors.<sup>13</sup> Alternatively, VET graduates can obtain a federal vocational baccalaureate, which allows them to enter a study programme at a university of applied sciences (UAS) or, after passing an aptitude test, at an academic university (SERI, 2021).<sup>14</sup> At both university types, they can complete their studies with a bachelor's degree and a master's degree.

Following the International Standard Classification for Education (ISCED-2011), general education and VET are located at level 3, while PET, UAS and academic universities are all located at the ISCED-levels 6 to 8 (SERI, 2015). There exists a high

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<sup>13</sup> PET programmes are completed by either a federal examination (leading to a Federal Diploma or Advanced Federal Diploma of Higher Education) or at a college of higher education (leading to an Advanced Federal Diploma of Higher Education) (ODEC, 2022).

<sup>14</sup> UAS are similar to academic universities, but they put a stronger focus on industry collaboration and applied research. They operate with the internationally standardised system and offer bachelor's and master's degrees, but do not offer doctorates.

permeability between general education and VET at the upper-secondary education level and academic education and PET at the tertiary education level (Hoffman & Schwartz, 2015).

### **3.3 Literature Review and Hypotheses**

#### **3.3.1 The Role of Education in Hiring Processes**

Signalling theory (Spence, 1973) provides a framework for understanding the connection between educational achievement and labour market outcomes, with a particular focus on the role of employers in the hiring process. Signalling theory argues that employers act under information asymmetry – especially in the first stages of a hiring process. Thus, they look for applicant characteristics that signal job-relevant skills, such as trainability and productivity (Arrow, 1973; Spence, 1973). An applicant's educational degree is one information from which employers can infer these characteristics.

Signalling theory also discusses why individuals invest in education: it posits that individuals have certain abilities before starting an education and that completing a specific educational programme enables them to signal these abilities in the labour market. Traditionally, signalling theories make this argument to explain why certain individuals invest in more years of education, i.e., that education can help high-ability individuals distinguish themselves from individuals with lower levels of ability.

However, this sorting mechanism can serve a different purpose in education systems with more than one prominent educational type. Some scholars argue that educational degrees send different signals in the labour market depending on the type of education, especially in diversified education systems without a single dominant type (Shavit & Muller, 2000). As diversified education systems have an array of upper-secondary and tertiary educational pathways, we argue that here education not only sorts high-ability

from lower-ability students, but also divides students alongside their specific abilities, skills, and interests (Abrassart & Wolter, 2019; Hillmert & Jacob, 2003).

Signalling theory states that an individual's ability is negatively correlated with educational costs, i.e., that individuals choose the educational pathway that most clearly signals their abilities and entails the lowest costs (Spence, 1973). Students in a diversified education system thus invest in those skill types, i.e., general, occupation-specific, or practical skills, with the highest individual utility (Möser et al., 2019). For example, students with strong practical skills are most likely to select into VET/PET, as they expect the highest benefits from this type of education. Hence, as different educational programmes serve as a means of sorting individuals alongside their specific abilities, employers may choose from a pool of differently skilled applicants when hiring new employees (Bills, 2003).

Various studies investigate employers' hiring preferences, often specifically related to an applicant's education (e.g. Damelang et al., 2019; de Wolf & van der Velden, 2001; Fossati et al., 2020). Overall, these studies show that employers prefer certain educational degrees or skills in the hiring process (e.g. Biesma et al., 2007; Humburg & van der Velden, 2015; McDonald & Korber, 2023). However, the literature also finds that the role of educational degrees in hiring processes depends on what other information employers have on the applicants (Di Stasio & Gërkhani, 2015; Fossati et al., 2020), the institutional context of the education system (Di Stasio & van de Werfhorst, 2016; Humburg & van der Velden, 2015; van Beek et al., 1997) and on employers' familiarity with different types of education (Hippach-Schneider et al., 2013).

Scholars argue that VET or PET degrees strongly signal an applicant's employability and job-related productivity (Konietzka & Kreyenfeld, 2001; Stumpf et al., 2020).

Yet, only few studies examine employers' preferences regarding different types of education, i.e., VET/PET versus general/academic education in hiring decisions (Hippach-Schneider et al., 2013; McDonald & Korber, 2023). By conducting a factorial survey among Swiss employers, McDonald and Korber (2023) show that Swiss employers prefer applicants with PET to university degrees for jobs that require a tertiary education, but that employers prefer applicants with general education for jobs requiring only an upper-secondary education. The study of McDonald and Korber (2023) is thus far closest related to this analysis.

In summary, in education systems that are highly diversified and have a strong vocational and professional path, using educational degrees as a selection criterion in recruitment is more reliable for employers (Bol & Van de Werfhorst, 2011; Di Stasio et al., 2016; Neugebauer & Daniel, 2022). In such systems, employers are likely to prefer applicants with a VET or PET degree to those with a general education or academic degree, respectively. As VET and PET degrees send signals that employers easily connect to the job-relevant skills and productivity, the signal of general or academic degrees becomes weaker in a comparison. General and academic degrees do not sufficiently reduce employers' information asymmetry regarding an applicant's job-relevant productivity, because these degrees are most often not geared towards specific occupations.

Based on these argumentations, our first hypothesis reads as follows:

**H1:** In countries with highly diversified education systems, employers generally prefer applicants with an upper-secondary VET degree to those with a general education for entry-level positions and applicants with a tertiary PET degree to those with an academic degree for high-level positions.



The previous sections have outlined the reasons why employers should prefer VET/PET in highly diversified education systems. However, the type of skills employers require also depends on the occupation (Di Stasio & van de Werfhorst, 2016). As newly available technologies constantly change the skills requirements, some occupations require workers who can quickly adapt to these changes (Deming & Noray, 2020). Krueger and Kumar (2004) argue that workers with a general education can better operate new technologies, while workers with a vocational and professional background are more efficient with established technologies. Thus, there exists reason to expect that employers' preferences for VET/PET or general/academic education vary depending on the occupation and its requirements.

### **3.3.2 Employers' Familiarity with Educational Degrees and their Hiring Preferences**

Extensions of the traditional signalling theory framework argue that signals are not universal, but that the signals employers receive from different educational degrees largely depend on their beliefs about the validity of these degrees (Cai, 2013). Signalling theory argues that employers go through a 'trial and error' process: by repeatedly hiring applicants with certain educational degrees, they learn about the value of those degrees, with their beliefs eventually reaching an equilibrium such that each educational degree receives a definite value (Spence, 1973). Thus, employers can only update (or confirm) their beliefs about applicants with certain degrees through exposure (Bailly, 2008). Furthermore, Cai (2013, p. 469) argues that not only labour market experience shapes employers' beliefs, but also exogenous factors, e.g., "a larger cultural environment [...], specific market conditions and the companies' particular characteristics".

While all employers rely on the signals of educational degrees to take decisions in hiring processes, some employers are better informed about educational degrees than others, mainly due to their previous experience (Spence, 2002). Highly diversified education systems – as opposed to education systems with a single dominant educational pathway – require employers to gather information on the skills of applicants with different educational degrees to take hiring decisions. Consequently, employers may not be fully informed about the many educational types and programmes or their potential labour market value (Spence, 2002).

Up to date, only one empirical study examines how employers' familiarity with domestic educational degrees affects their hiring preferences. Hippach-Schneider et al. (2013) draw on qualitative interviews with human resources personnel in England, Germany and Switzerland to show that some English employers are completely unfamiliar with VET, and that this unfamiliarity hinders them to properly assess the skills and knowledge of applicants with a VET degree. Their interviewed German and Swiss employers, in turn, highly value VET due to its practical component.

The other literature that comes closest to our research question is the one examining employer's familiarity with foreign degrees and its effect on the hiring process. These studies focus on differences in employers' familiarity with domestic and foreign degrees – i.e., on the place where the education was acquired and not on whether they prefer applicants with or without an immigration background.

These studies show that employers prefer domestic educational degrees, because they are more familiar with them. For example, analysing survey data from college graduates, Arbeit and Warren (2013) show that in the U.S. labour market, immigrants with foreign college degrees have a disadvantage compared to immigrants with U.S. college

degrees in terms of employment opportunities and wages. Similarly, Argue and Velema (2022) provide evidence that employers do not generally dismiss foreign degrees, but that university degrees from culturally distant countries yield an earnings disadvantage. Analysing earning returns for immigrants in eleven European countries, Lancee and Bol (2017) find that immigrants profit from acquiring domestic degrees and that culturally distant degrees send weaker signals to employers. However, by using factorial survey data, Damelang et al. (2020) show that employers prefer domestic to foreign degrees, but that they evaluate foreign degrees more similarly to domestic degrees when accreditation mechanisms, which provide information on the foreign degrees, exist.

Taken together, the literature provides evidence that employers receive clearer signals from educational degrees with which they are more familiar and hence prefer applicants with these degrees. However, this body of the literature cannot disentangle the effect of employers' characteristics on these preferences, irrespective of whether the degrees are acquired domestically or abroad. Thus, it is crucial to also consider literature that shows that individuals perceive domestic degrees differently depending on their own background and experiences.

The empirical evidence on the perception of VET/PET in Switzerland shows variation in the perceived values of this type of education. It further provides evidence that individuals' background characteristics influence their beliefs about educational degrees (Abrassart et al., 2020; Busemeyer et al., 2011; Muehleman et al., 2007; Wolter et al., 2006). Studies show that e.g., individuals born abroad need more time to consider VET/PET as a viable educational path for themselves or their children (Abrassart et al., 2020; Bolli & Rageth, 2022). Other studies find heterogeneity in the perception of VET/PET between the different language regions due to historic and cultural differences

(Muehleemann et al., 2007). Moreover, Busemeyer et al. (2011) show that an individual's own educational background biases their perception of the validity of other educational pathways.

Taken together, we argue that employers' exposure to different types of educational degrees and their experience with them affects their beliefs about those degrees and thus the signals they receive. Therefore, it is plausible to assume that employers differ in their level of experience and exposure. We henceforth call this level of experience and exposure *familiarity*, leaning on Goldstein and Gigerenzer (2002, p. 77), who state that the term familiarity "is typically used in the literature to denote the degree of knowledge (or amount of experience) [...]".

Our first hypothesis argues that employers who recruit graduates from diversified education systems should prefer applicants with a VET or PET degree to those with a general or academic degree, because of the close labour market linkage of VET and PET degrees. We now outlined how employers can differ in their familiarity with VET and PET degrees, and thus in their beliefs in the validity of the signal that they receive from the different types of education. Consequently, we expect that if employers are more familiar with VET and PET, their preferences for these degrees increase in the hiring process. Hence, we formulate our second hypothesis:

**H2:** In countries with highly diversified education systems, employers who are more familiar with VET and PET exhibit stronger preferences for this type of education than for general or academic education.

### **3.4 Analytical Strategy**

#### **3.4.1 Using Factorial Survey Data**

To test our hypotheses, we use data from a factorial survey experiment, which we conducted among employers in Switzerland. Within this survey, employers evaluated fictional applicant profiles for hypothetical vacancies. To warrant a quasi-experimental design, the applicant profiles differed in multiple characteristics, and varied randomly among respondents. By consulting recruitment-experienced experts from various industry sectors in a workshop and scanning real-life job ads, we ensured that all fictional applicants had realistic profiles and qualified for the vacancy in question (Gutfleisch et al., 2021). Factorial surveys have the advantage that they use a quasi-experimental design to identify causal relations between applicant characteristics and applicant profile evaluations and at the same time allow the inclusion of conventional survey questions (Hainmueller et al., 2015; Petzold & Wolbring, 2019).

In this paper, we focus on applicants' educational degrees, i.e., whether they have a VET degree or a general education degree (for entry-level positions) and whether they have a PET degree or a university degree (for high-level positions). The upper-secondary degrees are either federal VET diplomas – as a commercial employee or information technologist – or academic baccalaureates (general education) with a specialisation in business and law or physics and mathematics. The tertiary degrees are either Advanced Federal Diplomas for PET – in sales management or ICT management – and master's or bachelor's degrees (university) in either business administration or information technology. All educational degrees are closely related to the hypothetical position for which the applicant applies, i.e., all applicants applying for a commercial position have a degree in this field. For example, the upper-secondary general education degree with a focus on

business and law is only displayed to employers who evaluate profiles for the position ‘administrative assistant’.

Table B.2 in Appendix B lists all educational degrees included in the applicant profiles by each hypothetical position. To mitigate social desirability bias, applicants also differed in seven other characteristics: for entry-level positions, we varied the applicants’ gender, nationality, social skills, occupation-specific work experience, and work experience in the sector relevant to the firm; for high-level positions, we varied applicants’ upper-secondary education, whether they completed a continuing education or not, gender, social skills, overall work experience, and occupation-specific work experience (see Table B.3 in Appendix B for an overview of all applicant characteristics).

Except for the profiles that contained implausible combinations of applicant characteristics (Auspurg & Hinz, 2014) – for example, no work experience but work experience in the relevant sector – we used all profiles from the applicant profile universe. The exclusion of some applicant profiles entails that not all dimensions are orthogonal to one another, as Table B.4 and Table B.5 in Appendix B show.

We investigate the internal validity of our quasi-experiment with three tests: First, as the order of the applicant profiles does not vary randomly in the set of four profiles, our baseline estimations include a variable controlling for this potential order effect. Second, we show that including respondent characteristics in our estimations does not affect our main estimate. Third, by examining the correlations among all applicant profile variables (i.e., applicant characteristics) and with the respondent variables, we show that the randomisation was successful (Table B.6 and Table B.7 in Appendix B).

Each respondent rated four applicants for an entry-level position and four applicants for a high-level position, thus, in total eight applicants (see Figure B.1 and Figure

B.2 in Appendix B for an applicant profile example). We differentiate between entry-level positions and high-level positions to compare the two types of education at both the upper-secondary and tertiary education levels. In the survey, we showed the respondents the list of all hypothetical open positions within the survey, and asked them to choose the ones they have recruitment experience with. Consequently, each employer rated applicant profiles only for one entry-level position and one high-level position.<sup>15</sup> Consequently, respondents rated applicants for one entry-level position, either ‘administrative assistant’ or ‘IT assistant’ and for one high-level position, either ‘sales manager’ or of ‘IT director’ (see Table B.1 in Appendix B for an overview on the job descriptions). We chose these occupations as they are common in many industry sectors and because both applicants with general/academic degrees and those with VET/PET are qualified for these positions. Furthermore, comparing commercial and IT positions helps us illustrate potential differences by occupations, as IT positions are more prone to technological change (Bolli & Pusterla, 2023; Deming & Noray, 2020).

Although hypothetical vacancies may have a lower external validity (Gutfleisch et al., 2021), they allow us to control for differences in vacancy characteristics. Furthermore, robustness test estimations including only those respondents who state that the hypothetical vacancies rather or highly match the real vacancies in their firms yield qualitatively the same results as our baseline regressions, but indicate that our main results have a slight upward bias (see Table B.9 and Table B.10 in Appendix B).

When evaluating each applicant profile, the respondents answered the following question: How likely is it that your firm would invite this person for a job interview (on

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<sup>15</sup> As the respondents could choose multiple options, the combination of the entry-level position as ‘administrative assistant’ and the high-level position as ‘IT director’ – or vice versa – was also possible. Consequently, 22% of all respondents had a ‘mixed’ set of applicant profiles.

a Likert scale from 1 ‘very unlikely’ to 10 ‘very likely’)? As a robustness test, we also convert these Likert-scale evaluations into an applicant profiles ranking and use it as an alternative dependent variable (Di Stasio & van de Werfhorst, 2016).<sup>16</sup> The estimations including this ranking variable yield qualitatively the same results (Table B.11 and Table B.12 in Appendix B).

If respondents answer multiple questions that follow the same mechanism, survey fatigue may affect their answers, thus leading to less variation in the evaluations. To assess whether survey fatigue affects our results, we estimate a robustness test that only includes respondents with varying applicant profile evaluations. By including the time that respondents needed to evaluate each applicant profile as additional control variables, we further test the robustness of our results (Sauer et al., 2014). These two tests yield qualitatively the same results as our main estimations (in Appendix B, see Table B.8 for the summary statistics of the new variables and Table B.13 through Table B.16 for the detailed results of these tests).

We contacted 46,000 employers in Switzerland in autumn 2020 via e-mail. All contacted employers are registered in the biggest matching platform for apprenticeships and entry-level jobs in Switzerland. In total, 2,384 employers answered our survey, yielding a 5-percent response rate<sup>17</sup>. Table 3.1 displays the summary statistics for the sample of respondents without missing values for the included variables. We only include respondents without any missing values in the variables used in our analyses, leading to sample of 1,342 employers for the position of ‘administrative assistant’, 412 for ‘IT assistant’,

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<sup>16</sup> If two or more applicant profiles received the same evaluation, we assign them the same average rank out of four.

<sup>17</sup> One reason for this low response rate is that not all contacted employers had recruitment experience, which is why we excluded them from the survey. Moreover, response rates of surveys of representatives from firms or organisations are often lower than those from general population surveys (Anseel et al., 2010).



1,231 for 'sales manager' and 505 for 'IT director'. In Appendix B, Table B.19 through Table B.22 present the summary statistics for each sample of the different estimations.

**Table 3.1:** Summary statistics of respondent and firm variables

<b>Respondent and firm variables</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Female	0.5	-	0	1
Age	46.4	10.45	20	70
Respondent born in Switzerland (vs. outside Switzerland)	0.89	-	0	1
Respondent from German-speaking part (vs. French-speaking part)	0.92	-	0	1
Educational career of respondent				
General	0.18	-	0	1
Mixed	0.35	-	0	1
VET/PET	0.47	-	0	1
Respondent works in HR	0.46	-	0	1
Respondent is the firm director	0.31	-	0	1
Respondent is the firm owner	0.23	-	0	1
Recruitment experience of respondent				
Little experience (less than 10 in the past 5 years)	0.47	-	0	1
Much experience (more than 10 in the past 5 years)	0.53	-	0	1
Firm is internationally active	0.17	-	0	1
Relevance of apprentice training in firm	4.65	0.69	1	5
Firm size				
<10 employees	0.13	-	0	1
10-49 employees	0.36	-	0	1
50-249 employees	0.33	-	0	1
250+ employees	0.19	-	0	1
Firm industry				
Agriculture, forestry and fishing	0.02	-	0	1
Mining and quarrying	0.00	-	0	1
Manufacturing/production of goods	0.16	-	0	1
Energy supply	0.02	-	0	1
Water supply; sewage and waste disposal	0.01	-	0	1
Construction/building	0.16	-	0	1
Wholesale and retail trade; repair of motorcy- cles	0.8	-	0	1
Transport and storage	0.02	-	0	1
Hospitality/accommodation and gastronomy	0.04	-	0	1
Information and communication	0.06	-	0	1
Provision of financial and other services	0.03	-	0	1
Real estate and housing	0.01	-	0	1
Provision of professional, scientific and tech- nical services	0.04	-	0	1
Provision of other services	0.04	-	0	1
Public administration, defence, social security	0.11	-	0	1
Education and teaching	0.02	-	0	1
Health and social services	0.03	-	0	1
Art, entertainment and recreation	0.01	-	0	1
Other services	0.04	-	0	1
Firm region				
Région lémanique	0.05	-	0	1
Espace Mittelland	0.20	-	0	1
North-Western Switzerland	0.14	-	0	1
Zurich	0.23	-	0	1
Eastern Switzerland	0.22	-	0	1
Central Switzerland	0.14	-	0	1

<b>Respondent and firm variables</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Ticino	0.01	-	0	1
Rated hypothetical entry-level position				
Administrative assistant	0.77	-	0	1
IT assistant	0.23	-	0	1
Hypothetical high-level position				
Sales manager	0.71	-	0	1
IT director	0.29	-	0	1

*Notes:* Table displays summary statistics for all respondents. N of respondents=1,722.

To test whether we have a response-bias and whether our results are generalisable to the population of Swiss firms, we compare our responding sample to the contacted sample and to the population of firms training apprenticeships (Table B.23 in Appendix B). Using the few characteristics that are available to us (i.e., language regions, canton, and gender), we show that very small firms are under-represented, while firms with more than 50 employees and respondents from German-speaking Switzerland are over-represented in our responding sample. Nonetheless, we find comparable shares for the other regions and the respondents' gender.

### **3.4.2 Variable Selection**

Our dependent variable captures the likelihood for a job interview for an applicant. The variable is based on a Likert scale ranging from 1 (=very unlikely) to 10 (=very likely). Our main explanatory variable is an applicant's educational degree. We generate the binary variable 'upper-secondary education: VET' for entry-level positions, where we assign the value 1 to applicants who completed either an upper-secondary VET or an upper-secondary VET with a federal vocational baccalaureate<sup>18</sup>. We assign the value 0 to applicants with an upper-secondary general education (academic baccalaureate). For high-level positions, we compute the binary variable 'tertiary education: PET', where the value 1 includes all applicants with a tertiary PET degree, i.e., an Advanced Federal Diploma

<sup>18</sup>We merge applicants with a VET degree and those with a VET degree and a federal vocational baccalaureate into one group, as the results do not change compared to including them separately. Table B.17 in the Appendix B displays these results.

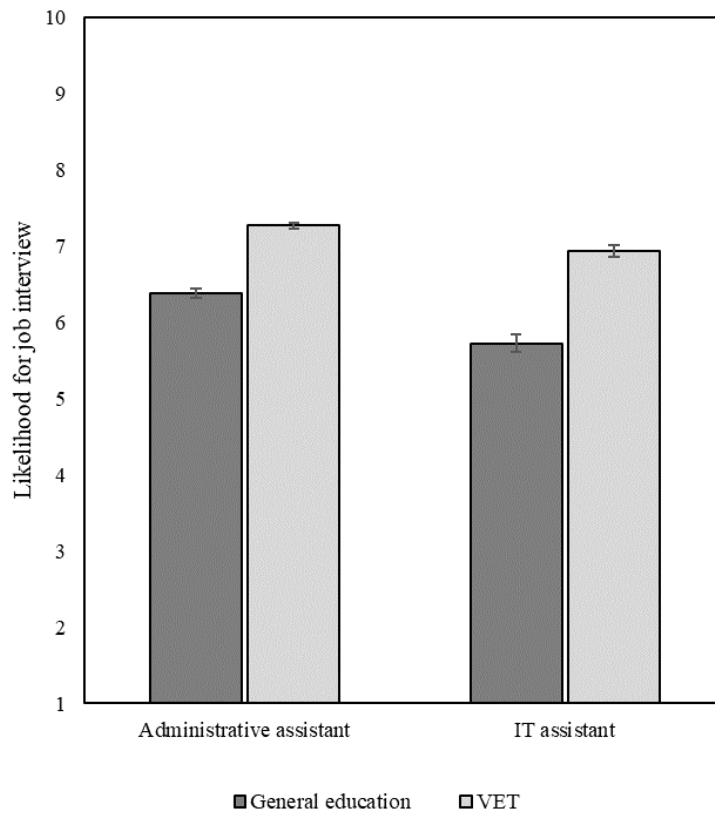
of Higher Education. The value 0 comprises applicants with a degree from either an academic university or a UAS<sup>19</sup>.

Figure 3.1 and Figure 3.2 descriptively show the mean value of our dependent variable by position and type of education. For the two entry-level positions, applicants with a VET degree have a higher mean likelihood for a job interview than those with a general education degree. For the two high-level positions, both types of education are comparable in terms of respondents' evaluation. However, for sales manager positions, applicants with a PET degree have a slightly higher mean likelihood for a job interview.

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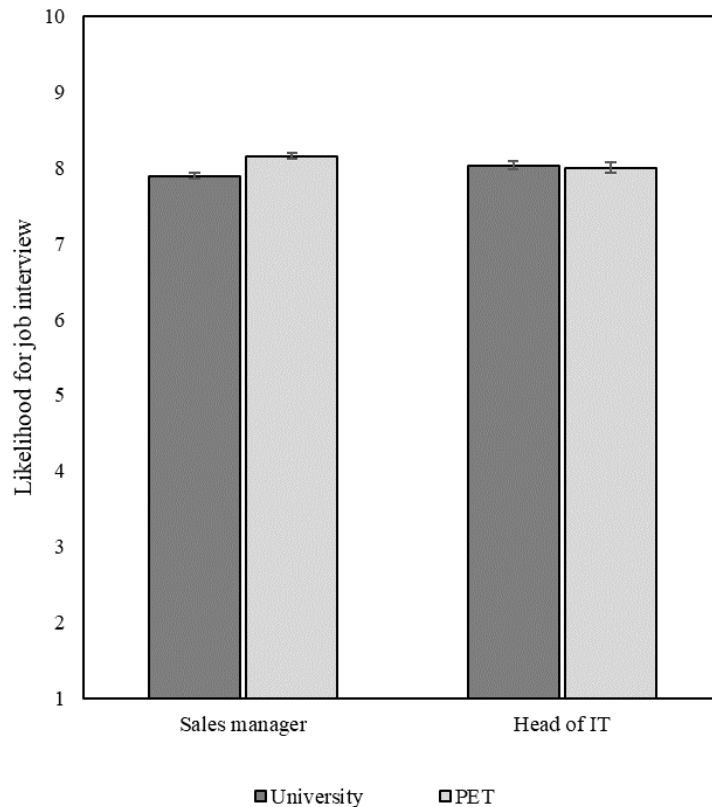
<sup>19</sup>Table B.18 in the Appendix B displays the results of baseline regressions for high-level positions, in which we differentiate between applicants with a degree from an academic university and those with a degree from a UAS. This table shows that while employers recruiting for an 'IT director' slightly prefer university educated applicants to PET educated applicants, applicants with a degree from a UAS drive this effect. However, as UAS also provide academic education, we group them with traditional academic universities. For the position 'sales manager' the results remain the same.

**Figure 3.1:** Mean likelihood for invitation to job interview for entry-level positions



*Notes:* Figure based on factorial survey data; the columns show the likelihood for a job interview on a scale from 1 'Very unlikely' to 10 'Very likely' with 95%-confidence intervals'; N for 'administrative assistant'=1,342, N for 'IT assistant'= 412.

**Figure 3.2:** Mean likelihood for invitation to job interview for high-level positions



*Notes:* Figure based on factorial survey data; the columns show the average likelihood for a job interview on a scale from 1 ‘Very unlikely’ to 10 ‘Very likely’ with 95%-confidence intervals; N for ‘sales manager’= 1,231, N for ‘IT director’= 505.

In our estimations, we include three different control variable sets. Our first set covers the other applicant characteristics: for the entry-level positions, we control for gender, nationality, work experience, sector-specific work experience and experience in volunteering. For the high-level positions, we include gender, experience in volunteering, general work experience, occupation-specific work experience, upper-secondary education, and whether applicants completed a continuing education programme.

Our second set includes three survey design variables: i) to what extent our hypothetical vacancies match the real positions in the respondent’s firm, ii) the applicant profile position within the set of four applicant profiles, and iii) whether the respondent received an incentive letter from trade and professional associations supporting the survey.

The third set covers the respondent and firm characteristics. Respondent characteristics include all variables that are listed in Table 3.1. However, due to the experimental design, we do not expect that the inclusion of respondent-level controls substantially changes the main estimate. Nevertheless, as we measure familiarity with the education system using specific employer characteristics, we include these variables already in our baseline models.

### **3.4.3 Measuring Employers' Familiarity with the Education System**

We additionally investigate whether employers' hiring preferences change contingent on their familiarity with VET/PET in Switzerland. Previous studies show that VET/PET is perceived differently depending on personal characteristics, experience with such degrees and exposure to them (Abrassart et al., 2020; Busemeyer et al., 2011; Wolter et al., 2006). Drawing on this literature, we use a broad set of variables to approximate employers' familiarity instead of directly measuring it. This approach also considers that familiarity may emerge through different sources of exposure and experience, such as employment or biography. Moreover, asking respondents directly on their familiarity with VET/PET may suffer from a social desirability bias. We classify the chosen familiarity variables in two categories: 1) employment-related variables and 2) biography-related variables.

- 1) When approximating familiarity through employment, we measure
  - a. whether respondents work in the human resources (HR) department or not.

The zero category subsumes employers who are the managing directors or the owners of the firm. As Derous and Ryan (2019) argue, respondents working in HR have had specific training regarding the education system and its different degrees, compared to non-HR employers who are more likely to rely

on subjective knowledge and experience. We thus argue that respondents working in the HR department have a higher familiarity with VET/PET.

- b. respondents' recruitment experience, i.e., in how many recruitments they were involved in the past five years. By including this variable, we consider that employers in different positions (e.g., managers or team leaders) can recruit new employees. We use a binary variable, where the value 1 indicates much recruitment experience (10 and more processes in the last five years) and 0 indicates relatively little experience (less than 10 hiring processes in the last five years).

2) When approximating familiarity through biography, we measure

- a. respondents' educational background (general education, mixed, VET/PET). Respondents who themselves completed VET or PET (either exclusively or before/after general or academic education) are intuitively more familiar with these degrees compared to respondents with only a general and/or academic education (Busemeyer et al., 2011).
- b. whether respondents were born in Switzerland or abroad. Respondents who were born in Switzerland were socialised from a young age within the domestic education system (Bolli & Rageth, 2022). As in Switzerland VET/PET are more common degrees than in other countries, we argue that respondents born in Switzerland have a higher familiarity with VET/PET (Abrassart et al., 2020).
- c. the language region of respondents (German-speaking vs. French- and Italian-speaking parts of Switzerland). Although VET/PET graduates constitute the largest percentage of upper-secondary education graduates in all of



Switzerland, VET/PET is more prevalent in the German-speaking parts than in the other language regions, due to cultural and historic reasons (Muehleemann et al., 2007). We therefore argue that respondents from German-speaking Switzerland are more familiar with VET/PET compared to those from the other language regions.

A principal-component factor (PCF) analysis supports the separation of these variables into these two groups based on the different sources of exposure and experience, i.e., familiarity through employment and familiarity through biography (Table B.24 and Table B.25 in Appendix B). Using the results of the PCF analysis, we generate two indices: ‘familiarity through employment’ and ‘familiarity through biography’. The two variables measure the *degree of familiarity* (Goldstein & Gigerenzer, 2002), ranging from 1 to 3, where 1 indicates no familiarity and 3 indicates maximum familiarity. When building these indices, we weighted each variable according to its factor loading from the PCF analysis.

Due to multicollinearity, we estimate separate models for each variable approximating familiarity (also supported by the PCF analysis in Table B.25 in Appendix B). Nonetheless, we include the two indices in the same estimation, because they represent two different sources of exposure and experience. While the summary statistics of the familiarity variables are presented in the previous Table 3.1 together with the other respondent characteristics, Table 3.2 displays the summary statistics for the two indices. While for the index ‘familiarity through employment’, the shares of each category are equally distributed, the second index ‘familiarity through biography’ is skewed towards a high familiarity, which we need to consider when interpreting these results.

**Table 3.2:** Descriptive statistics of familiarity variables

	Mean	SD	Min	Max
Familiarity through employment				
Low familiarity	0.33	-	0	1
Medium familiarity	0.34	-	0	1
High familiarity	0.33	-	0	1
Familiarity through biography				
Low familiarity	0.06	-	0	1
Medium familiarity	0.23	-	0	1
High familiarity	0.70	-	0	1

*Notes:* Summary statistics of familiarity indices based on analytical sample of factorial survey data. N of respondents=1,722.

### 3.4.4 Estimation Method

As every respondent evaluated four applicants per position, we need to account for the nested structure of the observations (Wallander, 2009). We hence cluster the observations by respondent and apply multilevel random-effects regressions (e.g. Atzmüller & Steiner, 2010). Our data follows a hierarchical two-level structure, where the applicant profile variables are at the lower level (level 1) and the respondent-level variables are at the higher level (level 2). To test whether unobserved respondent characteristics affect our results, we estimate the baseline regression models with individual fixed-effects. As the results are qualitatively the same (Table B.26 and Table B.27 in Appendix B), and as random-effects models are more efficient than fixed-effects models, and allow the introduction of cross-level interaction terms, we use these models as our main specifications.

We estimate the regressions separately for each position, resulting in four regressions (with three specifications for each regression due to the stepwise inclusion of additional control variables). The baseline regression models denote as follows:

$$Y_{ij} = \beta_0 + \beta_1 VET/PET_{ij} + \beta_2 AC_{ij} + \beta_3 VO_{ij} + \beta_4 VM_j + \beta_5 RC_j + (u_j + \varepsilon_{ij}) \quad (1)$$

$Y_{ij}$  assesses the likelihood of an applicant for being invited to a job interview, with  $i$  denoting the applicant profile (level 1) and  $j$  the respondent (level 2). The random

intercept  $\beta_0$  denotes the fixed part of the intercept for each cluster.  $VET/PET_i$  is the explanatory variable that captures an applicant's education, i.e., whether they have an upper-secondary VET degree (versus a general education degree) or whether they have a tertiary PET degree (versus a university degree), respectively.  $\beta_1$ , thus, constitutes the parameter of interest.

The control vector  $AC_{ij}$  contains the other applicant profile dimensions, i.e., applicant characteristics. As the survey design variables are at different levels, we include two vectors for the survey design variables.  $VO_{ij}$ , a level-1 variable vector, denotes the position of an applicant profile in the set of four profiles, and  $VM_j$ , a level-2 variable vector, controls to what extent the hypothetical vacancies resemble real positions within the firm, and whether the respondent received a support letter or not.  $RC_j$  includes the respondent-level controls, i.e., the respondent and firm characteristics.  $u_j$  denotes the level 2 error term, and  $\varepsilon_{ij}$  the level 1 error component, where we assume their covariance to be independent.

Furthermore, we interact an applicant's education with five respondent characteristics that indicate if they are familiar with the education system in Switzerland, and two indices that measure overall familiarity. Thus, we additionally introduce random slopes for the explanatory variable at the lower level to improve the models' fit (Heisig & Schaeffer, 2019).<sup>20</sup> We estimate separate models for each position and each familiarity variable. These linear mixed models with cross-level interactions and both random intercepts and random slopes for level-1 variables denote as follows:

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<sup>20</sup>Likelihood-ratio tests, which we apply to compare the fit of models with random intercepts and random slopes to those with only random intercepts, confirm a better fit when including random slopes. The results tables of regressions with cross-level interactions terms in Table B.32 through Table B.35 display the (statistical significance of) Chi<sup>2</sup>-values of these tests.

$$\begin{aligned}
Y_{ij} = & \gamma_{00} + \gamma_1 VET/PET_{ij} + \gamma_2 Familiarity_j + \gamma_3 VET/PET_{ij} * Familiarity_j + \gamma_4 AC_{ij} \\
& + \gamma_5 VO_{ij} + \gamma_6 VM_j + \gamma_7 RC_j + (u_{0j} + u_{1j} VET/PET_{ij} + \varepsilon_{ij})
\end{aligned}
\tag{2}$$

Model (2) uses the same dependent variable  $Y_{ij}$ , explanatory variable  $VET/PET_{ij}$  and the control vectors  $AC_i$ ,  $VO_{ij}$ ,  $VM_j$  and  $RC_j$  as in equation (1). We include the interaction term  $VET_{ij} * Familiarity_j$ , which contains the respective respondent variable for familiarity and the two familiarity indices. Furthermore, including  $u_{1j} VET/PET_{ij}$  allows for random slopes for the level-1 variable by cluster.

## 3.5 Results

### 3.5.1 Employers' Preferences for Applicant Education

Table 3.3 and Table 3.4 display the results of the baseline regressions for the two entry-level positions and the two high-level positions, respectively. Models 1 to 3 show the results for the position of 'administrative assistant' or 'sales manager', models 4 to 6 refer to the position of 'IT assistant' or 'IT director'. Results for the entry-level positions are annotated with the suffix 'a', those for the higher-level positions with the suffix 'b' next to the model number. We test several specifications: models 1 and 4 include only the applicant controls, models 2 and 5 additionally include the survey design controls, models 3 and 6 further include the respondent and firm controls. Table B.28 through Table B.31 in Appendix B report the full estimates.

For the two entry-level positions, our results show that the respondents prefer VET to general education. Effect changes are relatively small with the inclusion of additional controls, the only exception is the inclusion of the survey design controls in the estimation for the 'IT assistant' position. These controls significantly reduce the effect of VET on the likelihood for a job interview when respondents evaluate applicant profiles for IT

assistants. The variable ‘match of hypothetical vacancies with real positions in firm’ mainly drives this decline in the main effect. Including the respondent-level controls does not substantially change our main estimate, which confirms the high internal validity of our survey experiment. In the models 3 and 6, applicants with a VET degree have a significantly higher likelihood of 9.5% (administrative assistant) and 8.6% (IT assistant), respectively, for a job interview. Thus, our results for entry-level positions support hypothesis H1, which states that respondents prefer VET to general education.

**Table 3.3:** Baseline regression models for entry-level positions

Likelihood for job interview	Administrative assistant			IT assistant		
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)
Upper-secondary education of applicant:						
VET (ref.: general education)	0.909*** (0.063)	0.958*** (0.087)	0.953*** (0.087)	1.125*** (0.114)	0.864*** (0.158)	0.856*** (0.156)
Female applicant	0.158*** (0.045)	0.167*** (0.048)	0.166*** (0.048)	0.053 (0.083)	0.006 (0.089)	0.003 (0.089)
Nationality of applicant						
CH	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
DE/FR	-0.415*** (0.065)	-0.414*** (0.065)	-0.414*** (0.065)	-0.445*** (0.121)	-0.452*** (0.120)	-0.452*** (0.120)
PT	-0.315*** (0.063)	-0.312*** (0.064)	-0.314*** (0.064)	-0.252** (0.117)	-0.265** (0.116)	-0.267** (0.116)
TK	-0.392*** (0.066)	-0.387*** (0.066)	-0.388*** (0.066)	-0.467*** (0.124)	-0.484*** (0.123)	-0.484*** (0.123)
Volunteering	0.030 (0.046)	0.030 (0.046)	0.029 (0.046)	0.154* (0.086)	0.155* (0.086)	0.154* (0.086)
General work experience	0.386*** (0.020)	0.386*** (0.020)	0.386*** (0.020)	0.465*** (0.037)	0.465*** (0.037)	0.467*** (0.037)
Sector-specific work experience	0.532*** (0.050)	0.533*** (0.050)	0.533*** (0.050)	0.317*** (0.086)	0.315*** (0.086)	0.315*** (0.086)
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
<b>N of observations</b>		5,315			1,626	
<b>N of respondents</b>		1,342			412	
<b>Log-likelihood</b>	-11148.942	-11136.979	-11076.777	-3506.703	-3492.128	-3462.195

Notes: Table displays results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. Models (1) through (3) display results for the entry-

level position ‘administrative assistant’, while models (4) through (6) display results for the entry-level position ‘IT assistant’. Table displays coefficients for all applicant level variables. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

Table 3.4 displays the results for the two high-level positions. Compared to the two entry-level positions, respondents show more heterogeneous preferences regarding applicants’ education when hiring for high-level positions. For the ‘sales manager’ position, respondents are more likely to invite applicants with a PET degree to a job interview (2.4% in model 3) compared to those with a university degree. In contrast, for the ‘IT director’ position, applicants with a PET degree have a lower likelihood for a job interview (-1.1% in model 3). The results are again stable when we include additional controls and the estimates are significant at the 1%-level for the position ‘sales manager’ and at the 10%-level for the position ‘IT director’. As respondents prefer PET only for the ‘sales manager’ position but not for the ‘IT director’ position, this section provides mixed evidence regarding H1.

**Table 3.4:** Baseline regression models for high-level positions

Likelihood for job interview	Sales manager			IT director		
	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
Tertiary education of applicant:						
PET (ref.: university)	0.243*** (0.036)	0.236*** (0.038)	0.236*** (0.038)	-0.088* (0.053)	-0.110* (0.063)	-0.113* (0.063)
Upper-secondary VET	0.194*** (0.035)	0.147* (0.082)	0.145* (0.082)	0.287*** (0.052)	0.160 (0.142)	0.155 (0.142)
Continuing education	0.118*** (0.031)	0.103*** (0.040)	0.102** (0.040)	0.243*** (0.045)	0.207*** (0.060)	0.204*** (0.060)
Female applicant	0.089*** (0.032)	0.089*** (0.032)	0.089*** (0.032)	0.031 (0.047)	0.031 (0.047)	0.032 (0.047)
Volunteering applicant	0.062** (0.028)	0.063** (0.028)	0.063** (0.028)	0.036 (0.044)	0.037 (0.044)	0.037 (0.044)
General work experience	0.061*** (0.019)	0.061*** (0.019)	0.061*** (0.019)	0.033 (0.027)	0.034 (0.027)	0.034 (0.027)
Occupation-specific work experience	0.135*** (0.019)	0.135*** (0.019)	0.136*** (0.019)	0.113*** (0.028)	0.113*** (0.028)	0.112*** (0.028)
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
<b>N of observations</b>		4,869			1,989	
<b>N of respondents</b>		1,231			505	
<b>Log-likelihood</b>	-8,613.487	-8,600.812	-8,570.756	-3,424.04	-3,420.827	-3,396.429

*Notes:* Table displays results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. Models (1) through (3) display results for the entry-level position as ‘sales manager’, while models (4) through (6) display results for the entry-level position as ‘IT director’. Table displays coefficients for all applicant level variables. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

### 3.5.2 Effect of Employers’ Familiarity with VET/PET on their Hiring Preferences

Since we are not only interested in overall preference patterns, but also heterogeneity in respondents’ preferences based on their familiarity with VET/PET in Switzerland, we specify additional models with cross-level interaction terms. In a first step, we focus on the two entry-level positions and interact an applicant’s upper-secondary education with each of the respondent-level variables that approximate familiarity. We present the main

results of these mixed linear regression models in Figure 3.3 and Figure 3.4 (Table B.32 through Table B.35 in Appendix B show the full estimates).

Figure 3 displays the impact of respondents' familiarity on their hiring preferences for the two entry-level positions. Overall, we find that a higher familiarity with VET/PET has a significant positive effect on the preference for VET for the position of 'administrative assistant', and in most cases for the position of 'IT assistant'.

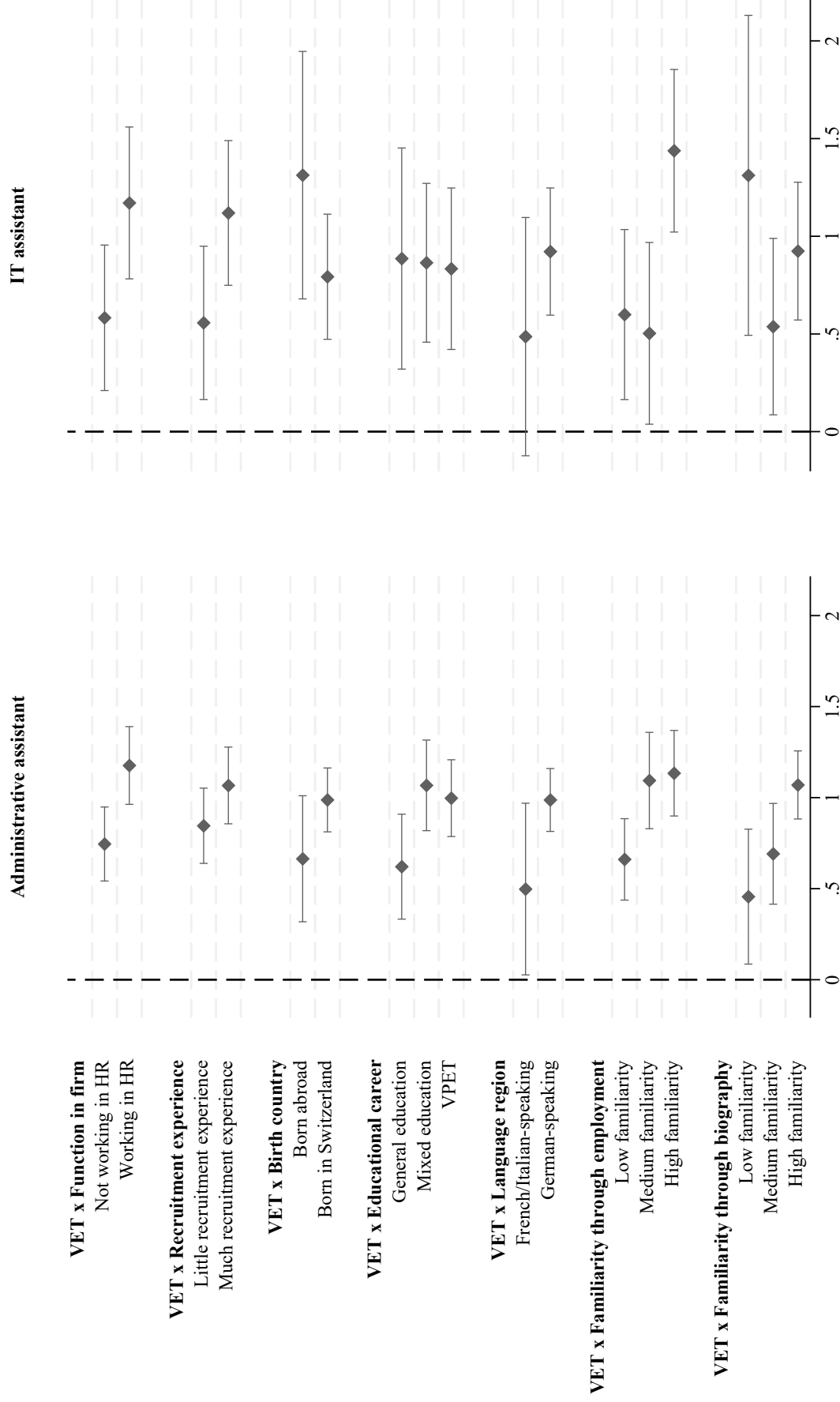
For the position of 'administrative assistant', all variables approximating familiarity significantly increase the positive effect of having a VET degree on the likelihood for a job interview. In addition, the familiarity indices confirm that employers with higher familiarity with VET/PET in Switzerland have a stronger preference for VET degrees.

For the position of 'IT assistant', the effect of familiarity is only significantly positive when we approximate familiarity by respondents working in HR and their recruitment experience. For the other variables, we find mixed and insignificant evidence: while respondents with a VET/PET degree, with a mixed educational background, or who were born in Switzerland have a lower preference for VET, those from German-speaking Switzerland, have a higher preference for VET. For the index 'familiarity through employment', only the highly familiar employers have a significantly stronger preference for VET, while the index 'familiarity through biography' has insignificant interaction effects, due to its insignificant component variables.

In summary, the estimations for the 'administrative assistant' position show that respondents with a higher familiarity with VET/PET have a stronger preference for applicants with a VET degree. For the 'IT assistant' position, the results are less clear and we find a significant positive familiarity effect only for two out of five variables. Thus, our evidence for the two entry-level positions only partly supports H2.



**Figure 3.3:** Interaction effects for the two entry-level positions



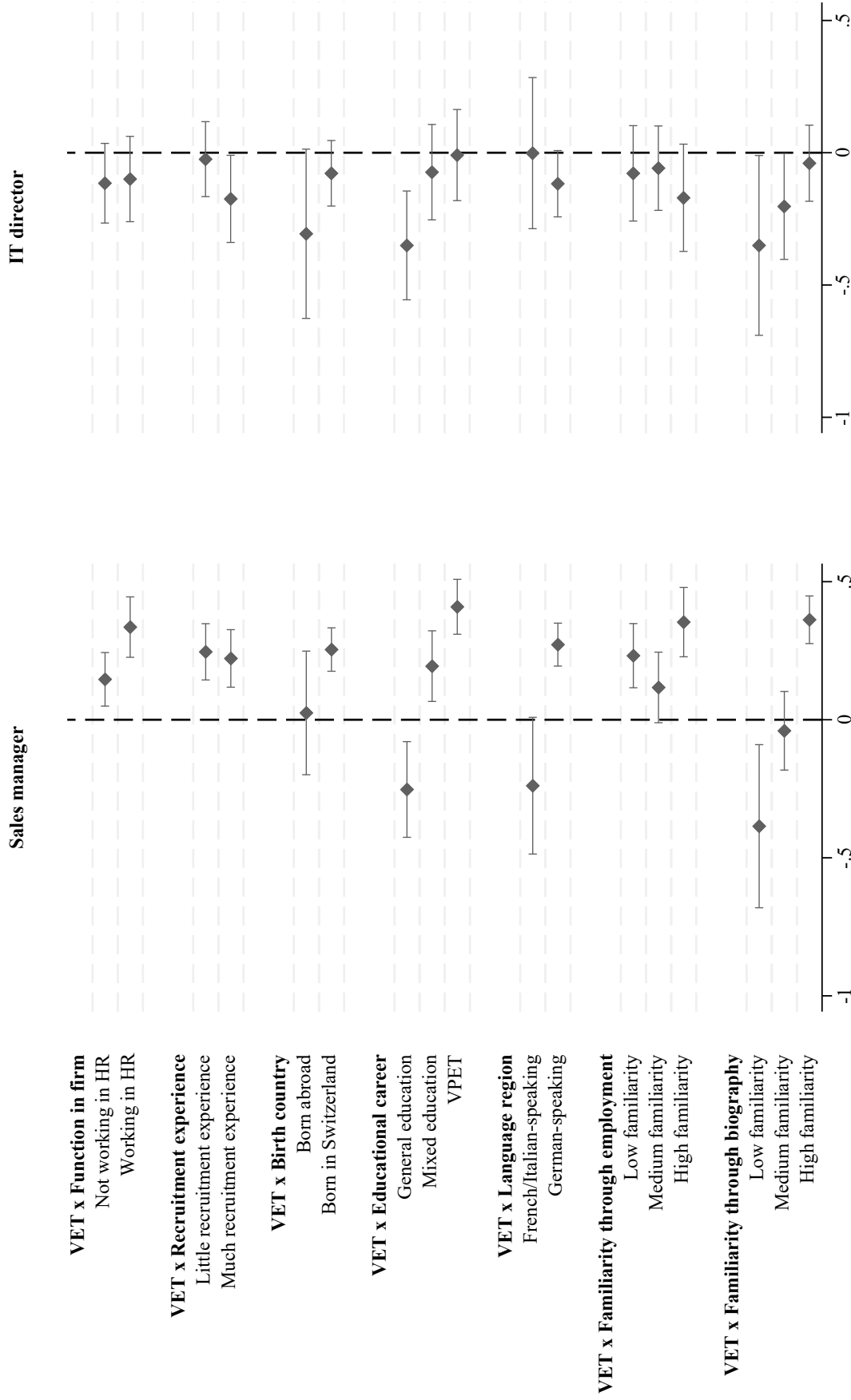
*Notes:* Figure displays average marginal effects of the familiarity variables on the effect of an applicant's education on the likelihood for a job interview. Figure displays point estimates and 95% confidence intervals. Separate models for each interaction term. All models include the applicant profile characteristics, the survey design controls, and the other familiarity variables. N of observations for administrative assistant=5,315 and IT assistant=1,626.

For the high-level positions, we find similar results (see Figure 3.4). For the ‘sales manager’ position, respondents with a high familiarity with VET/PET have a stronger preference for applicants with a PET degree, and this result applies to all variables approximating familiarity, except for the variable ‘recruitment experience of respondent’. The insignificant interaction effect of this variable potentially renders the first index ‘familiarity through employment’ also insignificant. The index ‘familiarity through biography’, however, shows significant positive effects, especially for its highest category.

For the ‘IT director’ position, we find positive effects for three variables approximating familiarity – the respondent’s position, country of birth and educational career – and the effect is significant for those respondents who have a mixed educational background or a VET/PET degree. We find a lower preference for VET for respondents working in German-speaking Switzerland and those with much recruitment experience, although these effects are not significant. Thus, while most effects for both familiarity indices are positive, they are not significant.

Overall, our results for the two high-level positions reveal heterogeneity in respondents’ hiring preferences depending on their familiarity with VET/PET. Nonetheless, all significant effects are positive, providing evidence that a higher familiarity with VET/PET increases respondents’ preference for such degrees. Nonetheless, our evidence only partly supports hypothesis H2 for the two high-level positions.

**Figure 3.4:** Interaction effects for the two high-level positions



*Notes:* Figure displays average marginal effects of the familiarity variables on the effect of an applicant's education on the likelihood for a job interview. Figure displays point estimates and 95% confidence intervals. Separate models for each interaction term. All models include the applicant profile characteristics, the survey design controls, and the other familiarity variables. N of observations for sales manager=4,869 and IT director=1,981.

### **3.6 Discussion and Conclusion**

This paper uses quasi-experimental data from a factorial survey to examine employers' preferences during the first stages of hiring processes. We investigate employers' hiring preferences for applicants with different educational degrees when they compete for the same position. We compare applicants with an upper-secondary VET degree to those with a general education degree for entry-level positions and applicants with a tertiary PET degree to those with a university degree for high-level positions. Furthermore, we contribute to the literature by investigating whether employers' familiarity with VET/PET affects their hiring preferences.

Our results provide evidence that employers prefer applicants with a VET to those with a general education for the entry-level positions 'administrative assistant' and 'IT assistant'. For the high-level positions, we find heterogeneity in employers' preferences: for the position of 'sales manager', employers prefer applicants with a PET degree, while for the position of 'IT director' they prefer those with a university degree. These results support our hypotheses –that in countries with a strong VET/PET system, employers prefer applicants with such degrees, but also that this preference depends on the occupation.

Nevertheless, these results only partly reflect the findings of the literature that examines different occupational positions and institutional contexts (e.g Hippach-Schneider et al., 2013; McDonald & Korber, 2023). While the study of McDonald and Korber (2023) is closest related to ours, we find different results. This discrepancy is due to McDonald and Korber (2023) analysing experienced workers (aged 40 to 55) for all positions, while our analyses comparing upper-secondary VET to general education explores hiring probabilities for entry-level positions. Furthermore, their finding that employers prefer general education at the upper-secondary level might stem from their

choice of a VET programme that is not directly related to their analysed position. Our results for the entry-level positions clearly point towards a preference for VET instead of general education, whereas for high-level positions, employers' preferences are heterogeneous. Furthermore, our study confirms previous evidence that potential differences in labour market outcomes across education types diminish for the highly-educated with more years of work experience (Korber & Oesch, 2019).

We further show that employers' familiarity with VET/PET plays an important role in shaping their hiring preferences for an applicant's education. For the two commercial positions, we mostly find significantly stronger preferences for applicants with a high familiarity with VET/PET. These results corroborate empirical studies investigating how employers evaluate degrees, with which they are not familiar (e.g. Argue & Velema, 2022; Damelang et al., 2020). Our results thus show that employers are substantially influenced by their familiarity with different educational degrees when forming their preferences regarding an applicant's education.

For the two IT positions, we find a positive significant effect only for few variables approximating familiarity. Circling back to the signalling theory, we argue that individuals who have the required skills to work in the IT domain presumably predominantly select into general or academic education, and that employers prefer applicants with such degrees for IT positions. As Krueger and Kumar (2004) explain, academic education prepares better for highly technologized occupations, such as those within the IT sector. Moreover, if there is a low prevalence of PET educated applicants in the IT domain, employers may not be able to learn about and thus familiarise themselves with these applicants' abilities. As Spence (1973) states, not all employers observe all types of signals, and not all signals are meaningful for all jobs.

In summary, although we provide evidence that applicants with a VET degree have an advantage when employers hire for entry-level positions, this is not always the case for applicants with a PET degree competing with those with a university degree for high-level positions. We further show that although familiarity with VET/PET can increase employers' preferences for VET or PET degrees, a higher familiarity only limitedly affects the preference for or against VET/PET in the IT domain.

Although preferences exhibited in factorial surveys investigating hiring decisions closely mirror employers' actual labour market behaviour (e.g. Gutfleisch et al., 2021; Hainmueller et al., 2015; Petzold & Wolbring, 2019), this quasi-experimental study has certain limitations. To address a potential hypothetical bias, we screened real vacancies and included recruitment experts in the design of the positions and applicant profiles. Moreover, we only surveyed employers with experience in hiring new employees, which substantially reduced our response rate but was essential for receiving reliable observations. Our robustness tests confirm the internal validity of our findings.

Furthermore, our results' external validity is limited to the positions that we analyse, the context within which we carried out the survey, and the sample that we included, i.e., individuals working in firms that train apprentices. Regarding the different industry sectors, we have high shares of respondents from the manufacturing and construction sectors, while we have relatively few respondents from other sectors (such as agriculture-, energy- and transport-related sectors). Additionally, employers from the French-/Italian-speaking parts of Switzerland – where VET and PET degrees are less prevalent – are underrepresented in our sample (see Table B.23 in Appendix B). We also use this variable on language regions to approximate 'familiarity', and due to its skewness, we need to carefully interpret these estimations. Additionally, the variable 'respondent born in

Switzerland', which also approximates familiarity, is skewed with only few respondents born abroad.

The concept of familiarity with VET/PET is complex and multifaceted and we can only approximate it by a broad set of variables that are valid within our context. Directly asking survey participants on their familiarity might result in social desirability bias and overestimation of their knowledge. We need to keep in mind that unobserved heterogeneity may also shape preferences. These proxies could also measure other factors, and thus affect the choice between applicants through a different channel. Moreover, a large share of our surveyed employers state that dual VET is important for their firm, i.e., that they must be at least somewhat familiar with VET and possibly also with PET. And since we only include recruitment-experienced employers in our study, the possibility that some among them are unfamiliar with VET/PET in Switzerland is very small.

To test the external validity of our findings, further research could analyse other positions in Switzerland, and use different approximations or direct (subjective) measurements of familiarity. Furthermore, since most countries do not have such a high share of VET/PET students, further studies should examine whether our results also hold in other countries where general education is more prevalent. Our study provides a starting point for other researchers to investigate the socio-cultural mechanisms that affect the potentially difficult standing of VET in their countries. The empirical evidence shows that employers are willing to learn and update their beliefs, thus examining which factors shape these beliefs is vital for more equitable opportunities of graduates in the labour market. Moreover, related research could explore other factors that contribute to individuals selecting into either general education or VET/PET, besides differences in abilities, such as information deficits about the education system.

Our analysis provides evidence that within Switzerland – a country with a highly diversified and standardised education systems with a strong VET/PET sector – employers strongly appreciate applicants with a VET or PET degree. Notwithstanding, employers’ preferences for VET/PET depend on their familiarity with such degrees and the type of position and occupation. As general and academic education becomes increasingly popular in Switzerland too (FSO, 2020), highlighting the value of VET and PET in the labour market may help education policy makers maintain the strong position of this type of education. A variety of educational pathways is desirable, as not all types of education speak to all individuals alike. The primary aim could be to provide information on the different possible pathways to entry-level and high-level positions to employers, mainly to facilitate job entry for differently-skilled individuals with varying educational degrees.





## **Chapter 4**

# **How do Employers Perceive Different Types of University Credentials in Recruitment? Evidence from a Factorial Survey Experiment<sup>21</sup>**

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<sup>21</sup> Co-authored with Ladina Rageth and Ursula Renold.



## 4.1 Introduction

Countries worldwide have experienced a remarkable educational expansion over the last few decades (OECD, 2022). In line with this expansion, the higher education sector has grown strongly, leading to a massification and marketisation of the sector, with consequences for the strategic positioning of higher education institutions (Tomlinson & Watermeyer, 2022). Moreover, in an ever-more internationalised and globally competitive education landscape, higher education institutions need to remain attractive, leading to an increased importance of the acquisition of resources and students (Münch, 2014). Consequently, many higher education institutions have extended their educational offering to include continuing education courses, which attract not only more students but also students with different backgrounds (Brandt, 2002; Jongbloed, 2002).

The societal consequences of introducing new educational credentials becomes visible in labour market settings (Tholen, 2016). Especially as the number and types of credentials proliferate, the higher education system gets increasingly under pressure to ensure favourable labour market outcomes for its graduates (Tomlinson & Anderson, 2021). While closure theorists argue that credentials – especially university credentials – are “cultural currencies” (Collins, 1979) symbolising an individual’s ability to pertain in high-level jobs, other theoretical frameworks emphasise the productivity-enhancing nature of credentials (human capital theory; Becker, 1993) or their positionality and signalling value (signalling theory; Spence, 1973).

Universities in Switzerland are one example where government-initiated reforms helped higher education institutions to expand their educational offering. From the 2000s onwards, Swiss universities increased the number of not only formal study programmes but also non-formal courses. These courses are based on the European Credit Transfer

System (ECTS) and are completed with a university credential. This similarity makes it difficult to distinguish them from formal university credentials, like bachelor's and master's degrees (Weber, 2014). In the German-speaking countries, examples of such credentials are the Certificate of Advanced Studies (CAS) or the Master of Advanced Studies (MAS), while comparable courses in other countries are often called 'post-graduate diplomas'.

Around the globe, continuing education has become a core mission for higher education institutions (UNESCO, 2023). In a 2022 survey across all UN regions, 68% of the higher education institutions stated that lifelong learning and thus continuing education is a nationally mandated mission (UNESCO, 2023). In an initiative of the European Commission (2020), higher education institutions take a leading role in offering continuing education courses, which closely follow regulation standards led by the *Bologna Process* (Crosier & Parveva, 2013).

Due to the different education systems and labour market contexts and varying types and definitions of continuing education, studies analysing the labour market outcomes of these courses provide mixed evidence (Dieckhoff, 2007; Ehlert, 2017; Schwerdt et al., 2012). In summary, these studies show that the effect of continuing education on labour market outcomes depends on the country and economic sector, and that it mainly improves employment prospects but does not always lead to higher salaries. We contribute to this literature by providing evidence on the labour market outcomes – i.e., the probability to be invited to a job interview and the salary level – of the under-researched case of continuing education at universities for highly qualified individuals, i.e., those who already completed a tertiary education. Most importantly, we explore the relative labour

market value of continuing education at universities relative to traditional formal education.

In Switzerland, non-formal continuing education at universities (hereafter: *continuing education at universities*) differs from formal university education in two main characteristics. First, continuing education courses at universities are less standardised, have weaker quality assurance and award no protected titles upon completion. Second, continuing education at universities has the goal to provide knowledge in specific areas and hence targets individuals with a tertiary degree and – even more importantly – work experience (Zimmermann, 2020). By offering continuing education, the universities expanded their traditional market and followed a demand-driven paradigm, which was previously uncharacteristic for this type of public institution (Münch, 2014).

By focusing on the Swiss example, this paper explores the labour market outcomes of continuing education at universities and its relative positioning compared to formal university education from the employers' perspective. We use data from a survey experiment among employers in Switzerland. Within this survey, each employer evaluated fictional and randomly varying applicant profiles for hypothetical vacancies. For each applicant profile, the employers indicated the likelihood that their firm would invite this applicant for a job interview and the salary they would recommend.

Our results show that employers do not differentiate between applicants who completed non-formal and formal university education when inviting applicants to a job interview. However, applicants with a continuing education credential have a salary premium compared to those with a formal university degree. Since the theories and hypotheses only partly predict this outcome, we provide additional tests with tentative explanations of the results.

We structure the remainder of this paper as follows: After we outline the analytical context of educational diversification at universities in Switzerland, we discuss the theoretical foundations, derive our hypotheses, and provide an overview on the empirical literature. Then, we explain our analytical strategy, followed by the description and discussion of our results, and end with a conclusion.

## **4.2 Educational Diversification at Universities in Switzerland**

In line with the *Bologna process* in the early 2000s, Swiss universities restructured their education following the three-cycle system – bachelor’s programmes, master’s programmes, and doctoral studies –, which is the standard for categorising university education in Europe (Crosier & Parveva, 2013). Furthermore, to increase mobility among European university students, the content of those programmes is measured by the European Credit Transfer System (ECTS). As a result, students may complete their formal studies with a Bachelor’s degree (first-cycle, 180 ECTS), a Master’s degree (second cycle, 90-120 ECTS) or a doctorate (third cycle, institution-based organised)<sup>22</sup>. These three education cycles are located at the tertiary level of the formal education system (all classified at ISCED-levels 6-8). Access to these university study programmes is defined at the national level. In Switzerland, prospective university students need to complete a baccalaurate to enrol in a formal university programme.

In Switzerland, both types of Swiss universities, i.e., the academic universities and the universities of applied sciences (UAS), also offer continuing education. In contrast to formal education, continuing education is non-formal and explicitly designed for work-experienced adults to update and renew their skills (FSO, 2021a). In 2019, 26.7% of the

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<sup>22</sup> Ordinance of the University Council on the Coordination of Teaching at the Swiss universities (AS 2019 4205).

adult population (aged 25-74) in Switzerland participated in continuing education, while adults with a tertiary education have a relatively high participation rate (38.7%; FSO, 2021b). Participation in continuing education at universities constitutes around 4% of all credentialed<sup>23</sup> continuing education participation (newest numbers only available for 2018; FSO, 2018b, p. 18). Over the period 2005-2016, graduate numbers of continuing education courses at Swiss universities have grown substantially (Zimmermann, 2020), whereas from 2018 to 2021, participation in such courses slightly increased at academic universities but decreased at UASs (CSRE, 2023). The course offerings are increasing in Switzerland (Zimmermann, 2020), but also in other European countries (Brandt, 2002; Jütte & Bade-Becker, 2018).

Continuing education courses at universities have the intention to bring back academically educated and work-experienced adults to universities to both update their knowledge and acquire additional, work-relevant knowledge (Weber, 2014). These courses are explicitly tailored to the needs of the labour market, but their emphasis on academically-oriented content makes them unique in the continuing education landscape (Jütte & Bade-Becker, 2018). However, in its guidelines, the university umbrella organisation *swissuniversities* states that university continuing education courses “have to be different in terms of content, didactics and organisation from bachelor’s and master’s study programmes” (swissuniversities, 2020).

Swiss universities offer several different continuing education courses.<sup>24</sup> This paper focuses on the MAS, which is most similar to a formal master’s degree in terms of its

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<sup>23</sup> Only around 48% of all non-formal continuing courses in Switzerland award a credential upon completion.

<sup>24</sup> There also exist the Certificates of Advanced Studies (10-15 ECTS), Diplomas of Advanced Studies (30-36 ECTS) and Master of Advanced Studies (hereafter: MAS; 60 ECTS). Another type is the (Executive) Master’s of Business Administration, the (E)MBA, which in Switzerland is part of the non-formal continuing education system. Furthermore, there are courses leading to a Master of Public Health



name ('Master of Advanced Studies') and scope (60 ECTS points). While formal master's study programmes build on related bachelor's study programmes and focus on scientific research methods, a MAS targets specialists and managers who want to update and deepen their knowledge in a particular area. MAS courses encompass an array of topics, and are more specific, narrower and shorter than formal study programmes (swissuniversities, 2020). As MAS target working individuals, students work alongside the course. Formal master's study programmes invariably require a bachelor's degree, but admission to a MAS is possible without a bachelor's degree if applicants have a professional tertiary degree and equivalent work experience. Table 4.1 provides an overview of other key characteristics of the two types of university credentials:

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(MPH) or Master of Public Administration (MPA) - all of which are also considered as MAS (swissuniversities, 2022).

**Table 4.1:** Characteristics of formal study programmes (Master of Arts/Science) and non-formal courses (MAS) at universities

TYPE OF UNIVERSITY EDUCATION	FORMAL	NON-FORMAL
Name	<b>Master of Arts/Science (Master)</b>	<b>Master of Advanced Studies (MAS)</b>
Classification	Tertiary education level (after upper-secondary education)	Non-formal continuing education (after tertiary education)
Content	Academic content (consecutive education for related bachelors' programme), emphasis on scientific methods and theoretical knowledge	Education with strong labour market linkage, combining specialised academic content with occupation-oriented content
Entry requirements <sup>c</sup>	Bachelor's degree in the same field (or a related one)	Academic tertiary degree or tertiary degree from professional education and training (i.e., formal programmes located at ISCED 6-8) and several years of work experience
Regulation <sup>c</sup>	Protected titles	No title protection
Quality assurance <sup>d</sup>	Nationally binding standards, low implementation autonomy	Recommended standards, high implementation autonomy
Duration <sup>b</sup>	90-120 ECTS	60 ECTS
Workload for students	Full-time studies (usually)	Part-time studies (usually)
Costs for students <sup>c</sup>	Low	High
Number of available offers <sup>a</sup>	1,220	523

*Notes:* Own table with key characteristics of formal master's degrees and non-formal MAS courses at Swiss universities (a: *swissuniversities*, 2022; b: ZHAW, 2021; c: Zimmermann, 2020; d: *swissuniversities*, 2020. See also the Swiss Federal Law on non-formal continuing education of May 15, 2013 (BBl 2013 3729).

The strong similarity between the two types makes it difficult to clearly define the MAS as a non-formal credential. The most essential difference between formal study programmes and continuing education courses at universities are the different quality assurance mechanisms. Although these non-formal courses are standardised to a certain degree (e.g., in terms of workload, admission requirements), they do not follow a nationwide framework, but only local guidelines by umbrella organisations such as *swissuniversities* (*swissuniversities*, 2020; Weber, 2014). Thus, for the implementation and offer of continuing education courses, there are no binding regulations but only recommendations (CRUS, 2012). Despite both master's degrees and MAS being awarded by universities and their content being measured by ECTS points, they belong to different sectors of the

education system, i.e., the formal and non-formal sectors, which are not in a vertical hierarchy, but exist alongside one another. Thus, as the MAS is not part of the formal education system, it does not qualify for entering formal study programmes at universities. Moreover, the entry requirements for the MAS are more flexible than the entry requirements for formal master's study programmes.

Fischer (2014) highlights that the multiplication of university credentials makes it increasingly difficult for the public to distinguish between formal degrees and non-formal credentials. Furthermore, *swissuniversities* predicts that the clear distinction between formal and non-formal university education may dissolve over time (*swissuniversities*, 2021). While the implementation of these courses had a positive impact on the continuing education participation of work-experienced adults (Weber, 2014; Zimmermann, 2020), their labour market value relative to formal university credentials remains unclear.

### **4.3 Literature Review and Hypotheses**

#### **4.3.1 Theoretical Foundations on Credentials in the Labour Market**

The literature uses several theoretical frameworks to investigate the effect of educational credentials on labour market outcomes. However, these theories focus on differences in terms of the length of education and the kind of acquired skills, but they do not consider differences between formal and non-formal credentials. Nevertheless, we build on these well-established theories to derive our hypotheses on how formal and non-formal credentials may differ in their labour market outcomes. By applying these theories, we can test how well they predict the labour market value of non-formal credentials relative to formal credentials. We follow Bills (2003), Tholen (2020) and van de Werfhorst (2011) and group the theories into three mechanisms that emphasise the different ways in which

education operates in the labour market: the *productivity-enhancing mechanism*, the *positional-good mechanism* and the *social closure mechanism*.

For the *productivity-enhancing mechanism*, we focus on the human capital theory as coined by Becker (1993). As the name already indicates, this mechanism postulates that employers use educational credentials to make inferences about an individual's productivity. Human capital theorists state that education serves individuals to increase their knowledge and enhance their skills, thereby stocking up their human capital. Employers equate more human capital with a higher productivity, and reward individual investments in human capital by giving better employment opportunities and paying higher salaries (Becker, 1993).

Traditionally, human capital theories posit that completing more education is favourable for an individual in terms of their labour market outcomes. Moreover, according to the human capital theory, longer and more in-depth education should convey a larger set of skills, which enhance an individual's productivity and knowledge (Mincer, 1989). Thus, as employers reward a larger set of skills, investing in longer and more extensive education programmes should positively affect an individual's labour market outcomes.

Considering the specific comparison in this article, we derive from the human capital theory that applicants with a formal master's degree should have better labour market outcomes than applicants with a non-formal MAS. Formal master's degrees are full-time programmes, which are more extensive (90-120 ECTS) compared to a MAS (60 ECTS), and thus equip individuals with a larger set of skills. As employers equate more skills with higher productivity, we expect them to prefer applicants with a master's degree to those with a MAS.

Another mechanism focusing on the productivity-related aspect of education is the *positional good mechanism* – in particular the signalling theory (Spence, 1973). This theory postulates that employers look for individuals who can signal a high trainability and productivity (Tholen, 2020). Signalling theories argue that employers are not fully informed about the specific skills of an applicant, i.e., there is uncertainty about an individual's productivity and the associated training costs (Cai, 2013). To compensate for this uncertainty, employers look for signals that they can associate with traits that are valuable in the labour market – i.e., trainability and perseverance – such as the completion of an education (Spence, 1973). According to the signalling theory, the job-relevant skills are taught on the job, thus the completion of an education programme is more meaningful to employers than the actual contents and skills learnt during the education programme.

Nonetheless, several empirical studies (Bol & Weeden, 2015; Ortiz & Rodriguez-Menés, 2016) show that the signalling strength of education depends on the institutional contexts of the education system and labour market in a country. Some studies (e.g. Di Stasio et al., 2016) also suggests that education sends a weak signal in education systems with a loose coupling between qualifications and occupations.

In this article, we compare applicants with two different university credentials. Whereas formal degrees from universities are well-established, non-formal university credentials have only recently been introduced. As non-formal credentials have a low degree of standardisation, a weaker quality assurance, and do not award protected titles, the skills of their graduates are less transparent and their signal should be weaker compared to graduates with formal degrees. As employers consider the hiring of new employees as an investment, they rely on trustworthy signals (Bailly, 2008). Drawing on the positional good mechanism, we expect that employers prefer applicants with credentials

that send a more reliable and familiar signal – because they are established, more standardised and have a stronger quality assurance – and therefore prefer applicants with formal degrees.

Taken together, both the productivity-enhancing and the positional-good mechanisms state that employers make inferences about the labour market potential of an applicant. The two theories postulate that employers prefer credentials that represent higher productivity levels and send stronger, less ambiguous signals. Following this argument, we derive our first set of hypotheses:

**H1a:** Applicants with a formal master's degree have a higher likelihood for a job interview than applicants with a non-formal MAS.

**H2a:** Applicants with a formal master's degree receive a higher recommended salary than applicants with a non-formal MAS.

The *social closure mechanism* provides a slightly contrasting perspective, as specified in the closure theory in general, and particularly within credentialism theories (Collins, 1979). According to the closure theory, social actors, e.g. institutions, organisations or simply individuals, construct barriers for others to enter certain realms of social life – such as highly rewarding positions in the labour market –, for example through credentials (Tholen, 2016). This theory argues that employers use educational credentials as an entry barrier for applicants not for skills- or productivity-related reasons (Bills, 2003). but because of the societal assumption that certain credentials simply are necessary to enter high-level jobs.

Credentialism theories (Collins, 1979), as a specification of closure theories, focus on the abstract and cultural value inherent to credentials, and thus stand in contrast to human capital or signalling theories. As Brown (2001, p. 20) highlights: “the content and occupational significance of credentials are more cultural and exclusionary than technical and efficacious”. Credentialism theories postulate that employers are likely to hire applicants with certain credentials to more or less intentionally restrict the access to highly rewarding positions through those credentials – and not because they associate high levels of productivity with them. By stating that individuals learn the relevant skills on the job, credentialism theories argue that education mainly imparts the ability to perform in high-level positions and persist in a demanding occupational environment (Bills, 2003).

Rivera (2011) argues that employers especially associate university graduates with the capability to understand and apply the norms necessary to perform in demanding jobs. Thus, credentialism theories’ view of credentials as a cultural currency also signifies a currency for employment. Here, employers’ preferences are detached from an applicant’s actual productivity level and instead relate to less objective criteria, such as the institution rewarding the credential – in this case universities (Tholen, 2020).

As universities have a longstanding tradition and high prestige within society (Tholen, 2016), we expect that employers trust all kinds of university credentials. Following these arguments, we state that employers trust individuals who completed a university education to possess the relevant cultural capital, knowledgeable of specific norms and habitus required for high-status positions. Consequently, if employers value applicants that are familiar with the relevant norms to persist in high-status positions, different types of university credentials should not differ in their labour market outcomes.

Consequently, we formulate a second set of hypotheses, which contrasts the first set derived from the productivity-enhancing and positional good mechanisms:

**H1b:** Applicants with a formal master's degree and applicants with a non-formal MAS have the same likelihood for a job interview.

**H2b:** Applicants with a formal master's degree and applicants with a non-formal MAS receive the same recommended salary.

#### **4.3.2 Empirical Evidence on Formal and Continuing Education Credentials in the Labour Market**

Only few studies compare the labour market outcomes of different types of university credentials. These studies mainly investigate bachelor's degrees compared to master's degrees, which often serve as a measure for overeducation. For example, using a field experiment in recruitment, Verhaest et al. (2018) show that applicants with a master's degree have higher call-back rates than those with a bachelor's degree, especially for hard-to-fill positions. Accordingly, Di Stasio (2017) and Habibi and Kamis (2021) show that employers prefer applicants with master's degrees, even when a bachelor's degree sufficiently qualifies for the vacancy. Using register-based data, Isopahkala-Bouret et al. (2021) additionally provide evidence that the type of institution – i.e., academic universities or universities of applied science – issuing the master's degree matters.

While these studies focus on formal educational credentials, other studies investigate the effect of continuing education in general on labour market outcomes. The literature on continuing education at universities mainly analyses this type of education from a conceptual perspective (Brandt, 2002; Jongbloed, 2002), or provides descriptive analyses of the offer of and demand for these courses (Zimmermann, 2020). To the best of



our knowledge, we provide first evidence on labour market outcomes of continuing education at universities.

The literature on continuing education in general is vast and analyses an array of continuing education types, while using different definitions. As the institutional contexts of the education systems and labour markets in German-speaking countries are closest to the ones in our case study, we focus this portion of the literature review on the studies examining the effect of continuing education on labour market outcomes in these countries.

On the one hand, scholars find that continuing education participation can yield varying but significant monetary returns, depending on the country (Triventi & Barone, 2014) and that it leads to a change in the working tasks (Görlitz & Tamm, 2016). Schwerdt et al. (2012), Denzler et al. (2022) and Ehlert (2017) further provide evidence that employer-mandated training leads to the highest salary premiums. Moreover, some scholars show that the effect of continuing education participation on salaries substantially varies by age, gender and educational background (Denzler et al., 2022). By studying the relation between continuing education participation and both unemployment risks and upward mobility in three European countries, Dieckhoff (2007) argues that this effect heterogeneity stems from differences in the labour market institutions of the respective country. In turn, other scholars find no significant effect of continuing education participation neither on earnings nor employment (Görlitz & Tamm, 2016; Schwerdt et al., 2012).

Taken together, the literature on the effect of continuing education on occupational mobility or salaries provides mixed evidence. Explanations for this heterogeneity may be the different definitions of continuing education and the variety of analysed courses. To

contribute to this literature, this paper focuses on the specific and under-researched case of continuing education at universities. We examine the relative positioning of continuing education credentials at universities to formal university credentials regarding specific labour market outcomes, i.e., the probability to be invited to a job interview and the recommended salary.

## **4.4 Analytical Strategy**

### **4.4.1 Data and Operationalisation**

This paper uses data from a factorial survey conducted among employers in Switzerland. For this survey experiment, we contacted around 46,000 employers in 2020 via e-mail. Our contacted sample of employers work in firms that are registered in the biggest job-matching online platform for young professionals in Switzerland. Only employers with recruitment experience were eligible to answer the survey and in total, 2'384 employers completed it. In the Appendix C, Table C.3 and Table C.4 present the summary statistics for the different sub-samples that we use in our estimations (see the following section on Estimation Method).

In factorial surveys, respondents take decisions in close-to-real-life situations. In our case, we asked employers to evaluate fictional applicant profiles for hypothetical vacancies for high-level jobs that require at least a tertiary education. We chose two positions that are relevant for a broad range of firms in different sectors: 'IT director' and 'sales manager'. The employers evaluated applicant profiles only for one of the two positions, depending on which position they were more familiar with. Appendix C shows the job descriptions for these two hypothetical vacancies. To ensure a realistic description of the two vacancies and the applicant profiles, we screened real job vacancies and conducted a workshop with recruitment experienced employers from different sectors.

By randomly assigning the different applicant profiles to employers, we are able to ensure a quasi-experimental design, which mitigates bias from unobserved respondent heterogeneity. The fictional applicants were all qualified for the respective vacancy and differed most importantly in terms of their university credentials, which were all obtained at Swiss universities. In addition, the applicants also randomly varied in their gender, upper-secondary education, years of general work experience, years of occupation-specific work experience, and volunteering experience. Table C.1 in Appendix C provides an overview of these applicant dimensions and Table C.2 exemplifies an applicant profile. In the survey, we used the full universe of applicant profiles, as there are no implausible combinations of the different dimensions. We successfully randomised the applicant profiles to employers, as the correlation matrix of all applicant characteristics (Table C.14 in Appendix C) and their correlation with respondent characteristics (Table C.15 in Appendix C) show.

The applicant characteristic whether an applicant has a non-formal MAS or a formal master's degree is our main explanatory variable<sup>25</sup>. All applicants completed a bachelor's degree prior to obtaining either a MAS or a master's degree. Figure 4.1 displays the applicants' different educational credentials, which were randomly displayed to employers in the survey experiment.

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<sup>25</sup> Table C.1 in Appendix C provides an overview on the dimensions and levels included in the applicant profiles.

**Figure 4.1:** Applicants' education that we compare for the two positions

<b>Sales manager</b>	
Bachelor's degree in Business Administration	Bachelor's degree in Business Administration
Master's degree in Business Administration	MAS in Marketing Management
<b>IT director</b>	
Bachelor's degree in Information Technology	Bachelor's degree in Information Technology
Master's degree in Information Technology	MAS in Information Systems Management

*Notes:* Figure displays the different educational credentials that we compare for the position 'sales manager' and the position 'IT director'; all credentials stem from a Swiss university.

When evaluating each applicant, the employers answered the following two questions: 1) How likely is it that your firm would invite this applicant for a job interview? 2) What monthly salary would you recommend for this applicant? Our first dependent variable is a categorical variable that ranges from 1 to 10 and measures the probability for an invitation to a job interview. Our second dependent variable is the logarithmic of the potential salary an employer would offer the applicant.

Our control variables include the other applicant dimensions including gender, upper-secondary education, years of general work experience, years of occupation-specific work experience, and volunteering experience. Moreover, the survey also covered questions on the employers and the firm they work for, and we include these variables as additional controls in a second step. These variables are the employer's age, gender, nationality, education, recruitment experience, position within firm, size of firm, industry sector and region of firm and whether the firm is internationally active. Furthermore, we include five items on their knowledge about higher and continuing education in Switzerland. Additionally, to account for possible weaknesses in the research design, we include

three survey-design variables: (1) one that controls for the order of the applicant profile within the deck, (2) one that measures to what extent the hypothetical vacancy matches real positions in the firms, and (3) one that captures whether survey respondents received an incentive letter to increase study participation. Table C.3 and Table C.4 in Appendix C provide an overview on the control variables and their summary statistics.

#### **4.4.2 Estimation Method**

We estimate several models to test our hypotheses. We compute separate estimations for each of the two dependent variables (likelihood for job interview and recommended salary) and for each position. After each baseline estimation, we stepwise include additional control variables. Nevertheless, due to the experimental study design, we do not expect the respondent-level control variables to change the results of our baseline estimations.

The number of observations in each estimation results from the multiplication of the number of respondents with the number of rated applicant profiles per respondent. Hence, the evaluations are nested by respondent, meaning that we operate with two-level data. Our lower-level variables include all applicant characteristics, while our higher-level variables comprise all respondent and firm characteristics. The study-design control variables include both a lower-level variable (order of applicant profile within deck) and two higher-level variables (match of position; receipt of incentive letter). We consider this nested structure by estimating multilevel random intercept regressions – the standard method to analyse data from factorial surveys (Auspurg & Hinz, 2014), – in which random intercepts account for differences in means of the dependent variables by cluster, i.e., by respondent. For the estimations including cross-level interactions (see the section Further Analyses for Explanation of Results) we use mixed linear regressions with random intercepts and random slopes.

## 4.5 Empirical Results

The following subsections describe our regression results. We compare the two kinds of applicants – i.e., those with a MAS and those with a master’s degree – in terms of 1) the likelihood for an invitation to a job interview and 2) the recommended salary. Both tables display six models: models (1) and (4) include only applicant characteristics, models (2) and (5) further include the three survey-design controls, and models (3) and (6) additionally include the respondent-level controls. Table C.5 through Table C.8 in the Appendix C display the full results tables.

### 4.5.1 Employers’ Evaluation of Formal versus Non-Formal Credentials

Table 4.2 presents the results of our estimations. First, we analyse the effect of a MAS compared to a master’s degree on the likelihood for a job interview. We display the results separately for each position.

For the position ‘sales manager’, although model (1a) – only including the applicant controls – shows a significant positive effect of having a MAS, this effect becomes insignificant in the models (2a) and (3a), where we include the respondent-level and survey-design controls. This change in the main coefficient mainly stems from including the survey-design variable ‘order of applicant profile within deck’, even though this variable does not have a significant effect on the likelihood for a job interview (see Table C.5 in the Appendix C). When interacting our explanatory variable with this survey-design control, we find that the positive effect of having a MAS declines with each rated applicant profile, i.e., that employers evaluate both applicant groups more similarly when having more information on the other applicants from the pool.

For the position ‘IT director’, however, the results are stable over the different model specifications (see Table C.9 in Appendix C). Thus, our results indicate that employers do not distinguish between applicants with a MAS and those with a master’s

degree when considering applicants for a job interview, and this evidence supports H1b over H1a.

**Table 4.2:** Likelihood for a job interview: MAS vs. master’s degree

Likelihood for job interview	Sales Manager			IT director		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
MAS (ref: master’s degree)	0.153*** (0.054)	0.070 (0.096)	0.075 (0.098)	0.076 (0.080)	0.087 (0.136)	0.081 (0.130)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey-design controls	No	Yes	Yes	No	Yes	Yes
Respondent-level controls	No	No	Yes	No	No	Yes
<b>No. of evaluations</b>		1,918			778	
<b>No. of employers</b>		1,216			491	
<b>Log-Likelihood</b>	-3,762.496	-3,752.848	-3,711.06	-1490.587	-1488.374	-1454.603

*Notes:* Table displays results of linear regressions with random intercepts and robust standard errors clustered by respondents in parentheses. Models with the suffix ‘a’ refer to the position ‘sales manager’, models with the suffix ‘b’ refer to the position IT director. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

For the recommended salary, Table 4.3 shows a significant positive effect of holding a MAS versus a master’s degree in all model specifications. According to models (6a) and (6b), applicants with a MAS receive an around 1% higher salary than those with a master’s degree. This result is stable over the different model specifications. Therefore, we do not find any support for either of our two hypotheses, H2a and H2b.

**Table 4.3:** Recommended monthly salary: MAS vs. master’s degree

Recommended salary	Sales Manager			IT director		
	(4a)	(5a)	(6a)	(4b)	(5b)	(6b)
MAS (ref: master’s degree)	0.015*** (0.002)	0.010* (0.005)	0.011** (0.005)	0.013*** (0.004)	0.010 (0.006)	0.012* (0.006)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey-design controls	No	Yes	Yes	No	Yes	Yes
Respondent-level controls	No	No	Yes	No	No	Yes
<b>No. of evaluations</b>		1,710			677	
<b>No. of employers</b>		1,084			427	
<b>Log-Likelihood</b>	1,058.36	1,076.578	1,290.828	401.847	414.235	497.263

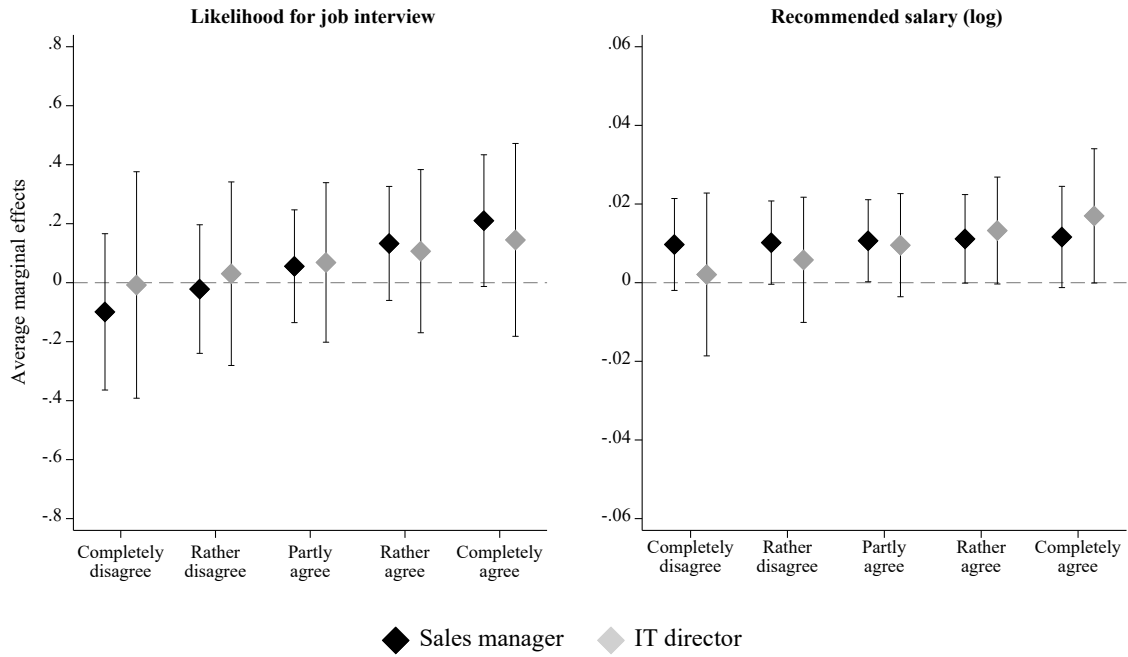
*Notes:* Table displays results of linear regressions with random intercepts and robust standard errors clustered by respondents in parentheses. Models with the suffix ‘a’ refer to the position ‘sales manager’, models with the suffix ‘b’ refer to the position IT director. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

#### 4.5.2 Further Analyses for Explanation of Results

The results of our baseline estimations merit a closer investigation. In terms of likelihood for a job interview, we do not detect a difference between applicants with a MAS and applicants with a master’s degree. This finding could stem from employers not knowing the difference between these credentials, especially as they have similar names and are both awarded by universities. In the survey, we presented the employers with five Likert-scale items on their knowledge about higher and continuing education, one of which reads as follows: “I know the difference between the Master of Advanced Studies and the Master of Arts/Science” (Table C.3 and Table C.4 in Appendix C). Almost half of the employers indicated that they find it difficult to distinguish between these two credentials. To test whether employers’ lack of knowledge may explain our findings, we interact our explanatory variable with this item and find positive interaction effects for both positions and dependent variables, but only significant effects on the likelihood for a job interview for the ‘sales manager’. Figure 4.2 displays the average marginal effects (AME) of holding a MAS relative to a master’s degree depending on employers’ knowledge about the difference between the two credentials.



**Figure 4.2:** AME of having a MAS vs. master’s degree depending on employers’ knowledge about the difference between the two credentials



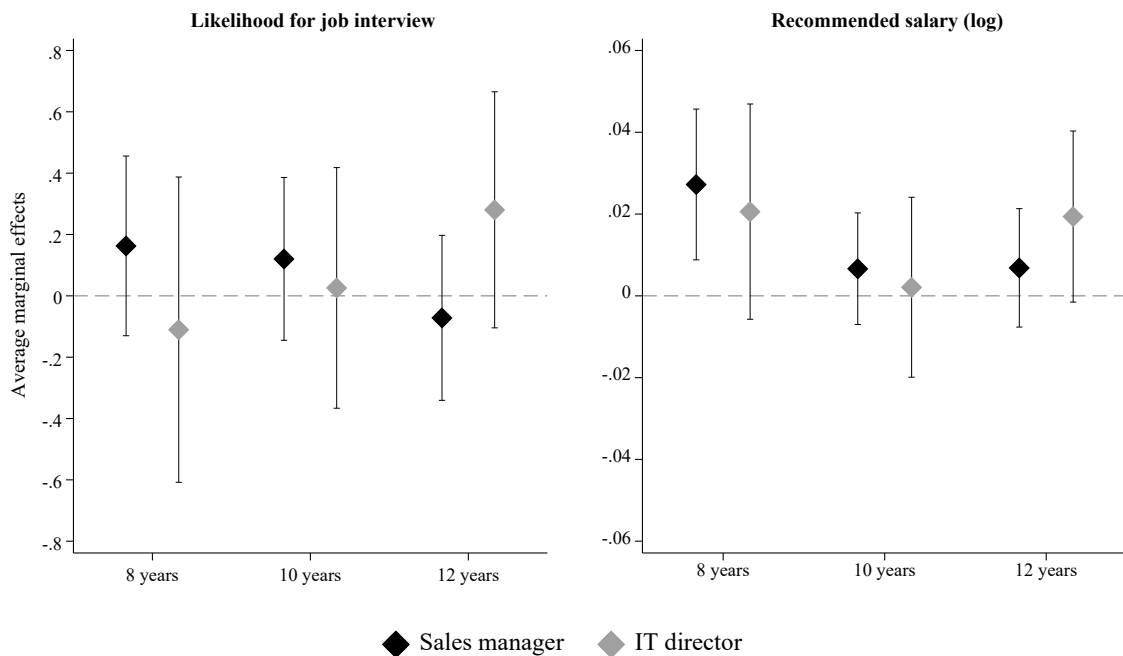
*Notes:* Figure displays average marginal effects with 95%-CI of MAS relative to master’s degree on both dependent variables depending on the level of agreement to the 5-point Likert scale item “I know the difference between the Master of Advanced Studies and the Master of Arts/Science.”

Thus, we find no evidence that a lack of knowledge on the difference between a MAS and a master’s degree drives employers to equally evaluate the two credentials. On the contrary, the positive trend indicates that the more employers know about the difference between the two credentials, the stronger their preference for applicants with a MAS.

We also find that applicants with a MAS receive a higher salary than applicants with a formal masters’ degree. As MAS are more occupation-oriented than formal masters’ degrees, employers might associate a MAS with lower training costs. Another characteristic that employers associate with lower training costs is an applicant’s work experience (Salvisberg & Sacchi, 2014): Figure 4.3 (full results in Table C.10 and Table C.11 in Appendix C) shows estimations with interaction terms between an applicant’s education (MAS versus master’s degree) and their general work experience. For the position ‘sales manager’, the positive effect of holding a MAS diminishes with increasing work

experience for both dependent variables, with significant interaction effects on the recommended salary for 10 and 12 years of work experience. For the position ‘IT director’, we also find negative – although not significant – interaction effects on the recommended salary, especially when work experience increases from 8 to 10 years. Furthermore, we find positive interaction effects on the likelihood for a job interview, but they are not significant.

**Figure 4.3:** AME of having a MAS vs. master’s degree depending on applicant’s general work experience



*Notes:* Figure displays average marginal effects with 95%-CI of MAS relative to master’s degree on both dependent variables depending on an applicant’s general work experience.

These results provide some indication that the benefit of having a MAS compared to a master’s degree diminishes with more work experience, thereby supporting the argument that employers value low training costs, and are ready to pay a higher salary. However, while we do find positive interaction effects, they are not always statistically significant.

### **4.5.3 Robustness Tests**

To test the robustness of our results, we estimate further regressions. A large share of the surveyed employers stated that the hypothetical vacancies only partly match the vacancies that exist within their firm. However, excluding those employers who indicated a low match from the analyses does not qualitatively change our results. Table C.12 and Table C.13 in Appendix C display the results of this robustness test. To account for potential respondent fatigue effects and response bias, we compare respondent fixed-effects and random-effects regressions, and also estimate regressions that include the time employers needed to rate each applicant profile. These additional regressions support our results' robustness (see Table C.16 and Table C.17 in Appendix C). Regarding the external validity of our results, the comparison of the respondent sample with the contacted sample and the population of firms that train apprentices shows that firms from the German-speaking part are overrepresented in the responding sample (see Table B.23 in Appendix B of Chapter 3, as Chapter 4 uses the same sample).

### **4.5.4 Discussion of Results**

Regarding our first set of hypotheses (H1a and H1b), our findings reveal that employers do not differentiate between a formal master's degree and a non-formal continuing education, i.e., a MAS, when inviting applicants to a job interview. This finding is in line with credentialism theories, which postulate that employers value credentials from trustworthy institutions – such as universities – and are less concerned with the actual content of these credentials. Employers' may simply prefer applicants who are familiar with the relevant norms to persist in high-level positions, and therefore attribute the same value to formal and non-formal university credentials for the analysed high-level positions. The differences in terms of quality assurance and title protection may be less relevant to

employers: they trust all types of university credentials – confirming the universities’ strong reputation and high societal prestige (Weber, 2014).

Moreover, another explanation for this result may be that employers – contrasting the predictions of the human capital theory – are indifferent towards a master’s programme teaching more skills (measured by ECTS) than a MAS, and believe that the MAS can compensate its shorter duration by imparting more job-relevant skills. Employers presumably highly value job-relevant educational contents, and might expect that continuing education strongly conveys these contents. Nonetheless, in the section ‘Further Analyses for Explanation of Results’ we show that almost half of the employers do not fully know the difference between a master’s degree and a MAS. However, we also find that this lack of knowledge does not explain why employers do not prefer either of the analysed credential over the other.

Regarding our second set of hypotheses (H2a and H2b), we find that the employers recommend a higher salary for applicants with a MAS relative to those with a master’s degree. This unexpected finding does not support any of our hypotheses derived from the theories. While numerous studies find significant effects of continuing education on employment or mobility, but the evidence on the effect on salaries is mixed (Görlitz & Tamm, 2016; Schwerdt et al., 2012). However, with around 1%, the economic and social significance of the salary premium of a MAS compared to a master’s degree is small – but nonetheless systematic for both analysed positions.

Our result indicates that there are other reasons why employers may pay a higher salary for a MAS compared to a master’s degree – despite the latter’s greater scope and high degree of standardisation. Another difference between a non-formal MAS and a formal master’s degree are the distinct kinds of skills that they convey. In line with the

productivity-enhancing and positional-good mechanisms, the finding that employers reward a MAS with a higher salary may indicate that employers particularly value the stronger labour market linkage of the skills imparted in a MAS, and thus associate this credential with lower training costs and higher productivity levels.

Our further analyses provide another explanation why our surveyed employers would pay a higher salary to applicants with a MAS compared to those with a master's degree. While a MAS imparts more occupation-specific skills, employers might also associate more work experience with a MAS than with a master's degree. While a master's degree is often acquired directly after obtaining a bachelor's degree, individuals starting with a MAS already need to have a certain amount of relevant work experience. Although our survey experiment controls for the amount of work experience – such that applicants with a master's degree are directly comparable to those with a MAS – our surveyed employers may picture a more experienced applicant when evaluating applicants with a MAS. The section 'Further Analyses for Explanation of Results' partly supports this interpretation, as the salary premium for a MAS is highest with low levels of work experience.

As stated in the literature section, the established theories do not directly consider differences between formal and non-formal credentials. Nonetheless, we find less support for the productivity-enhancing and positional-good mechanisms in our comparison of different types of university credentials. On the contrary, the social closure mechanism may enhance our understanding as to why employers attach the same value to the two credential types.

However, institutional differences in education systems or labour markets are also important to consider when determining which of these mechanisms are appropriate

within a specific context (van de Werfhorst, 2011). For example, in vocationally-oriented education systems, credentials may send different signals to employers due the different types of education having a specific purpose in the labour market (Di Stasio et al., 2016). Moreover, from a productivity-enhancing perspective, in education systems in which employers actively engage in setting qualification standards of educational credentials, employers presumably give a higher value to the skills imparted in these credentials and are also more familiar with them (Rageth & Renold, 2020).

#### **4.6 Conclusion**

This paper analyses the labour market positioning of continuing education at universities. We focus on one specific continuing education credential, i.e., the Master of Advanced Studies (MAS) and its labour market value relative to formal university credentials.

To remain internationally competitive and to absorb the rising demand for lifelong learning from both students and employers, Swiss universities introduced non-formal continuing education courses in the early 2000s. Nevertheless, so far, the labour market positioning of these credentials remains under-analysed, despite the increasing number of such courses. By investigating how employers evaluate applicants with different types of university credentials, we provide first evidence on the relative positioning of these credentials in the labour market.

In recent years, universities faced the expectation that they should cater to work-experienced individuals by offering continuing education courses (Zimmermann, 2020). Consequently, more and more highly-educated individuals acquire such continuing education credentials. Our result that the two types of university credentials have similar labour market outcomes support the argument that universities and their credentials have a high standing within society (Weber, 2014).

Our results complement previous evidence, which mainly focuses on the effect of continuing education on job mobility and not on job entry, and which finds mixed results (e.g. Dieckhoff, 2007; Görnitz & Tamm, 2016; Schwerdt et al., 2012). These mixed results stem from both the differences in the analysed countries' education system and labour market institutions and the different definitions and types of continuing education. Moreover, the literature on continuing education does not compare it to other types of education, e.g., formal education, regarding the respective labour market outcomes.

Our evidence regarding the likelihood for a job interview supports theories on the social-closure mechanism, but when examining the recommended salary, we do not find support for any of the outlined theories. This finding indicates that existing theories on how different educational credentials are perceived in the labour market may not sufficiently account for the differences between formal and non-formal credentials. Moreover, our tentative tests of different explanations for the unexpected results suggest that future research may investigate the complex interactions of educational credentials with other applicant characteristics and employers' background.

Our finding that employers do not distinguish between different types of university credentials in the hiring process indicates that the introduction of continuing education at universities challenged the positioning of established university credentials in the labour market. Scholars discussing the role of continuing education at universities in Switzerland state that the positioning of these courses remains ambiguous (Weber, 2014; Zimmermann, 2020). Our results partly support these scholars' argumentation, which states that these credentials' similarity to formal university credentials makes a clear positioning difficult. Furthermore, our tentative tests indicate that employers who know the difference between the two credential types even prefer the non-formal credential,

possibly due to its occupation-oriented context. However, when interpreting our results, we also need to consider that in most countries, formal credentials are substantially different to non-formal credentials regarding various indicators, such as the length of education, the educational provider, or the costs. We therefore acknowledge that while universities around the globe restructure their education programmes, our case study provides a unique setting, which allows to directly compare the two types of university credentials.

While a quasi-experiment has several advantages compared to conventional surveys and real experiments, it faces certain limitations. Despite having consulted real-life vacancies and recruitment experts to create the hypothetical vacancies and the applicant profiles, employers usually have more information on applicants in real hiring processes. Moreover, in real hiring processes, employers may not face the same time constraints as in quasi-experimental settings. Nevertheless, Gutfleisch et al. (2021) show that employer evaluations for hypothetical positions do not differ significantly from real vacancies.

To limit the complexity and number of the applicant profiles, we restrict the applicant dimensions and possible educational paths. For example, we omit applicants who obtained a continuing education credential from a university after a formal master's degree or after a doctorate. Furthermore, we did not include other non-formal credentials from universities, for which the results might substantially differ from when using a MAS. Although these pathways are also plausible, we deliberately omitted them to focus on educational pathways that are comparable in length.

Moreover, we had to limit our hypothetical vacancies to positions for which applicants with different educational backgrounds qualify, and that are available in firms of different sizes and from various industries. Hence, we need to be careful when



generalising these results to other positions and occupational fields. Furthermore, our sample consists of a high share of firms from the private sector, which potentially value labour-market-oriented credentials higher than general education credentials, more so than organisations from the public sector. Additionally, the tight coupling between the labour market and the education system in Switzerland might result in employers favouring occupation-specific credentials due to high practical value.

Policy makers should aim at more clearly defining and communicating the purpose and target group of continuing education courses offered at universities. Such an undertaking may help clearly position continuing education against formal university education, such that these two types of university credentials can co-exist and have their unique labour market value. With the proliferation of university credentials, further research could investigate the relative value of different types of university credentials in other countries and examine the employer and firm characteristics that influence the labour market outcomes of these credentials.

## **Chapter 5**

# **Who Profits from Acquiring New Skills? Time Trends in the Heterogeneous Returns to Continuing Education and Training**



## 5.1 Introduction

The labour market is constantly subject to profound structural changes (Allmendinger et al., 2019). One main driver of these changes is technological progress and the emergence of a knowledge society, which redefines occupational profiles by changing the type of skills that are required to perform the relevant tasks (Goldin & Katz, 2009). Consequently, workers need to continuously update their skills to prevail in the labour market. However, several scholars show that with technological change an upgrading of the labour force emerges, i.e., that mainly the number of higher-skilled jobs increases, while middle-skilled jobs have decreased, even more than lower-skilled jobs (Autor, 2013; Frey & Osborne, 2017; Oesch & Rodríguez Menés, 2011). Furthermore, scholars show that technological change is rather complementary to higher-skilled occupations, and less likely to replace them, i.e., that higher-skilled workers with the knowledge to use these technologies are labour market winners (Autor & Dorn, 2013; Frey & Osborne, 2017).

One method to adapt to rapid changes in the job-relevant skills is the participation in continuing education and training (CET) – the non-formal sector of the education system. CET can have different purposes, with different institutions involved. For example, CET can be provided from private or public providers, and can aim at labour market re-entry or job mobility. In many instances, CET serves as a means for career development and lifelong learning: these CET courses are designed to impart specific skill sets, which individuals can mostly apply in their current or new jobs (OECD, 2021). CET is often provided by firms, does not lead to a certification and is not standardised – which are its main differences to formal education (Allmendinger et al., 2019). This study analyses the effect of workers engaging in CET on their wage growth.

The human capital theory framework (Becker, 1993) states that new skills enhance productivity, and thus are worthwhile for individuals, since a higher productivity improves their labour market outcomes. The skill-biased technological change (SBTC) hypothesis (Acemoglu, 2002) is an elaboration based on the notions of human capital theory, with special focus on the role of technological change. The SBTC hypothesis argues that the highly-skilled make firms more productive, which is why the labour market rewards them more than lower-skilled workers. Moreover, as technological change progresses, the SBTC hypothesis suggests that over time, the highly-skilled reap even more benefits, because they possess the skills to adapt to rapidly changing technologies. Thus, these two theoretical concepts predict contrasting outcomes for different groups of individuals when they acquire new skills.

While the empirical evidence suggests that job security increases through participation in CET (Ebner & Ehlert, 2018), it also provides mixed evidence on the effect on wages or job mobility, i.e., that there are only small effects, or none at all, depending on the empirical strategy of the different studies. The empirical evidence also shows that while the highly-skilled, i.e., those with high education levels, most frequently engage in CET, lower-skilled individuals experience the largest effect on different labour market outcomes (Doerr et al., 2017; Wolter & Schiener, 2009).

Scholars studying CET as an active labour market policy, i.e., to re-integrate the unemployed and to increase employment probability, find heterogeneous effects by type of training (Card et al., 2018; Gerfin & Lechner, 2002) and also length of training (Biewen et al., 2014; Kluve et al., 2012; Lechner et al., 2007). Other studies show that the demand for higher-skilled workers has increased over time and their wages have increased, as the SBTC hypothesis predicts (Hémous & Olsen, 2022; King et al., 2017; Mouw &

Kalleberg, 2010). Therefore, so far, the studies on the relation between CET and wages find mixed evidence, and heterogeneity by group of individuals.

This study investigates the effect of CET on the wage growth of workers in Switzerland. Moreover, the study analyses which group of workers profits most from acquiring new skills, and whether this effect has changed over time for any group. I contribute to the literature in two ways: First, I investigate the effect of different intensities of CET on workers' labour market outcomes, i.e., I analyse the effects on wage growth depending on the length of a CET course. I hypothesise that longer CET courses have a larger positive effect on wage growth. Second, I analyse the development of the relation between CET and wage growth over time by skill level of a worker to show if the returns have changed for a specific group. Following the framework underlying the SBTC hypothesis, I hypothesise that the highly-skilled experience an increased positive effect of CET on wage growth over time.

To undertake my analysis, I use the Swiss labour force survey (SLFS) – a representative panel providing information on labour market indicators of the Swiss population. I restrict my analysis to employed individuals who participated in the survey between 2010 and 2020. I regress the wage growth of a worker on two CET variables: 1) participation in CET and 2) length of CET course. To analyse heterogeneous effects, I interact these two variables with the skill level – i.e., proxies thereof – of a worker. Moreover, I investigate whether the effects of the two CET variables have changed over time by a worker's skill level.

Switzerland provides an interesting case study because participation in CET in Switzerland is traditionally high (FSO, 2021b), and CET in Switzerland is mostly privately and firm-based organised, i.e., that the skills acquired in CET are expectedly

closely related to a person's occupation (Denzler et al., 2022). This study limits its scope by measuring the effect on wages growth only, thereby omitting other outcomes, such as occupational mobility, changes in work tasks or satisfaction with work, which are undoubtedly as relevant for workers.<sup>26</sup>

The results show that the effect of CET on wage growth is significantly positive, while this effect is driven by longer CET courses. Furthermore, the results show that workers with lower education levels and occupations with low skill demand have a statistically significant positive wage growth. However, the changes in effects on wage growth over time show a slight upward trend for the highly-skilled, and a slight downward trend for the lower-skilled, depending on the skill proxy I use.

I structure the remainder of this study as follows: the first section reviews the theoretical and empirical literature on the relation between CET and wages. The second section illustrates the analytical context, the data and the empirical strategy. The third section presents the results of my estimations, followed by a section that discusses the robustness of these results. The last section discusses the results in a broader context and concludes with potential policy implications.

## **5.2 Literature on CET and its Relation to Wages**

The next section outlines the literature, from which I derive my hypotheses. I reference the human capital theory (HCT; e.g. Becker, 1993) and the skill-biased technological change hypothesis (SBTC; e.g. Acemoglu, 2002) and corresponding empirical evidence to explain returns to CET and their heterogeneity.

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<sup>26</sup> A linking of other data sets (such as the Swiss Household Panel) with the SLFS might provide grounds to analyse the effects of CET on these other outcomes.

### **5.2.1 CET as human capital accumulation**

Within the human capital theory (Becker, 1993), education is one of the core resources of an individual, but also of society as a whole. Most generally, an individual's human capital is the stock of skills or knowledge they acquire over their lifetime. Individuals build this stock through formal and non-formal education, and informal education (e.g., through work experience), all of which teach them new skills (Mincer, 1989). Human capital, thus, is the “embodiment of skills” (Mincer, 1984, p. 201). Firms reward high levels of skills, which signify high levels of productivity, and they do so mainly by offering higher wages (Becker, 1993; Mincer, 1989). Consequently, individuals make investments to enhance their skills and to improve their labour market outcomes.

The most common way to build a human capital stock is to invest in formal education or ‘schooling’ (Mincer, 1989). As adults sooner or later enter the labour market and as formal education is time-intensive, formal education, for the largest part, takes place early in life, most often before labour market entry. Nevertheless, skills investment – especially against the backdrop of technological change and lifelong learning – is also possible after labour market entry. This is where human capital theorists no longer use the terms ‘education’ or ‘schooling’, but introduce the term ‘training’ instead (Mincer, 1989). As training equips an individual with a specific skills set to directly use them within their current or future job or occupation, it helps individuals to update their skills and to prevail in the labour market (Allmendinger et al., 2019). Furthermore, within HCT, there exists a conceptual distinction between general and (firm- or occupation-) specific training (Becker, 1993).

As participation in training enhances skills and signals an individual's readiness to adapt to changing job requirements, Becker (1993) argues that general as well as specific training pays off in the labour market. Hence, if workers participate in training – be



it general or specific – they arguably become more productive, which their current or a future employer is ready to reward (Konings & Vanormelingen, 2015). Consequently, my first sub-hypothesis to hypothesis set H1 reads as follows:

**H1a:** CET has a positive effect on a worker's labour market outcomes.

While CET can vary remarkably in length, shorter CET courses are more common (Dieckhoff, 2007). And as CET courses are usually short, longer, more intensive CET courses should convey more skills than short-term courses. With an enhanced skill set, individuals might tackle a broader range of tasks within their jobs, and hence make their firm more productive. Furthermore, the Mincer specification of returns to human capital accumulation assumes a linear relation of schooling or training to wage, and thus constant returns (Mincer, 1989). Hence, I argue that there exist heterogeneous returns in terms of length of CET courses.

Following the previously outlined argumentation based on the HCT, it is reasonable to expect that longer courses have a larger effect on returns than shorter ones as longer courses convey more skills and are therefore equip the worker with the capability to tackle a broad array of tasks. Relying on these considerations, I derive a second sub-hypothesis to H1, which reads as follows:

**H1b:** Longer CET courses have a larger positive effect on a worker's labour market outcomes than shorter CET courses.

These previous elaborations imply a linear relation between human capital and returns. While this might be still true for short-term education such as CET, much empirical evidence, however, provides reason to believe that additional schooling has different effects depending on how many years of education a person has already completed

(Balestra & Backes-Gellner, 2017; Brand & Xie, 2010; Henderson et al., 2011). These studies find that the slope of wage returns is steeper for individuals with lower educational levels or from disadvantaged backgrounds, and has significant decreasing returns at high educational levels. Despite individuals with high levels of education having higher wages, additional investment after a certain threshold yields lower marginal returns (Trostel, 2004). In other words, highly-educated individuals who invest in more education might acquire a surplus, for which there might not be a significant positive return anymore. Individuals with lower levels of education, in turn, might only take up additional education if they expect positive returns, which compensate the costs for education (Oreopoulos & Petronijevic, 2013). Consequently, I formulate a second set of hypotheses, H2, for which the first sub-hypothesis reads as follows:

**H2a:** There are diminishing returns to education, i.e., lower-skilled individuals experience a larger positive effect of CET on labour market outcomes than higher-skilled individuals.

### **5.2.2 Skill-biased technological change and CET**

While scholars developed the human capital theory, many disruptive technologies were just emerging, with a rapid surge of technological change only to happen later in the 20<sup>th</sup> century (Powell & Snellman, 2004). As these technologies started to interfere more strongly into the labour market, scholars developed a hypothesis to explain how the labour market and the labour force might adapt to this restructuring of jobs. Therefore, the skill-biased technological change (SBTC) hypothesis (Acemoglu, 2002; Goldin & Katz, 2009) was introduced to explain how technological change fosters a concentration of the workforce, while favouring the highly-skilled. As the SBTC hypothesis relates the

accumulation of skills to an increased productivity, it is an elaboration based on the HCT framework (see Mincer, 1989 for his elaborations on the effect of technologies).

Scholars observed that while the supply of highly educated workers rose, their wages did too (Goldin & Katz, 2009). This collinear development happens if newly introduced technologies demand for individuals with a large stock of human capital, i.e., if they are skill-biased. These disruptive technologies are often ‘general purpose technologies’ (Goldin & Katz, 2009; Hornstein et al., 2005), which are neither industry- nor product-specific, and require a large share of the workforce to adapt them. Human capital and technological change are, according to Mincer (1989), complementary and induce a simultaneous relation. First, human capital, as the stock of knowledge, creates new technological change. Second, technological change in the labour market requires adaptations in the necessary human capital. The SBTC, thus, is a type of an endogenous growth process (Acemoglu, 2002). This argument entails that if employers seek after new employees, they select workers with skills that are not only not yet absorbed by technologies, but who potentially foster more technological change and thus higher firm productivity.

Therefore, the SBTC hypothesis assumes different consequences of technological change for different types of job-relevant tasks. Autor et al. (2003) reason that technologies substitute both routine manual and routine cognitive tasks, while they complement non-routine cognitive tasks. Consequently, firms decrease labour input in routine (manual and cognitive) tasks, and increase labour input into non-routine cognitive tasks.<sup>27</sup> Non-routine cognitive tasks are presumably best performed by highly educated individuals, for which the demand increases in industry sectors with high levels of computerisation. The empirical evidence indeed shows that workers with higher skill levels and new

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<sup>27</sup> Workers in non-routine manual tasks, in turn, are said to switch to other lower-skilled occupations, which are less likely to be automated (Autor & Dorn, 2013; Frey & Osborne, 2017).

technologies are complementary (Arvanitis, 2005; Bolli & Pusterla, 2023; Michaels et al., 2014), i.e., that new technologies make them more productive. Hence, the profitability of training, according to Mincer (1989), should increase for this type of workers.

Moreover, scholars argued that SBTC contributes to an increase in wage inequality in high-income countries (Lemieux, 2008)<sup>28</sup>: individuals who accumulate skills that enable them to work in highly technologized occupations, i.e., managers, professionals, technical workers, are rewarded better than individuals who work in occupations with less computerisation where there is less or no need for technology-related skills. Therefore, higher-skilled workers are labour market winners who receive higher wages because of their presumed productivity, and often have the bargaining power for other benefits too (Guadalupe, 2007; King et al., 2017; Li et al., 2019). Lower-skilled workers, in turn, lack the skills that are complementary to productivity increasing technologies, leading to fewer employment opportunities in rewarding jobs.

Thus, higher-skilled workers have a larger ‘bundle’ of skills, which they can apply in the labour market (Hanushek et al., 2015; Spitz-Oener, 2006). Moreover, the highly-skilled can optimise their skill bundle by engaging in CET and acquiring new, up-to-date skills. Therefore, relying on the SBTC hypothesis, I complete hypothesis H2 with a second sub-hypothesis, which contrasts the first sub-hypothesis and reads as follows:

**H2b:** If CET operates through a SBTC channel, individuals with higher skill levels experience a larger positive effect of CET on labour market outcomes than individuals with lower skill levels.

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<sup>28</sup> Already when the SBTC hypothesis emerged, scholars acknowledged that it only partly explains wage inequality (Card & DiNardo, 2002; Goldin & Katz, 2009; Lemieux, 2008).

The empirical evidence shows that technological change, as measured in computerisation or automation and therefore the complexity of occupations, has increased over time (Krueger & Kumar, 2004; Spitz-Oener, 2006). Studies from the United States show that automation-related innovation has increased during several decades (Hémous & Olsen, 2022), while wage inequality has widened too, because the highly-educated – despite growing in numbers – received increasing returns over time as well (Hornstein et al., 2005). Scholars attribute this mechanism to the skill premium these individuals experience due to their specific set of skills, which is sought after in the labour market. Relying on the body of empirical evidence concerned with the temporal component of technological change and the restructuration of the labour market, it is reasonable to assume that over time, the rewards for new skills have increased. Thus, considering the potential temporal change in effects, my third set of hypotheses reads as follows:

**H3:** If CET operates through a SBTC channel, the effect of CET on labour market outcomes has increased over time for the highly-skilled, but not for the lower-skilled.

Note that while the elaborations of the SBTC hypothesis do include a temporal component, the HCT theory does not predict any change in returns over time.

### **5.2.3 Review of the Empirical Evidence**

There exists a large body of empirical studies testing the relation between non-formal education and labour market attainment. When reviewing this literature, it becomes apparent that the relevant studies provide mixed evidence on the effect of CET on different labour market outcomes. According to Bills (2005), these heterogeneous results stem from the large variety of CET courses and its different purposes. Moreover, Dieckhoff (2007) and Vogtenhuber (2015), who analyse the impact of CET on occupational mobility

across countries, show that the effect varies across the different countries due to differences in the institutions involved in the labour market and the non-formal education sector. As this study investigates the outcomes of CET, the following sections review selected studies on the relation between CET and mainly wages.

Since CET is vastly heterogeneous in its contents and depends highly on the institutions of the education system and the labour market of a country, its effect on wages expectedly strongly varies across countries. Triventi and Barone (2014) e.g., find effects between 0%-8% on the gross individual income, depending on the European country. In line with human capital theories, studies find that general training seems to yield higher individual returns than firm-provided training (Acemoglu & Pischke, 1999; Li et al., 2000; Muehler et al., 2007; O'Connell & Byrne, 2012), most likely because employers reap the benefits of firm-provided training more than the workers (Muehlemann & Wolter, 2020).

However, as with formal education, participation in CET is often prone to a selection bias. Studies show that participation in CET highly depends on individual characteristics – such as the level of education (Kramer & Tamm, 2018; Saar & Räis, 2017; Schwerdt et al., 2012), sometimes with employers intentionally favouring the highly-skilled for training (Goux & Maurin, 2000). Against this backdrop, many studies apply experimental and quasi-experimental designs to account for selection into CET. One approach to moderate these issues is a comparison-group approach, where a counterfactual is created by examining non-participants who are very similar to CET participants. These studies find mixed evidence, i.e., that there is evidence for small (around 0.5%) and sometimes insignificant wage returns to CET (Görlitz, 2011; Leuven & Oosterbeek, 2008), but

also for larger (around 5%) and significant effects (O'Connell & Byrne, 2012; Ruhose et al., 2019).

For Switzerland, Denzler et al. (2022), using a difference-in-difference approach, find that CET has a positive effect on annual wages and reduces risk of unemployment, but that the effects are heterogeneous to gender, age, education, and regional labour market conditions. Schwerdt et al. (2012) use the same data as in this paper combined with a voucher distribution experiment, but they, in turn, find no statistically significant effect on wages.

Other scholars also use the randomised distribution of training vouchers to gauge the causal effect on participation in and returns to CET. Furthermore, these studies investigate effect heterogeneity by skill level of individuals and find mixed evidence. Doerr et al. (2017) find overall small positive employment effects and no effects on wages four to seven years after receipt of voucher. Yet, they find that mainly individuals with lower skill levels experience wage benefits from redeeming a training voucher, but that they mainly participate in programmes that reward a formal degree upon completion. In turn, Hidalgo et al. (2014) distribute vouchers only to the lower-skilled and find that participation increases in the medium term, but find no effects on wages or job mobility. Furthermore, Rinne et al. (2011) find no heterogeneous treatment effect depending on the skill level of the analysed groups.

The empirical literature also discusses the effect of different lengths, measured in weeks or months, of CET. These studies mostly analyse CET as an active labour market policy, i.e., a public intervention to reduce inequalities in the labour market to e.g., bring back unemployed individuals to the labour market (Biewen et al., 2014; Gerfin & Lechner, 2002; Kluve et al., 2012; Lechner et al., 2007). These studies find that short to

medium length training are most effective for labour market reintegration. Longer training courses appear not to have any effect or even negative effects on labour market outcomes (so-called “lock-in effects”).

Other studies use a more fine-grained measure of CET intensity to estimate its effect on labour market outcomes, such as hours a worker spends in firm-provided CET. Konings and Vanormelingen (2015) illustrate that each additional hour of training has a premium for the annual wage of 0.44%, and an even higher productivity premium for the firm with 0.76%, while Lopes and Teixeira (2013) find effects of 0.04% on hourly wages and 0.12% on firms’ productivity.

Scholars further investigate the effect technological change has on the provision and use of CET. These studies find that technological change, such as automatization or robotisation – even if it is only subjectively perceived – has an impact on training participation. If workers can decide themselves to participate, the training incidences increase (Innocenti & Golin, 2022), and if the employer provides training, there emerges a significant training gap for workers in occupations prone to automatization in favour of the higher-skilled (Heß et al., 2023; Koster & Brunori, 2021; Müller, 2023). Relatedly, several studies analyse the change of occupational structures and wage inequality in relation to technological change over time. Some of these studies find that firm investments in ICT contributes to wage inequality at the workplace, while favouring the highly-skilled and highly computerised occupations (Hémous & Olsen, 2022; Kristal, 2013; Mouw & Kalleberg, 2010), even though the effect might emerge indirectly through an increased workplace heterogeneity (King et al., 2017).

Overall, the discussed studies provide mixed conclusions on the effect of CET on labour market outcomes. These differences might result from the different institutions



involved in the labour market in the respective countries and the different types and purposes of CET. This study contributes to the literature in two ways: by investigating different intensities of CET, I show whether there exist different effects on wage growth depending on the length of a CET course, which so far, scholars mainly analysed only for the unemployed. Moreover, I analyse the development of the relation between CET and wage growth over time by skill level of a worker, to show if returns have changed for a specific group.

### **5.3 Continuing Education and Training in Switzerland**

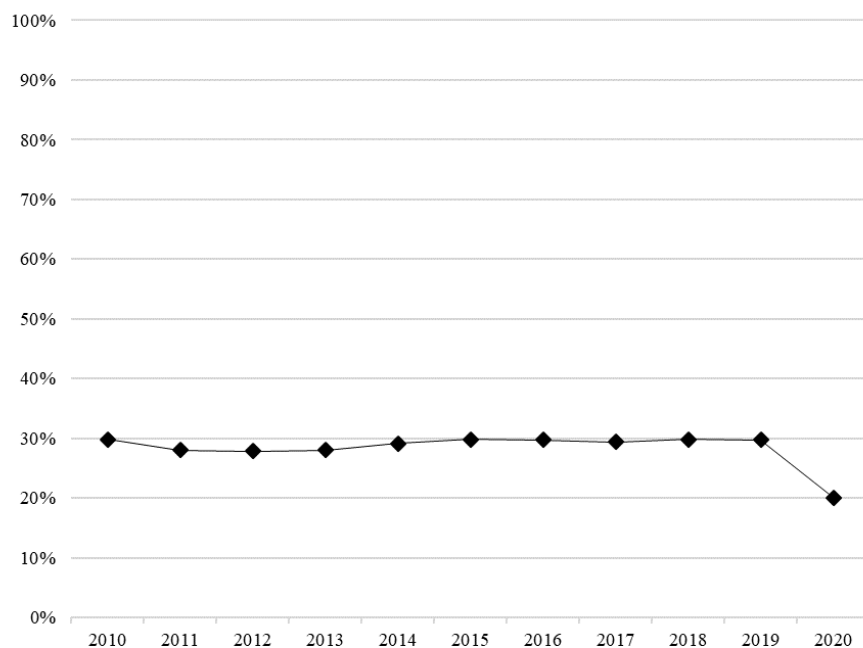
As this study focuses on non-formal education and its effects on labour market outcomes, it is important to outline the distinction to formal education from the onset. The OECD (2021) defines formal education as an activity, which individuals undertake intentionally and which leads to a certification and encompasses clear learning goals. Furthermore, formal education is recognised at the national level, with a more or less high degree of standardisation, and usually is part of primary, secondary or tertiary education levels. Non-formal continuing education and training in most countries is also rather organised and mostly intentional, but does not lead to a widely recognised certificate (Ehlert, 2017).

The OECD describes CET as a complex landscape that is governed by different public and private stakeholders and policy frameworks (OECD, 2021). As it is explicitly designed for work-experienced adults to update and renew their skills to pertain in the labour market, CET best captures the concept of lifelong learning (FSO, 2018b). Within the non-formal education sector, there is mostly no one linear trajectory of courses, as it is the case within the hierarchical formal education system. Furthermore, non-formal education courses are mostly unrelated to formal education programmes, and thus most often do not qualify alone to enter formal education programmes.

The CET landscape in Switzerland is highly diversified with numerous options for different target groups (CSRE, 2018). The Swiss Federal Statistical Office (FSO) states that CET involves “institutionalised, deliberate education, planned by an education provider outside the formal education system” (FSO, 2018b, p. 23). CET can encompass a variety of contents targeted at adults, such as language or software courses, conferences, seminars, or on-the-job-training. Such offers can be of small extents with no certification but also appear in the form of longer, in-depth programmes with certification (Ebner & Ehlert, 2018).

The SLFS shows for the time period 2010-2020 that on average, 29% of the working population participated in CET (Figure 5.1).

**Figure 5.1:** Participation in continuing education in Switzerland 2010-2020



*Notes:* Share of the working population participating in continuing education four weeks before being surveyed. The dip in 2020 is rooted in the COVID-19 pandemic. Source: Own illustration based on SLFS (2010-2020).

The CSRE (2023) calculates in the most recent Swiss national education monitoring report, the vast majority (i.e., around 87%) of CET activities of the employed population in 2021 was work-related. As in many other OECD countries, participation in CET in Switzerland depends on an individual's level of education, employment status and job position and occupation (FSO, 2022). Consequently, the higher the formal level of education, the more frequently a person engages in CET (FSO, 2022).

## **5.4 Data and Variable Selection**

### **5.4.1 The Swiss Labour Force Survey**

I use data from the Swiss Labour Force Survey (SLFS) to undertake this analysis. The SLFS is a representative panel initiated in 1991. It provides information on the labour force structure and labour force behaviour of the Swiss population, more precisely on current or previous employment, unemployment, retirement, working conditions, occupation, income, job search, occupational mobility, but also on formal and non-formal education, the composition of the household and on demographic characteristics. This survey constitutes the main information provider on employment-related topics. Residents – nationals and foreigners – in Switzerland above 15 years are eligible to participate in the SLFS.

For this study, I use a sub-sample of the SLFS. As the questionnaire has changed from 2010 and again from 2021 onwards<sup>29</sup>, I restrict the data to the time period between 2010 to 2020. As of 2010, each selected individual gives four interviews over the course

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<sup>29</sup> The first relevant change is the survey mode, i.e., the change from annual to quarterly interviews. The second change concerns the question on CET from 2021 onwards, where CET activities are surveyed for a different time frame. Furthermore, as there was a remarkable decline in CET activities in 2020 due to the COVID-19 pandemic, I reasonably exclude survey periods after 2020 from the analysis.

of 15 months and then leaves the panel.<sup>30</sup> Furthermore, I transform the longitudinal structure of the panel to obtain one cross-section per individual by introducing time-lagged variables. I do so because information on annual wage and thus the dependent variable ‘wage growth’ – which I describe in a later section – is available twice, i.e., in the first and the third survey wave. I rely on CET activities of individuals from the first two survey waves. Hence, I estimate the effect of CET on wage growth nine months after CET activities took place.<sup>31</sup> I rely on previous empirical studies that state that investigating short-term effects of CET on wage growth is reasonable (Dieckhoff, 2007; Pischke, 2001). Furthermore, estimating the short-term effects of CET on wage growth allows me to plausibly exclude firm-switching – another potential outcome of CET activities and thus a source of wage growth.

Before performing the analyses, I impose further restrictions on the sample. I limit the data to employed individuals, i.e., I exclude unemployed persons and those in upper-secondary vocational education and training. Furthermore, the analytical strategy combined with this specific data structure requires that there be at least three observations per individual, meaning that individuals with fewer observations drop out. The final analytical sample consists of 114,908 observations.

#### **5.4.2 Dependent variable**

I use a worker’s wage growth as my dependent variable. Wages are available only twice per person, i.e., in the first and the third survey wave. I use the imputed variable by the Swiss federal statistical office (FSO), who transformed the indications of wages to gain

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<sup>30</sup> While the survey followed annual conduction from 1991 to 2009, its structure was fundamentally revised, and it now surveys individuals on a quarterly base since 2010. Furthermore, the sample experienced a substantial increase in size, and now consists of 126,000 interviews per year.

<sup>31</sup> There are three months between the first and the second survey wave, and also between the third and the fourth survey wave. Between the second and the third, there are nine months. This procedure results in 15 months of panel time per individual.

information on annual wages.<sup>32</sup> I take the natural logarithm of the value to standardise the wage and to display relative changes to the worker's wage level. Furthermore, I calculate wages for full-time equivalents.

I define  $t$  and  $t_{-1}$  as my time periods of interest. The index  $t$  represents the third survey wave, and  $t_{-1}$  denotes the end of the second survey wave, i.e.,  $t$  minus nine months. Wage growth denotes the previous wage subtracted from the current wage, i.e.,  $\ln wage_{i,t} - \ln wage_{i,t-1} = \Delta \ln wage_{i,t}$ . As the values of the first and 99<sup>th</sup> percentile are implausible, I set these values to missing (Balestra & Backes-Gellner, 2017).

Using wage growth instead of current wage has several advantages. For one, by focusing on wage growth, we can mitigate (but not completely remove) the impact of individual characteristics, i.e., selection bias through omitted variable bias, which influence wage levels. Unlike wage levels, wage growth has no fixed effect. This allows for a more accurate analysis of the factors affecting changes in wages rather than the level of wages themselves. Second, I address the issue of reverse causality by regressing wage growth on CET activities from the previous period.

### 5.4.3 Explanatory variables

The explanatory variables are a worker's CET activities. As engagement in CET activities is not systematically documented in Switzerland, all available information on the population's CET is self-reported.<sup>33</sup> Individuals in the SLFS report their CET activities retrospectively, i.e., the questions state as follow: "during the last four weeks, did you attend any CET courses?" and "during the last four weeks, how many hours in total did you spend on CET courses?".

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<sup>32</sup> The FSO do so because some individuals indicate hourly wages, and others indicate monthly wages.

<sup>33</sup> The case is different for formal education, where formal education participation in Switzerland is documented by the federal statistical office via the individual's old age and survivor's insurance number.

Information on participation in CET and the number of hours for CET is available in every survey wave. I summarise all CET activities of a worker at the end of the second survey wave, i.e., at  $t_{-1}$ . Drawing on this information, I construct two explanatory variables. To undertake a differentiated analysis, these variables illuminate the different intensities with which CET can be pursued. The two CET and explanatory variables are:

- 1) *Participation in CET*  $i_{i,t-1}$ : this variable is based on a binary variable that measures whether an individual participated in CET at  $t_{-1}$ :
- 2) *Length of CET course*  $i_{i,t-1}$ : based on the question how many hours an individual spent in a CET course, this variable has three categories: 0 (no CET), 1 (1-12 hours) and 2 (more than 12 hours).

Introducing this differentiation allows me to estimate the effect by the extensive (participation) and the intensive margin (intensity or length) of a worker engaging in CET. I exclude those who indicate implausible values for the hours of training during the last four weeks, i.e., I set to missing values above 250 hours in total during the four weeks prior to the interview.

#### **5.4.4 Heterogeneity by skill level**

To test my second and third hypothesis, I investigate heterogeneity by skill level of a worker. Many data sources, such as the SLFS, do not contain direct measures of skills.<sup>34</sup> Therefore, I approximate skills with two variables, which the empirical literature frequently uses (e.g. Oesch & Rodríguez Menés, 2011; Spitz-Oener, 2006). These proxies are based on the education level and the skill level of the occupation, respectively, which are included in the SLFS:

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<sup>34</sup> Triventi and Barone (2014) find that introducing a direct measure of cognitive skills does not affect the size of the main coefficient. Thus, it is reasonable to approximate skills with indirect measures.

- 1) *Tertiary education* $_{i,t-1}$ . This variable uses the International Standard Classification of Education ISCED-11. I generate the variable ‘tertiary education of a worker’, where the value 1 comprises all individuals with a tertiary education (including those with a doctorate), – i.e., levels six to eight on the ISCED – and 0 encompasses all individuals with education below the tertiary level.
- 2) *High – skilled occupation* $_{i,t-1}$ . This variable uses the one-digit International Standard Classification of Occupations ISCO-08. According to the International Labour Organization ILO (2012), Managers, Professionals, Technicians and Associate Professionals (categories 1 to 3) are classified as high-skilled occupations. I code the binary variable ‘high-skilled occupation of a worker’ such that these three ISCO-categories are subsumed under the value 1, while other occupations comprise the lower-skilled group of workers, i.e., the value 0.

The data show – as expected – that a worker having a tertiary education and a high-skilled occupation correlate significantly. A principal component factor analysis confirms that these two variables load onto the same factor (Table D.20 and Table D.21 in Appendix D), allowing me to generate a binary variable ‘high-skilled worker’, which takes the value 1 if a worker either completed tertiary education or has a high-skilled occupation. I use this variable in a test of the baseline regressions to check whether it yields similar results to the two separate variables. To further test the robustness of these indicators as skill proxies, I use specifications with the worker’s wage as another skill proxy. The section ‘Robustness of Results’ describes the results of these robustness tests.

As we know from previous empirical studies (e.g., from Switzerland), the highly-skilled are more likely to take up CET (Denzler et al., 2022; Gerfin, 2004; Schwerdt et

al., 2012). To illustrate that this is the case also for the individuals surveyed in the SLFS, Table 5.1 displays the means of the two CET variables by skill proxy and two-sample t-tests of difference in means to illustrate whether they significantly differ by skill level. We see that the two groups significantly differ in all respects, i.e., that the highly-skilled in this sample are more actively engaging in CET.

**Table 5.1:** Summary statistics of CET variables by skill proxy

<b>CET Variable</b>	<b>Worker with below tertiary education</b>	<b>Worker with tertiary education</b>	<b>Difference</b>
Participation in CET	0.26	0.4	0.15***
Length of CET course			
No CET	0.83	0.73	0.1***
1-12h	0.09	0.13	0.04***
12h +	0.08	0.14	0.06***
N of observations	63,955	50,953	
	<b>Occupation with lower skill demand</b>	<b>Occupation with higher skill demand</b>	<b>Difference</b>
Participation in CET	0.23	0.4	0.17***
Length of CET course			
No CET	0.85	0.73	0.12***
1-12h	0.08	0.13	0.05***
12h +	0.07	0.14	0.07***
N of observations	53,579	61,329	

*Notes:* Summary statistics (means of CET variables) and results of two-sample t-tests. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: SLFS 2010-2020. N= 114,908.

Note that whether a worker has tertiary education or works in a high-skilled occupation is often prone to selection bias, because we frequently cannot measure the underlying abilities, which lead them to enter this level of education or type of occupation. However, I do not use these characteristics as a proxy for underlying abilities, but the stock of human capital a worker has. In line with human capital theories, I thus argue that CET courses do not (only) require skills upon the entry to the education or occupation, but that the courses create and build skills and therefore a worker's human capital.



### 5.4.5 Empirical Strategy

I use ordinary least squares to estimate the effect of  $CET_{i,t-1}$  on  $\Delta \ln wage_{i,t}$ . I use a dummy variable for each survey year to account for time-related effects, and a vector of control variables. The model for the baseline regressions look as follows:

$$\Delta \ln wage_{it} = \beta_0 + \beta_1 CET_{i,t-1} + \beta X_{i,t-1} + \alpha_t + \varepsilon_{i,t} \quad (3)$$

Where  $\Delta \ln wage_{it}$  is the outcome variable that measures the individual wage growth of a worker.  $CET_{i,t-1}$  is a placeholder for each of the two the explanatory variables, which capture CET activities.  $\beta_1$  thus represents the coefficient of interest.  $X_{i,t-1}$  is a vector of control variables that includes worker and firm characteristics measured at  $t_{-1}$  – the time of CET participation.  $\alpha_t$  are the year dummies, and  $\varepsilon_{i,t}$  is the error term. The vector of control variables,  $X_{i,t-1}$ , measures characteristics of a worker and the firm or organisation they work for. Table 2 displays a description of each variable, while Table D.1 in the Appendix D displays their summary statistics. As the index  $t_{-1}$  already indicates, all control variables were measured at the time of participation in CET.

**Table 5.2:** Description of covariates in the estimated regressions

<b>Variable</b>	<b>Description</b>	<b>Literature</b>
<i>Employment variables</i>		
Temporary contract	binary	Ehlert (2017)
Tenure in firm	3 categories	Pischke (2001)
Leadership position	binary	Gerfin (2004)
Part-time employment (less than 90%)	binary	Pischke (2001)
<i>Firm variables</i>		
Firm size	3 categories	O’Connell and Byrne (2012)
Region of firm residence	7 categories	Wolter and Schiener (2009)
Industry sector	21 categories	Li et al. (2000)
<i>Demographic variables</i>		
Age	5 categories	Görlitz (2011)
Female	binary	Görlitz (2011)
Swiss nationality	binary	Ebner and Ehlert (2018)
Civil status: married	binary	Denzler et al. (2022)
Household size	continuous	Ebner and Ehlert (2018)
<i>Skill proxies</i>		
Tertiary education	binary	Dieckhoff (2007)
High-skilled occupation	binary	Ruhose et al. (2019)

Notes: List of covariates, their description and reference to the literature. Source: SLFS 2010-2020.

To analyse heterogeneity in effects of CET on wage growth, I estimate the same linear regressions as in Eq. (3) but include the interaction term  $CET_{i,t-1} * Skill_{i,t-1}$ , where  $Skill_{i,t-1}$  stands for one of the two proxies that measure skills, i.e., the education level and skill level of the occupation. Furthermore, to investigate the change over time, I estimate Eq. (3) with sample splits for each year between 2011 and 2020.<sup>35</sup>

This wage equation is similar yet different to the traditional Mincer wage equation. The difference is that – because this information is missing in the data – I omit the continuous and the squared term for work experience, which in my estimation is only represented by the inclusion of variables such as age and tenure in firm. Similarly to the updated Mincer wage equation, Eq. (3) includes a number of other independent variables, which are shown to affect a worker’s wage, and thus potentially wage growth (Polachek, 2008).

<sup>35</sup> Note that as my analytical period starts in 2010, I cannot estimate the effect of CET activities from 2009 on wage growth between 2009 and 2010.

## 5.5 Results

The following section presents the results of baseline regressions and heterogeneity analyses. Table 5.3 displays the results of baseline regressions of the dependent variable wage growth on the two CET variables. I estimate separate models for each explanatory variable. I run two estimations for each explanatory variable separately, with the first including only survey years as controls, and the second including the full set of covariates. Models (1), (3) and (5) display estimations with only year dummies, while models (2), (4) and (6) include all control variables. Table D.1 in Appendix D includes the full list of covariates.

### 5.5.1 Baseline Regressions

The results for the baseline regressions show that both explanatory variables have a positive significant effect on wage growth. The first explanatory variable – ‘participation in CET’ – has a positive significant effect on wage growth by 0.4% in the full model (2). The second explanatory variable, which differentiates between shorter and longer CET courses, only has positive significant effect for its second category, i.e., for long CET courses. Long CET courses lead to a positive annual wage growth of 0.4% (model 6) compared to not participating in CET. I do not find an effect on wage growth when a worker participates in a short CET course. Furthermore, the covariates also show the expected sign of their effects, highlighting the credibility of the estimated models. The full results table is listed in the Appendix D, Table D.2.

Thus, the baseline regressions provide evidence for hypothesis H1a, which states that CET has a positive effect on wage growth and for H1b, which states that longer CET courses have a larger positive effect than shorter CET courses.

**Table 5.3:** Effect of CET on annual wage growth

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.005*** (0.001)	0.004*** (0.001)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.001 (0.002)	0.001 (0.002)
Long CET course			0.007*** (0.002)	0.004** (0.002)
<i>Survey years</i>	Yes	Yes	Yes	Yes
<i>Employment variables</i>				
Temporary contract		0.030*** (0.004)		0.030*** (0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003* (0.002)		-0.003* (0.002)
8 years and more		-0.007*** (0.002)		-0.007*** (0.002)
Working part-time		-0.014*** (0.002)		-0.014*** (0.002)
In leadership position or self-employed		-0.003** (0.001)		-0.003** (0.001)
High-skilled occupation		0.001 (0.001)		0.001 (0.001)
<i>Firm variables</i>				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002 (0.002)		-0.002 (0.002)
100+		-0.003 (0.002)		-0.003 (0.002)
Industry sector		Yes		Yes
Region of firm residence		Yes		Yes
<i>Demographic variables</i>				
Tertiary education		0.004*** (0.001)		0.004*** (0.001)
Female		0.006*** (0.002)		0.006*** (0.002)
Age				
15-24		Ref.		Ref.
25-39		-0.013*** (0.004)		-0.013*** (0.004)
40-54		-0.025*** (0.004)		-0.025*** (0.004)
55-64		-0.030*** (0.004)		-0.030*** (0.004)
65		-0.019 (0.012)		-0.019 (0.012)

Swiss nationality	0.000 (0.001)		0.001 (0.001)	
Married	-0.003* (0.001)		-0.003* (0.001)	
Household size	0.001 (0.001)		0.001 (0.001)	
<b>N of observations</b>	114,908	114,908	114,908	114,908
<b>R<sup>2</sup></b>	0.000	0.006	0.000	0.006

*Notes:* Results of linear regressions of wage growth on CET variables with robust standard errors in parentheses. Models (1) and (3) include year dummies, models (2) and (4) all control variables as defined in Table D.1. \*=10%, \*\*=5%, \*\*\*=1% significance. Data source: SLFS 2010-2020.

### 5.5.2 Heterogeneity by skill level

The following sections outline the results of the heterogeneity analyses. In a first step, I test whether the effect of the explanatory variables differs by skill level of a worker. By interacting the explanatory variables with two proxies for a worker's skill level, I show whether there exists heterogeneity regarding wage growth for these different groups of workers when they engage in CET. These analyses serve to test my second set of hypotheses, H2a and H2b. Table D.3 and Table D.4 in Appendix D show the full results tables.

In a second step, to investigate potential changes in effect by skill level over time, I estimate models with sample splits by survey year and the same interaction terms as in Table 5.4 and Table 5.5. This final set of estimations serve to test my hypothesis H3. Table D.5 through Table D.12 in Appendix D show the respective results tables.

The following tables include different specifications; models (1), (3) and (5) are models with only year dummies, models (2), (4) and (6) include all covariates.

### 5.5.3 Tertiary educated workers

The first heterogeneity analysis focuses on the education level as a proxy for the skill level of a worker. Here I distinguish between workers who completed tertiary education (and above) and those with lower levels of education. Table 5.4 displays the results for linear regression models, which include the two CET variables and the level of education

of a worker as interaction terms. I again estimate baseline models with only the year dummies as covariates, and full models with the same covariates as in the baseline regressions.

Table 5.4 shows that there is no presence of an interaction effect for the highly-skilled, i.e., those with a tertiary education or above in any of the six models. I detect no statistically significant results (except for short CET courses, which are only significant at the 10%-level), but the effects are negative in qualitative terms. Furthermore, the baseline effects of the CET variables are significantly positive for the variable ‘participation in CET’. The variable ‘length of CET course’ has no effect in the full model. These baseline effects represent the effect for those without a tertiary education. Thus, workers with lower skill levels experience a positive effect when engaging in CET, the effect sizes are even comparable to the baseline effects of workers with tertiary education who do not participate in CET. Consequently, the analysis of the first proxy for skill levels provides evidence in support of H2a, which states that workers with lower skill levels profit more from CET than higher-skilled workers.

**Table 5.4:** Heterogeneity by skill level – tertiary education

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.006*** (0.002)	0.005*** (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.004 (0.003)	0.004 (0.003)
Long CET course			0.007** (0.003)	0.005 (0.003)
Tertiary education	0.008*** (0.001)	0.006*** (0.002)	0.008*** (0.001)	0.005*** (0.002)
Participation in CET # Tertiary education	-0.004* (0.002)	-0.004 (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course # Tertiary education			-0.007* (0.004)	-0.007* (0.004)
Long CET course # Tertiary education			-0.002 (0.004)	-0.000 (0.004)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
<b>N of observations</b>	114,908	114,908	114,908	114,908
<b>R<sup>2</sup></b>	0.000	0.006	0.000	0.006

Notes: Results of linear regression with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

### 5.5.4 Workers in higher-skilled occupations

Table 5.5 displays the results for the second proxy for skills, i.e., whether a worker works in a high-skilled occupation or not. I again included this binary variable in an interaction term with the explanatory variables separately. When including the occupation of a worker as a proxy for skills, the results are very similar to when including the level of education. Hence, these two variables likely provide a similar skills measure, as also shown by the PCF analysis. The estimations yield no significant effect for the interaction terms with the skill proxy and the respective CET variable in the full models. Hence, workers in high-skilled occupations do not profit from engaging in CET. The baseline effects – i.e., the effects for workers from a lower-skilled occupation engaging in CET – are positive, with the baseline effect of ‘participation in CET’ on wage growth being

significant at a 1%-level. Thus, this analysis too provides evidence in favour of hypothesis H2a.

**Table 5.5:** Heterogeneity by skill level – high-skilled occupation

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.008*** (0.002)	0.006*** (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.002 (0.003)	0.002 (0.003)
Long CET course			0.009*** (0.003)	0.004 (0.003)
High-skilled occupation	0.006*** (0.001)	0.002 (0.002)	0.005*** (0.001)	0.001 (0.002)
Participation in CET # High-skilled occupation	-0.006** (0.003)	-0.004* (0.003)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course # High-skilled occupation			-0.003 (0.004)	-0.002 (0.004)
Long CET course # High-skilled occupation			-0.003 (0.004)	-0.000 (0.004)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
<b>N of observations</b>	114,908	114,908	114,908	114,908
<b>R<sup>2</sup></b>	0.000	0.006	0.000	0.006

*Notes:* Results of linear regression with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Taken together, the results show that workers with higher skill levels do not profit significantly from engaging in CET activities. Workers with lower skill levels, in turn, profit significantly from pursuing CET in some instances. Hence, these analyses provide evidence in support of H2a rather than in support of H2b, and thus supporting traditional HCT predictions over the predictions of the SBTC hypothesis.

### 5.5.5 Change over time in the effect of CET on wage growth by skill level

As a last heterogeneity analysis, I investigate the change over time in the returns to CET for workers depending on their skill level. To this end, I use sample splits by each year within the analytical period, where I include the aforementioned interaction terms as in

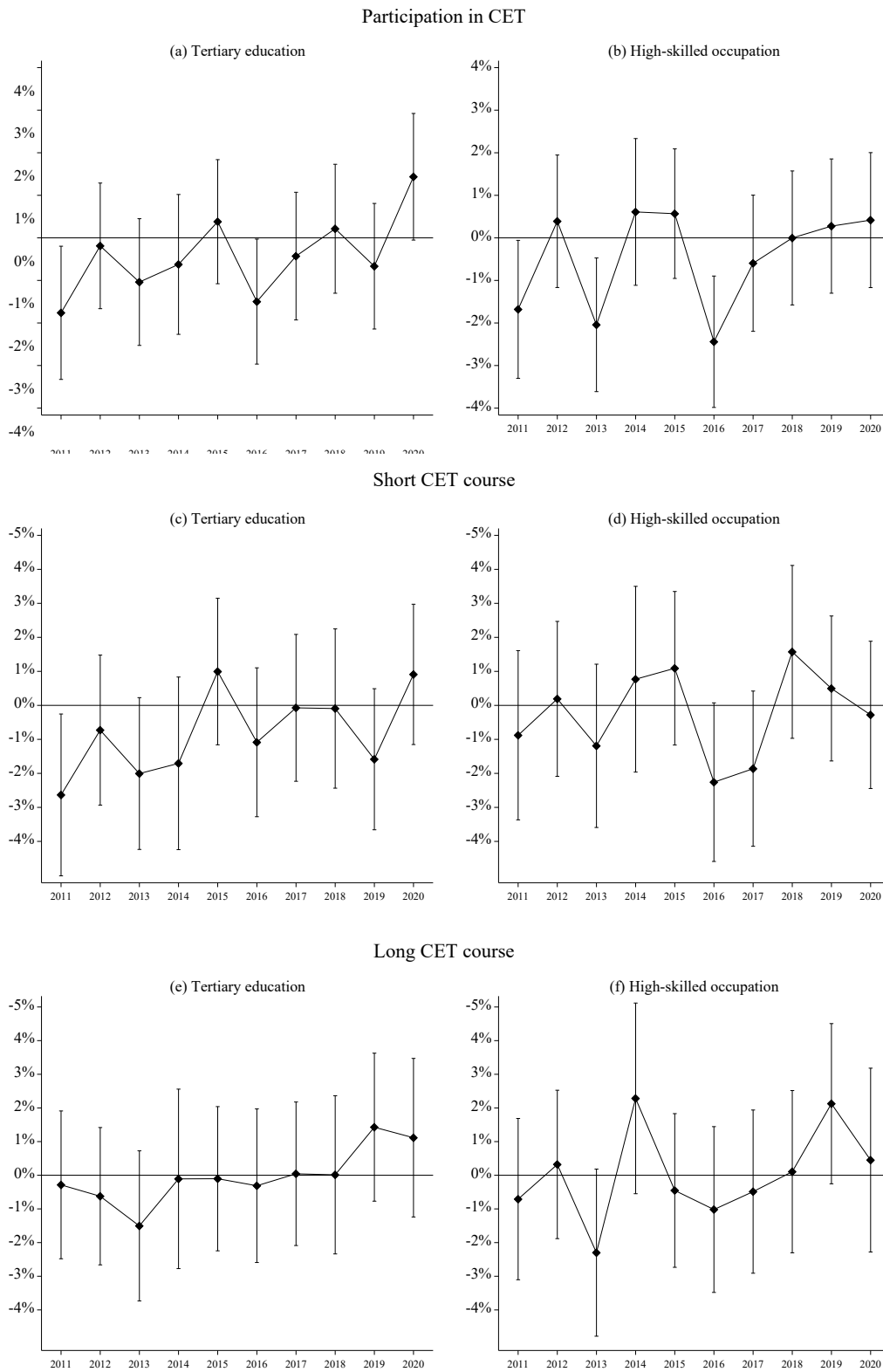


the previous heterogeneity analyses to account for the different skill levels of the workers. To efficiently illustrate the change over time, Figure 5.2 and Figure 5.3 include average marginal effects (AME) with 95% confidence intervals of the two CET variables at the respective skill level of a worker for each time period. I include a single plot for each explanatory variable and each proxy for a worker's skill level.

I first focus on the effects over time for the highly-skilled, i.e., those with tertiary education and in higher-skilled occupations. In Figure 5.2 the first two plots display the change over time for the variable 'participation in CET'. For tertiary educated workers, there seems to be a stable AME over time, except for the first and last point in the timeline, where there is a larger difference detectible. For workers in high-skilled occupations, the AME of participating in CET displays some trendless fluctuations in the first half of the decade, while the effect seems to stabilise in the second half of the decade. For both, the AME moves closely around zero within this time period, and rarely deviates significantly from zero, as the confidence intervals depict.

For the second variable, 'length of CET course', I provide two separate plots for the two non-zero categories of the variable. When focussing on short CET courses and its AME on wage growth for the highly-skilled, we see that over time, there is a slightly positive trend, for tertiary educated workers with some fluctuations. For workers in high-skilled occupations, the AME overall seems to move around zero, with some outliers in the second half of the decade. Again, the AMEs are not significantly different from zero. Similarly, long CET courses show no statistically significant effect. The AME varies more strongly for each time period for both skill proxies.

**Figure 5.2:** Effect of CET on wage growth over time for higher-skilled workers

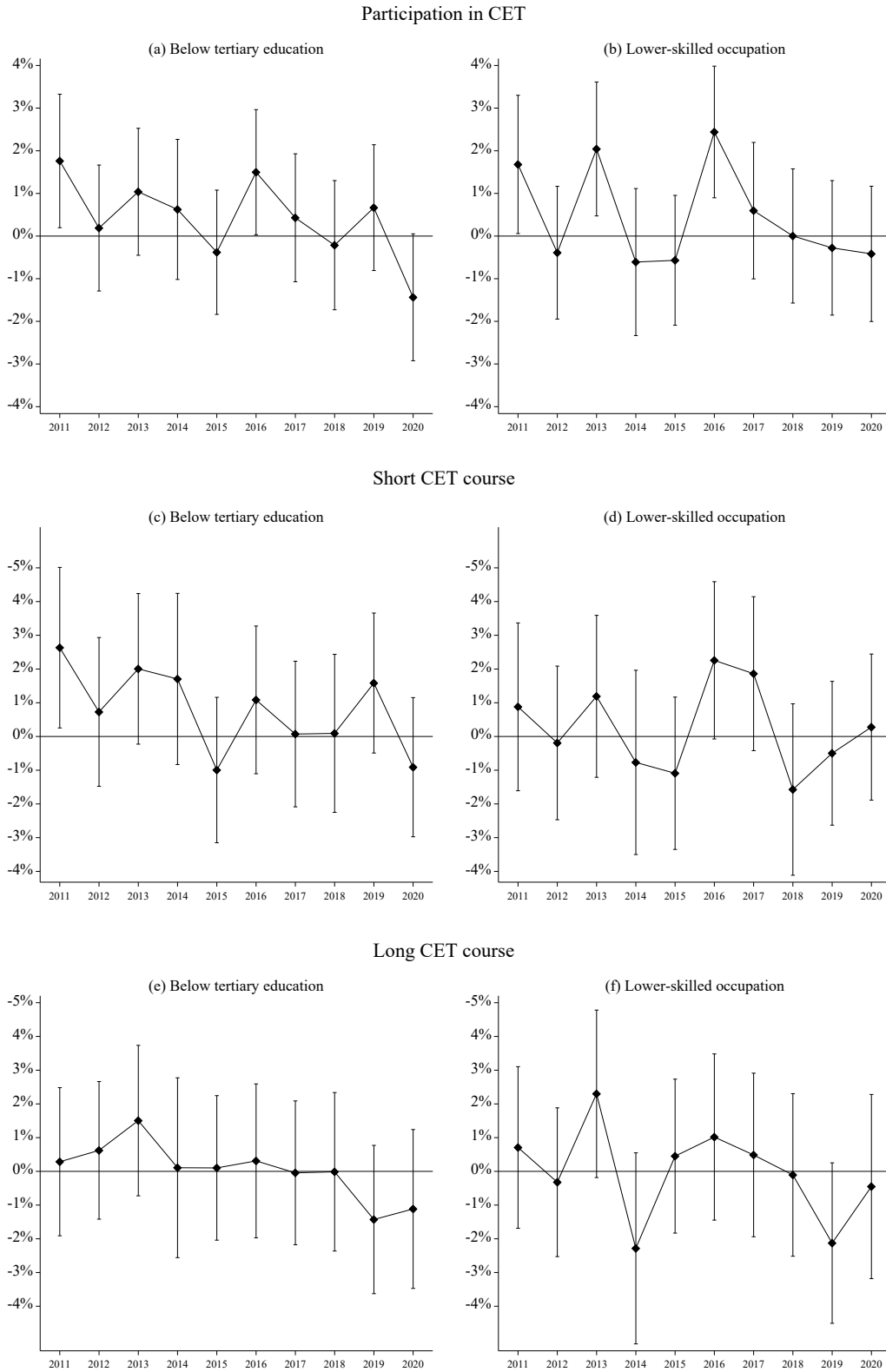


*Notes:* Plots of linear regression results. Plots display average marginal effects (point estimates) and 95%-confidence intervals by survey year. N per year=11'000. Source: own illustration based on SLFS 2010-2020.

When turning to Figure 5.3 and the AME over time for the lower-skilled, we see that the trend points towards a slight negative trend in AME of the two CET variables. The first variable ‘participation in CET’ shows strong fluctuations for both skill proxies, with a slight downward trend. For workers with education below the tertiary level, the AME are almost always close to zero, with statistically significant deviations from zero only in three time periods. For workers in occupations with lower skill demand, there are strong fluctuations over this time period, with a downward trend in the second half of the decade.

The second variable, ‘length of CET course’, shows strong fluctuations for both categories and both proxies. Short CET courses for workers with education below tertiary level almost always have a positive AME, which are mostly not significant, except for two years. Short CET courses for workers in lower-skilled occupation show no clear trend in AME. Long CET courses for workers with education below tertiary level have mostly positive but not significant AME on wage growth, with a slight negative trend in the second half of the decade. For workers in lower-skilled occupations, there are some stronger fluctuations in effect, with only two statistically significant effects over this time period.

**Figure 5.3:** Effect of CET on wage growth over time for lower-skilled workers



*Notes:* Plots of linear regression results. Plots display average marginal effects (point estimates) and 95%-confidence intervals by survey year. N per year= $\sim$ 11'000. Source: own illustration based on SLFS 2010-2020.

Overall, an analysis over this time period provides no compelling evidence regarding hypothesis H3. Nonetheless, for most variables for the highly-skilled, there is a slight upwards trend detectible, while the trends for the lower-skilled are slightly negative. As most effects remain close to zero and deviations from zero are only occasionally statistically significant, the estimations with sample splits provide no intuitive evidence regarding a trend in the effect of CET on wage growth over time. Hence, I turn to a three-way interaction of the CET variables, the skill proxies and the survey years (included as a continuous variable) to make statements on the slope of the time period variable as a function of the interaction of CET activities and a worker's skill level. Table D.13 and Table D.14 in Appendix D show these three-way interactions for the highly-skilled.

The three-way interactions illicit that the effect is different for each skill proxy. When using the education level (tertiary vs. below tertiary) the interaction effect is significantly positive for the workers with tertiary education. In turn, when turning to the interaction with the proxy 'higher-skilled occupation', the effect is positive but not significant. Hence, I find some evidence to support hypothesis H3, which states that over time, the effect of CET on wage growth has grown more positive for the highly-skilled than for the lower-skilled.

### 5.5.6 Robustness of Results

To assess the robustness of the results, I estimate several further regressions for both the baseline and the heterogeneity analyses: 1) For the baseline regressions, I present results for estimations with absolute wage values and for estimations where I regress the worker's current wage on the CET variables and the lagged dependent variable. 2) For the heterogeneity analyses, I replace the interaction terms with sample splits and replace the two proxies. 3) Furthermore, to account for distortions caused by outliers in the CET variables, I further estimate linear regressions where I exclude high rates of CET activities. Appendix D includes all tables of the robustness tests discussed in this section.

As Table D.15 illustrates, when estimating regressions with absolute values of wage growth as a dependent variable, the effects are almost identical to the main results. For the variable 'length of CET course', the second category is only significant at the 10%-level in the full model.

Estimating models with a lagged dependent variable (LDV) constitutes the second robustness test for the baseline regressions. Regressing a worker's current wage ( $wage_{it}$ ) on the LDV  $wage_{it-1}$  allows for controlling for unobserved heterogeneity, as an individual's previous wage is highly indicative of their ability and therefore their skill level. Table D.16 shows that the effects for the explanatory variables are qualitatively similar but larger in effect size compared to the effects from the main models.

The explanatory variable 'length of CET course' is based on the question on how many hours were spent on CET during the last four weeks prior to the interview. Reporting training in hours in hindsight might be difficult, resulting in a variable with much noise. Therefore, I also test whether outliers of individuals who are highly engaged in CET affect the main estimates. Table D.17 displays the results of this robustness test. This

test only concerns the variable ‘participation in CET’, as ‘length of CET variable’ already distinguishes between high and low CET intensity<sup>36</sup>. Thus, I restrict observations to individuals participating only one survey wave in total. As Table D.17 shows, the results for the variable ‘participation in CET’ are almost identical to the results of the main models.

To test the robustness of the heterogeneity analyses for the different effects by skill level, I estimate the baseline regressions with sample splits by skill level. Table D.18 and Table D.19 display the results of linear regressions with sample splits. The highly-skilled experience almost no significant positive effects, irrespective of the operationalisation of CET, meaning that the positive returns to CET remain with the lower-skilled workers, confirming the main models for the heterogeneity analyses. I also estimate regressions where I interact the variable ‘higher-skilled worker’ (see section ‘Heterogeneity by skill level’) with the two CET variables. As Table D.22 shows, the results are similar to the results with the two proxies included separately.

Within the human capital theory framework and the empirical evidence, the effect is heterogeneous depending on the nature of CET, i.e., whether it is firm-specific/employer-initiated or general (see e.g. Muehler et al., 2007; O’Connell & Byrne, 2012). The SLFS includes information on whether individuals engage in CET for private reasons or for work-related reasons. I estimate the same OLS regressions as in the main models, but with a reduced sample by the variable ‘CET for work-related or private reasons’, comparing a model with and without said variable.<sup>37</sup> Results (Table D.23) show that neither the variable ‘length of CET course’ nor the variable ‘CET for work-related or private

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<sup>36</sup> I already excluded implausible values for this variable, as described in the section ‘Explanatory variables’.

<sup>37</sup> Note that these tests are only possible for the variable ‘length of CET’, as the variable ‘CET for work-related or private reasons’ is filtered by ‘participation in CET’.

reasons' have an effect on wage growth in any of the models. Consequently, the reduction of the sample size presumably drives the changes in effect.

Nevertheless, the variable 'CET for work-related or private reasons' does not provide us with information on whether the respective CET course is general or work-related, i.e., the more relevant distinction for this analysis.<sup>38</sup> However, Bills and Hodson (2007) argue that CET generally enhances skills, whereas it is not clearly distinguishable whether these skills are general, transferable or for private use only or whether they are useful for the current employment of the worker. Similarly, there is no information in the SLFS on who financed the CET course(s)<sup>39</sup>. This lack of information hence does not allow for estimating models including the costs of CET.

#### **5.5.7 Is there a selection bias to the returns to CET?**

As Heckman (1974) illustrated, there is a selection bias to which wages we can observe in the labour force. Individuals – and in Heckman's case study especially women – whose reservation wages are higher than the expected wage rate from employment usually opt out of the labour market because the benefits from engaging in non-work activities are higher. To test whether this is the case in this sample of the Swiss labour force, I estimate a Heckman two-step model to account for this selection bias. The SLFS data include information on unemployed individuals, allowing to test for the likelihood of employment in a first step, with a person having children under 15 years as an instrument (leaning on Leuven & Oosterbeek, 2008). As expectedly women are more likely to leave the labour market when caring for young children – due to wage penalties and weaker career prospects (Oesch et al., 2017) –, I interact the instrument with the gender of the surveyed

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<sup>38</sup> Additionally, the SLFS does not strategically categorise the content of the attended CET courses.

<sup>39</sup> The Swiss Federal Statistical Office conducts a different panel, which focuses on formal and non-formal education of the Swiss population and which includes this information. This survey is conducted in a five-year interval.



individual. Table D.24 in Appendix D displays the results of this test. I find that the instrument, i.e., having children below 15 years, has a significant positive effect on labour market participation in both specifications. This effect, however, is different for men and women, i.e., that the interaction effect with the instrument and gender is highly and significantly negative. Thus, women with children are less likely to remain in the labour market. However, the inverse mills ratio is insignificant for all specifications, meaning that there is no selection bias in the effect of CET.

## **5.6 Discussion and Conclusion**

Technological change has transformed the labour market profoundly, around the globe, but especially in knowledge societies. Processes such as automatization and digitalisation reshape occupational profiles and create new career pathways. However, it also puts workers at risk of skills depreciation and requires them to update their skills to prevail in the labour market. Continuing education and training, thus, is specifically designed for individuals who want to acquire new skills to further their career and adapt to changes in the labour market.

This study investigates the effect of CET on a worker's short-term wage growth. I use representative Swiss panel data between 2010 and 2020 to first estimate the effect depending on the length of a CET course, and second, changes in effect over time depending on the skill level of a worker. Hereby, I use two variables, i.e., 'participation in CET' and 'length of CET of course'. I find that both variables have a positive effect on a worker's wage growth, especially longer CET courses, for which there seems to be no lock-in-effect. Furthermore, the results show that mainly workers with lower skill levels – i.e., with lower levels of education and within occupations with lower skill demand – profit from CET (corroborating the findings of e.g. Doerr et al., 2017). These results are

in line with the previous empirical evidence, which finds that CET has a small short-term effect on wages or wage growth (e.g. Görlitz, 2011; Leuven & Oosterbeek, 2008; Ruhose et al., 2019). Furthermore, these results provide evidence in support of human capital theories over the SBTC hypothesis.

However, I find slight upward trends for the effects over time for the highly-skilled, and a slight downward trend for the lower-skilled within the analytical period, thereby supporting the assumptions of the SBTC hypothesis. Moreover, studies show that due to technological change, there emerges a ‘training gap’ over time in favour of the highly-skilled (Heß et al., 2023; Koster & Brunori, 2021; Müller, 2023), while this study provides evidence that this group also experienced increasing returns over time.

Moreover, CET might even more fulfil the purpose of job safety or job switch (Ebner & Ehlert, 2018). Workers might use CET to catch up on skills they lack within the current position, or to apply for a new position. Thus, CET then would not have an immediate effect on wage growth, but only later on. Hence, the results presented here might be downward biased. Nevertheless, the short-term horizon of this analysis mitigates possibility of job change. The variable ‘Individual has the same job since last interview’ shows that only very few people (around 2%) change the job during the 15 months of being included in the panel.

The results of the heterogeneity analyses confirm previous empirical studies (e.g. Denzler et al., 2022; Schwerdt et al., 2012; Wolter & Schiener, 2009). There exist several explanations as to why lower-skilled workers stronger profit from CET. Scholars argue that CET might be more specifically targeting the lower-skilled, i.e., that there is no general effect of CET, as in many countries the contents might specifically targets the lower-skilled (see e.g. Doerr et al., 2017). Against this assumption speaks that the highly-skilled

engage most often in CET (CSRE, 2023; Denzler et al., 2022; Schwerdt et al., 2012). As the highly-skilled have diminishing returns to education in general and experience a saturation effect (Wolter & Schiener, 2009), they presumably hope to reap other benefits, such as a larger professional network, or just enjoyment of education (Marginson, 2019). The lower-skilled, in turn, are expected to only take up education if the expected benefits are high as there are high discount rates. Scholars nowadays acknowledge that the benefits of education go beyond an individual's wage and that their wage is not always directly linked to their productivity (Klees, 2016).

The analysis of potential effect changes over time for the highly-skilled shows that the highly-skilled indeed faced a positive trend in returns over time, depending on the skill proxy. According to the third hypothesis, accelerating technological change causes this positive effect. The returns to CET for the lower-skilled have slightly declined over time. Regarding the overall heterogeneity analyses, these results show that the returns to CET for the highly-skilled have caught up to the returns for the lower-skilled. Thus, as hypothesised by the SBTC, the labour market seeks workers with large skill bundles and therefore rewards CET for the highly-skilled. This reasoning might also explain the slightly declining returns for the lower-skilled.

Nonetheless, although the analytical period comprises a decade, a longer period would serve for a more compelling analysis to detect clearer time trends. A recent study by Park et al. (2023) shows that over time, the output of disruptive innovation in many economic sectors has declined between the early 1970s and 2010. Their finding might show that the labour market has less needed to adapt to disruptive changes lately, and that higher returns to CET might be driven by another, unobserved factor.

Naturally, the study design faces certain limitations. With the applied analytical strategy, I am not capable to claim a causal effect of CET on wage growth. While I do find a positive correlation of CET and wage growth, endogeneity issues, such as potentially omitted variables (e.g., for motivation or the purpose of engaging in CET) and also likely measurement error, impede drawing causal conclusions from these estimations. Unfortunately, there exist no instruments or exogenous variation in the non-formal education sector in Switzerland to exploit.

Albeit other studies frequently analysing short-term effects of CET (see e.g. Dieckhoff, 2007), this panel structure only allows for the analysis of a very short-term effect of CET on wage growth. Furthermore, the small share of workers who switch jobs (around 2%) do not allow to measure the effect for job-changers, who often experience an increase in their wage. However, due to this short period, switching jobs becomes less likely, such that omitting this information is less critical.

As there exists no direct measure for a worker's skill level within this data, I rely on approximations to estimate the heterogeneity analyses. And while an individual's occupational class and their education level are commonly used proxies for their level of skills, they provide no perfect measure. Similarly, Spitz-Oener (2006) argues that there exists large within-group variation by level of education or type of occupation regarding skills.

This analysis provides evidence in support of the effectiveness of CET concerning wage benefits. As many studies show that the highly-skilled engage in CET most often, while the lower-skilled so far have benefitted more. Previous studies show that the highly-skilled are more likely to receive CET, especially with increasing technological change, and this study provides evidence that their returns increased as well over time. To ensure

equity in the labour market, policy makers could encourage and financially support firms to invest in their lower-skilled workforce, such that they do not fall behind in a rapidly changing labour market. While formal education might be more effective for job changes or career re-orientation, many workers lack the time to invest in formal education after labour market entry. Thus, creating targeted and longer CET courses, which foster career changes and job safety, are desirable.

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# Appendix



# Appendix A

## A.1 Sample and Population comparison

**Table A.1:** Sample and population comparison

<b>Characteristic</b>	<b>Analytical sample</b>	<b>Population of VET graduates in 2018</b>
Tertiary education: PET	43%	31% <sup>a</sup>
Female	68%	45% <sup>b</sup>
Age	22.5	22
Parents with tertiary education	60%	38%
Born in Switzerland / Swiss nationality	91%	79% (apprentices in 2017/2018) <sup>c</sup>
Residence region		
Central Switzerland	20%	11% <sup>b</sup>
Espace Mittelland	22%	24%
North-Western Switzerland	17%	13%
Zurich	19%	17%
Eastern Switzerland	19%	16%
Geneva	3%	16%
Ticino	0%	4%
Type of completed VET programme		
Engineering	23%	33%
Business	51%	41%
Sciences	4%	6%
Arts	5%	3%
Health and Welfare	17%	17%

*Notes:* The statistics for the population of VET graduates in 2018 stem from the Swiss Federal Statistical Office (FSO). a: FSO (2020), b: FSO (2023b), c: FSO (2019a), d: FSO (2023a).

## A.2 Summary Statistics, Full Results Tables of Baseline and Heterogeneous Effects Estimations

**Table A.2:** Summary statistics of the variables included in the models

	N	Mean	Std. Dev.	Min	Max
<b>Dependent Variable</b>					
Tertiary education: PET	180	0.43	-	0	1
<b>Explanatory Variables</b>					
Subjective information level	180	3.74	0.86	1	5
Misinformation on wage benefits of TE: average	180	12.14	8.09	0.92	61.52
Misinformation on wage benefits: PET	180	10.32	5.73	0.4	28.4
Misinformation on wage benefits: university	180	13.05	10.74	0.58	85.58
Uncertainty about eligibility for TE: overall	180	2.16	1.81	0	7
Uncertainty about eligibility: PET	180	0.55	0.92	0	3
Uncertainty about eligibility: university	180	1.61	1.47	0	4
<b>Control Variables</b>					
Female	180	0.68	-	0	1
Age	180	22.66	3.78	18	35
18-23 years	180	0.71	-	0	1
24-29 years	180	0.21	-	0	1
30-35 years	180	0.08	-	0	1
Parents with tertiary education	180	0.6	-	0	1
Holding a baccalaureate	180	0.15	-	0	1
<b>Additional Control Variables I</b>					
Intention to enrol in tertiary education	180	0.56	-	0	1
Not enough financial resources to take up TE	180	2.88	1.48	1	5
Born in Switzerland	180	0.91	-	0	1
Living with family	180	0.18	-	0	1
Employed	180	0.8	-	0	1
University education among friends/family	180	0.93	-	0	1
PET education among friends/family	180	0.67	-	0	1
<b>Additional Control Variables II</b>					
Residence region					
Central Switzerland	180		Ref.		
Espace Mittelland	180	0.22	-	0	1
North-Western Switzerland	180	0.17	-	0	1
Zurich	180	0.19	-	0	1
Eastern Switzerland	180	0.19	-	0	1
Type of completed VET programme					
Business	180		Ref.		
Engineering	180	0.23	-	0	1
Sciences	180	0.04	-	0	1
Arts	180	0.05	-	0	1
Health and Welfare	180	0.17	-	0	1
<b>Additional Control Variables III</b>					
Relevance of official information sources (5-point Likert scale)	180	2.85	0.77	1	5

*Includes web pages of education providers or of educational counsellors, flyers or leaflets,*

*magazines or newspapers, social media accounts of education providers, counselling appointments, fairs and information events of education providers.*

Relevance of informal information sources (5-point Likert scale)	180	3.06	0.85	1	5
<i>Includes family, friends, colleagues and employers</i>					
How important were the following reasons for taking up TE? (items on a 5-point Likert scale)					
Career upgrade	180	4.01	0.93	1	5
Career change	180	3.13	1	1	5
Recommendations from others	180	2.22	0.98	1	5
Personal interest in pursuing TE	180	4.41	0.8	2	5
Expectation of employer to acquire more education	180	2.16	1.32	1	5
How was the decision-making process?					
How long did the decision-making process take?	180	1.97	1.22	1	5
How stressful was the decision-making process?	180	2.71	1.26	1	5

*Notes:* Table displays summary statistics of the variables included in the regression models.

**Table A.3:** Baseline estimations with aggregated explanatory variables – full results table

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.064 (0.040)	0.056 (0.040)	0.079** (0.040)	0.036 (0.038)
Uncertainty about eligibility	0.039** (0.019)	0.033* (0.018)	0.029 (0.018)	0.034** (0.017)
Misinformation on wage benefits	0.007* (0.004)	0.008** (0.004)	0.012*** (0.004)	0.012*** (0.004)
<b>Control variables</b>				
Female	0.014 (0.073)	0.080 (0.074)	0.133 (0.093)	0.190** (0.090)
Age	0.026*** (0.009)	0.014 (0.011)	0.015 (0.010)	0.009 (0.010)
Parents' tertiary education	-0.229*** (0.061)	-0.206*** (0.062)	-0.229*** (0.057)	-0.231*** (0.055)
Holding a baccalaureate	-0.297*** (0.100)	-0.235** (0.099)	-0.169* (0.099)	-0.143 (0.094)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.087 (0.068)	0.144** (0.067)	0.108 (0.067)
Not enough financial resources		-0.024 (0.022)	-0.041* (0.021)	-0.017 (0.023)
Born in Switzerland		-0.012 (0.126)	0.003 (0.118)	-0.023 (0.097)
Living with family		0.203** (0.093)	0.184* (0.098)	0.150 (0.096)
Employed		0.133 (0.089)	0.178** (0.090)	0.119 (0.096)
University education among friends/family		-0.242* (0.127)	-0.313** (0.127)	-0.339*** (0.121)
PET among friends/family		0.079 (0.076)	0.107 (0.072)	0.113* (0.067)
<b>Additional control variables II</b>				
Region of residence (ref. Central Switzerland)				
Espace Mittelland			-0.082 (0.097)	-0.105 (0.090)
North-Western Switzerland			-0.137 (0.099)	-0.131 (0.088)
Zurich			-0.100 (0.105)	-0.131 (0.105)
Eastern Switzerland			0.066 (0.104)	-0.011 (0.104)
Type of completed VET programme (ref. VET: Business)				
VET: Engineering			0.184* (0.098)	0.220** (0.091)
VET: Sciences			0.268 (0.165)	0.327** (0.148)
VET: Arts			0.089 (0.143)	0.153 (0.116)
VET: Health and Welfare			0.181** (0.089)	0.248*** (0.082)
<b>Additional control variables III</b>				
Relevance of official information sources				0.001 (0.044)
Relevance of informal information sources				0.024

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
				(0.041)
Reasons for TE				
Career upgrade				0.025 (0.036)
Career change				-0.102*** (0.035)
Recommendations				-0.021 (0.045)
Interest				0.099** (0.040)
Expectation of employer				0.056* (0.029)
Decision-making process				
Duration of decision				-0.048* (0.027)
Difficulty of decision				-0.010 (0.027)
N	180	180	180	180
Pseudo R2	0.15	0.21	0.26	0.36
Log-likelihood	-104.01	-97.30	-90.70	-79.06

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively.



**Table A.4:** Heterogeneous effect estimations with disaggregated explanatory variables  
– full results table

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.065* (0.039)	0.057 (0.039)	0.088** (0.039)	0.053 (0.037)
Uncertainty about eligibility: university	0.091*** (0.021)	0.083*** (0.021)	0.081*** (0.020)	0.083*** (0.020)
Uncertainty about eligibility: PET	-0.069** (0.035)	-0.059* (0.033)	-0.067** (0.034)	-0.056* (0.030)
Difference uncertainty: PET vs. university	14.72***	12.89***	13.87***	13.79***
Misinformation on wage benefits: university	0.009*** (0.003)	0.010*** (0.003)	0.012*** (0.003)	0.012*** (0.004)
Misinformation on wage benefits: PET	-0.012* (0.006)	-0.011* (0.006)	-0.009 (0.006)	-0.011* (0.006)
Difference misinformation: PET vs. university	6.44*	6.84*	7.21*	7.68*
<b>Control variables</b>				
Female	0.074 (0.071)	0.122* (0.070)	0.179** (0.087)	0.254*** (0.087)
Age	0.025*** (0.009)	0.014 (0.010)	0.016 (0.010)	0.012 (0.010)
Parents' tertiary education	-0.231*** (0.060)	-0.210*** (0.061)	-0.231*** (0.056)	-0.238*** (0.052)
Holding a baccalaureate	-0.229** (0.097)	-0.174* (0.095)	-0.103 (0.093)	-0.070 (0.094)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.074 (0.064)	0.131** (0.061)	0.105* (0.062)
Not enough financial resources		-0.018 (0.021)	-0.036* (0.020)	-0.016 (0.021)
Born in Switzerland		-0.046 (0.120)	-0.019 (0.112)	-0.035 (0.091)
Living with family		0.200** (0.092)	0.180* (0.094)	0.156 (0.095)
Employed		0.092 (0.085)	0.135 (0.084)	0.060 (0.086)
University education among friends/family		-0.220* (0.120)	-0.306*** (0.118)	-0.348*** (0.117)
PET among friends/family		0.057 (0.073)	0.083 (0.068)	0.093 (0.062)
<b>Additional control variables II</b>				
Region of residence (ref. Central Switzerland)				
Espace Mittelland			-0.069 (0.091)	-0.086 (0.082)
North-Western Switzerland			-0.094 (0.099)	-0.067 (0.092)
Zurich			-0.057 (0.101)	-0.062 (0.098)
Eastern Switzerland			0.100 (0.102)	0.026 (0.103)
Type of VET programme (ref. VET: Business)				
VET: Engineering			0.194** (0.093)	0.249*** (0.089)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
VET: Sciences			0.335** (0.161)	0.385*** (0.140)
VET: Arts			0.082 (0.160)	0.188 (0.118)
VET: Health and Welfare			0.175* (0.089)	0.240*** (0.081)
<b>Additional control variables III</b>				
Relevance of official information sources				0.011 (0.041)
Relevance of informal information sources				0.037 (0.043)
Reasons for TE				
Career upgrade				0.036 (0.033)
Career change				-0.091*** (0.034)
Recommendations				-0.006 (0.044)
Interest				0.078** (0.037)
Expectation of employer				0.048* (0.029)
Decision-making process				
Duration of decision				-0.051** (0.026)
Difficulty of decision				-0.011 (0.027)
N	180	180	180	180
Pseudo R2	0.21	0.26	0.32	0.41
Log-likelihood	-96.86	-91.32	-84.03	-72.34

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. ‘Difference misinformation’ and ‘Difference uncertainty’ report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET.

### A.3 Tests for Multicollinearity of Explanatory Variables

**Table A.5:** Regression post-estimation for multicollinearity: variance inflation factors (VIF) for the aggregated explanatory variables

<b>Variable</b>	<b>VIF</b>	<b>1/VIF</b>
Subjective information level	1.39	0.718962
Misinformation on wage benefits of TE: Average	1.33	0.751828
Uncertainty about eligibility for TE: Overall	1.21	0.823642
Mean VIF	1.53	

*Notes:* Regression post-estimation for multicollinearity of aggregated explanatory variables. N=180.

**Table A.6:** Regression post-estimation for multicollinearity: variance inflation factors (VIF) for the disaggregated explanatory variables

<b>Variable</b>	<b>VIF</b>	<b>1/VIF</b>
Subjective information level	1.39	0.717347
Misinformation on wage benefits of TE: PET	1.61	0.620435
Misinformation on wage benefits of TE: University	1.44	0.694241
Uncertainty about eligibility for TE: PET	1.24	0.806680
Uncertainty about eligibility for TE: University	1.37	0.730616
Mean VIF	1.55	

*Notes:* Regression post-estimation for multicollinearity of disaggregated explanatory variables. N=180.

**Table A.7:** Regression post-estimation for multicollinearity: matrix of correlations of aggregated explanatory variables

e(V)	Subjective assessment of information level	Uncertainty about eligibility for TE: overall	Misinformation on wage benefits of TE: average	Constant
Subjective information level	1			
Uncertainty about eligibility: overall	-0.0587	1		
Wage benefits correctness: average	-0.0173	-0.1190	1	
Constant	-0.2854	-0.1272	-0.2063	1

*Notes:* Regression post-estimation for multicollinearity of aggregated explanatory variables. N=180.

**Table A.8:** Regression post-estimation for multicollinearity: matrix of correlations of disaggregated explanatory variables

e(V)	Subjective assessment of information level	Uncertainty about eligibility: university	Uncertainty about eligibility: PET	Misinformation on wage benefits: university	Misinformation on wage benefits: PET	Constant
Subjective information level	1					
Uncertainty about eligibility: university	-0.1006	1				
Uncertainty about eligibility: PET	0.0893	-0.1846	1			
Misinformation on wage benefits: university	0.1138	-0.0434	0.0592	1		
Misinformation on wage benefits: PET	-0.0813	-0.2641	0.0302	-0.4163	1	
Constant	-0.2526	-0.1935	0.0233	-0.0667	-0.0813	1

*Notes:* Regression post-estimation for multicollinearity of aggregated explanatory variables. N=180.

## A.4 Factor Analysis for Explanatory Variables

**Table A.9:** Factor analysis for explanatory variables

<b>Factor</b>	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
Factor 1	1.120	0.103	0.373	0.373
Factor 2	1.017	0.154	0.339	0.712
Factor 3	0.863	.	0.288	1.000

*Notes:* Table displays results of principal-factor analysis of the explanatory variables. N=180.

**Table A.10:** Factor analysis for explanatory variables: rotated factor loadings and unique variances

<b>Variable</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Uniqueness</b>
Subjective information level		0.9512	0.0952
Uncertainty about eligibility: overall	0.7485		0.3837
Misinformation on wage benefits: average	0.7480		0.3843

*Notes:* Table displays results of principal-factor analysis of the explanatory variables after rotation. N=180.

## A.5 Heckman Sample Selection Robustness Check

**Table A.11:** Heckman sample selection test for robustness of probit results with variable “no motivation for further education”

	TERTIARY EDUCATION: YES		TERTIARY EDUCATION: PET	
	Baseline (M1)	Heterogeneous effects (M2)	Baseline (M3)	Heterogeneous effects (M4)
Subjective information level	0.224** (0.096)	0.216** (0.097)	0.078** (0.039)	0.079** (0.038)
Uncertainty about eligibility for TE:				
Overall	-0.071 (0.046)		0.029 (0.018)	
Misinformation on wage benefits of TE:				
Overall	-0.009 (0.011)		0.006 (0.004)	
Uncertainty about eligibility:				
University		-0.041 (0.059)		0.078*** (0.020)
Uncertainty about eligibility: PET				
University		-0.148* (0.088)		-0.072** (0.033)
Misinformation on wage benefits:				
University		-0.009 (0.009)		0.008** (0.003)
Misinformation on wage benefits: PET				
University		0.005 (0.015)		-0.010* (0.006)
Instrument:				
No motivation for further education	-0.491*** (0.081)	-0.492*** (0.082)		
Lambda (inverse mills ratio)			0.069 (0.047)	0.077 (0.047)
Female	0.162 (0.186)	0.169 (0.188)	0.070 (0.069)	0.113* (0.067)
Age	-0.060*** (0.022)	-0.059*** (0.022)	0.006 (0.011)	0.007 (0.011)
Parents tertiary education	0.190 (0.161)	0.196 (0.163)	-0.200*** (0.060)	-0.190*** (0.060)
Eligible for university education	0.245 (0.229)	0.237 (0.233)	-0.234** (0.093)	-0.178* (0.093)
Not enough financial resources	-0.090 (0.058)	-0.088 (0.059)	-0.025 (0.021)	-0.021 (0.020)
Born in Switzerland	-0.031 (0.326)	-0.020 (0.332)	0.027 (0.104)	0.012 (0.104)
Living with family	-0.197 (0.199)	-0.209 (0.203)	0.140 (0.090)	0.126 (0.091)
Employed	-0.122 (0.222)	-0.139 (0.229)	0.141* (0.084)	0.095 (0.082)
University education among friends/family	0.505* (0.288)	0.484* (0.293)	-0.209* (0.124)	-0.194* (0.115)
PET education among friends/family	0.250 (0.180)	0.235 (0.182)	0.100 (0.075)	0.085 (0.071)
N	359	359	204	204
Pseudo R2	0.222	0.225	0.206	0.251
Log Likelihood	-191.051	-190.359	-110.502	-104.267

*Notes:* Table displays Heckman sample selection regressions. The first two columns display selection equations, with M1 including aggregated explanatory variables and M2 including disaggregated explanatory variables. The third and fourth column display outcome equations, with M3 including aggregated explanatory variables and M4 including disaggregated explanatory variables. M1 and M2 include bootstrapped

(1,000 iterations) robust standard errors. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively.

**Table A.12:** Heckman sample selection test for robustness of probit results with variable “no adequate information on TE found”

	TERTIARY EDUCATION: YES		TERTIARY EDUCATION: PET	
	Baseline (M1)	Heterogeneous effects (M2)	Baseline (M3)	Heterogeneous effects (M4)
Subjective information level	0.201** (0.085)	0.193** (0.087)	0.071* (0.042)	0.077* (0.042)
Uncertainty about eligibility for TE: Overall	-0.079* (0.043)		0.028 (0.018)	
Misinformation on wage benefits of TE: Overall	-0.010 (0.011)		0.005 (0.004)	
Uncertainty about eligibility: University		-0.039 (0.056)		0.077*** (0.020)
Uncertainty about eligibility: PET		-0.166** (0.081)		-0.071** (0.034)
Misinformation on wage benefits: University		-0.007 (0.009)		0.008** (0.003)
Misinformation on wage benefits: PET		-0.001 (0.015)		-0.011* (0.006)
Instrument: No adequate information on TE found	-0.142** (0.070)	-0.140** (0.071)		
Lambda (inverse mills ratio)			0.055 (0.061)	0.072 (0.081)
Female	0.132 (0.173)	0.145 (0.175)	0.041 (0.070)	0.088 (0.067)
Age	-0.071*** (0.021)	-0.071*** (0.021)	0.009 (0.012)	0.008 (0.012)
Parents tertiary education	0.245 (0.151)	0.252* (0.153)	-0.195*** (0.061)	-0.186*** (0.061)
Eligible for university education	0.122 (0.236)	0.131 (0.246)	-0.256*** (0.094)	-0.197** (0.094)
Not enough financial resources	-0.082 (0.055)	-0.079 (0.056)	-0.022 (0.021)	-0.018 (0.021)
Born in Switzerland	-0.383 (0.298)	-0.380 (0.301)	-0.019 (0.102)	-0.030 (0.099)
Living with family	-0.311* (0.189)	-0.319* (0.190)	0.122 (0.094)	0.103 (0.097)
Employed	-0.213 (0.216)	-0.244 (0.222)	0.149* (0.086)	0.096 (0.084)
University education among friends/family	0.509* (0.265)	0.498* (0.268)	-0.190 (0.131)	-0.169 (0.129)
PET education among friends/fam- ily	0.256 (0.170)	0.235 (0.174)	0.058 (0.072)	0.049 (0.069)
N	360	360	206	206
<b>Pseudo R2</b>	0.129	0.132	0.198	0.243
<b>Log Likelihood</b>	-214.154	-213.366	-112.972	-106.590

*Notes:* Table displays Heckman sample selection regressions. The first two columns display selection equations, with M1 including aggregated explanatory variables and M2 including disaggregated explanatory variables. The third and fourth column display outcome equations, with M3 including aggregated explanatory variables and M4 including disaggregated explanatory variables. M1 and M2 include bootstrapped



(1,000 iterations) robust standard errors. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively.

## A.6 Robustness Tests of Baseline and Heterogeneous Effects Estimations

**Table A.13:** Baseline estimations including sample without (prospective) baccalaureate students

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.031 (0.043)	0.023 (0.040)	0.090** (0.045)	0.071 (0.051)
Uncertainty about eligibility	0.122*** (0.022)	0.106*** (0.021)	0.111*** (0.019)	0.094*** (0.019)
Misinformation on wage benefits	0.009* (0.005)	0.009** (0.005)	0.011*** (0.004)	0.011*** (0.004)
<b>Control variables</b>				
Female	0.029 (0.072)	0.074 (0.072)	0.107 (0.079)	0.156* (0.082)
Age	0.014 (0.009)	0.004 (0.009)	-0.002 (0.008)	-0.007 (0.009)
Parents' tertiary education	-0.273*** (0.063)	-0.234*** (0.067)	-0.250*** (0.059)	-0.265*** (0.055)
Holding a baccalaureate	-0.278*** (0.082)	-0.222*** (0.083)	-0.133* (0.078)	-0.084 (0.067)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.043 (0.066)	0.085 (0.066)	0.110* (0.064)
Not enough financial resources		-0.012 (0.022)	-0.044** (0.020)	-0.038* (0.023)
Born in Switzerland		-0.076 (0.122)	-0.129 (0.107)	-0.142 (0.099)
Living with family		0.161* (0.085)	0.164** (0.083)	0.135* (0.080)
Employed		0.126 (0.085)	0.117 (0.083)	0.089 (0.091)
University education among friends/family		-0.223 (0.157)	-0.362** (0.157)	-0.365*** (0.141)
PET among friends/family		0.043 (0.075)	0.117 (0.074)	0.139** (0.071)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			0.086 (0.093)	0.039 (0.090)
North-Western Switzerland			-0.150 (0.094)	-0.166* (0.094)
Zurich			-0.143 (0.096)	-0.158* (0.095)
Eastern Switzerland			-0.028 (0.101)	-0.082 (0.094)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.129 (0.079)	0.184** (0.077)
VET: Sciences			0.494** (0.235)	0.528** (0.207)
VET: Arts			0.049 (0.142)	0.057 (0.136)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
VET: Health and Welfare			0.221** (0.096)	0.288*** (0.097)
<b>Additional control variables III</b>				
Relevance of official information sources				-0.052 (0.042)
Relevance of informal information sources				0.037 (0.040)
Reasons for TE				
Career upgrade				-0.013 (0.033)
Career change				-0.057 (0.041)
Recommendations				-0.038 (0.049)
Interest				-0.052 (0.051)
Expectation of employer				0.047 (0.033)
Decision-making process				
Duration of decision				-0.029 (0.030)
Difficulty of decision				0.015 (0.028)
N	135	135	135	135
Pseudo R2	0.23	0.30	0.39	0.45
Log-likelihood	-71.19	-64.36	-56.19	-50.46

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

**Table A.14:** Heterogeneous effects estimations including sample without (prospective) baccalaureate student

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.018 (0.042)	0.010 (0.039)	0.104** (0.045)	0.075 (0.051)
Uncertainty about eligibility: university	0.145*** (0.022)	0.125*** (0.022)	0.144*** (0.023)	0.122*** (0.025)
Uncertainty about eligibility: PET	0.058 (0.047)	0.059 (0.043)	0.056 (0.046)	0.063 (0.047)
Difference uncertainty: PET vs. university	3.09* (0.062)	1.83 (0.062)	2.88* (0.062)	1.30 (0.062)
Misinformation on wage benefits: university	0.011** (0.004)	0.011*** (0.004)	0.014*** (0.004)	0.015*** (0.004)
Misinformation on wage benefits: PET	-0.011 (0.007)	-0.011 (0.007)	-0.015** (0.007)	-0.016** (0.007)
Difference misinformation: PET vs. university	4.66** (0.081)	5.53** (0.081)	7.82*** (0.076)	11.33*** (0.076)
<b>Control variables</b>				
Female	0.062 (0.074)	0.088 (0.071)	0.138* (0.080)	0.194** (0.086)
Age	0.012 (0.009)	0.002 (0.009)	-0.003 (0.008)	-0.008 (0.009)
Parents' tertiary education	-0.268*** (0.062)	-0.232*** (0.065)	-0.278*** (0.061)	-0.299*** (0.056)
Holding a baccalaureate	-0.219*** (0.081)	-0.172** (0.080)	-0.065 (0.076)	-0.024 (0.076)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.037 (0.062)	0.089 (0.062)	0.135** (0.063)
Not enough financial resources		-0.005 (0.022)	-0.040** (0.020)	-0.038* (0.021)
Born in Switzerland		-0.089 (0.116)	-0.145 (0.092)	-0.164* (0.090)
Living with family		0.170** (0.084)	0.172** (0.079)	0.153* (0.079)
Employed		0.104 (0.083)	0.087 (0.083)	0.062 (0.093)
University education among friends/family		-0.185 (0.144)	-0.372** (0.147)	-0.401*** (0.147)
PET among friends/family		0.023 (0.076)	0.115 (0.074)	0.132* (0.068)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			0.063 (0.092)	0.014 (0.090)
North-Western Switzerland			-0.144 (0.091)	-0.157 (0.096)
Zurich			-0.120 (0.095)	-0.137 (0.097)
Eastern Switzerland			0.007 (0.102)	-0.064 (0.097)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.177** (0.087)	0.233** (0.091)
VET: Sciences			0.639*** (0.231)	0.618*** (0.194)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
VET: Arts			0.158 (0.156)	0.155 (0.138)
VET: Health and Welfare			0.215** (0.092)	0.311*** (0.088)
<b>Additional control variables III</b>				
Relevance of official information sources				-0.038 (0.043)
Relevance of informal information sources				0.035 (0.043)
Reasons for TE				
Career upgrade				-0.026 (0.038)
Career change				-0.049 (0.035)
Recommendations				-0.030 (0.049)
Interest				-0.039 (0.049)
Expectation of employer				0.056* (0.033)
Decision-making process				
Duration of decision				-0.044 (0.031)
Difficulty of decision				0.012 (0.026)
N	135	135	135	135
Pseudo R2	0.34	0.39	0.50	0.56
Log-likelihood	-60.96	-56.53	-46.10	-40.55

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. ‘Difference misinformation’ and ‘Difference uncertainty’ report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET.

**Table A.15:** Baseline estimations with parents' education differentiated into PET and university

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.057 (0.039)	0.056 (0.039)	0.077* (0.040)	0.037 (0.038)
Uncertainty about eligibility	0.042** (0.020)	0.035* (0.019)	0.032* (0.019)	0.040** (0.017)
Misinformation on wage benefits	0.007* (0.004)	0.009** (0.004)	0.012*** (0.004)	0.012*** (0.004)
<b>Control variables</b>				
Parents TE: PET	-0.181*** (0.067)	-0.174*** (0.066)	-0.144** (0.066)	-0.156** (0.064)
Parents TE: University	-0.112 (0.083)	-0.065 (0.080)	-0.090 (0.076)	-0.111 (0.073)
Female	0.025 (0.073)	0.084 (0.075)	0.129 (0.094)	0.194** (0.092)
Age	0.028*** (0.009)	0.017 (0.011)	0.018* (0.010)	0.013 (0.010)
Holding a baccalaureate	-0.300*** (0.102)	-0.232** (0.102)	-0.176* (0.103)	-0.139 (0.097)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.106 (0.069)	0.159** (0.069)	0.120* (0.068)
Not enough financial resources		-0.027 (0.022)	-0.041* (0.022)	-0.018 (0.023)
Born in Switzerland		-0.008 (0.122)	-0.001 (0.118)	-0.027 (0.102)
Living with family		0.184* (0.096)	0.171* (0.100)	0.126 (0.100)
Employed		0.121 (0.092)	0.157* (0.091)	0.089 (0.095)
University education among friends/family		-0.286** (0.128)	-0.348*** (0.130)	-0.384*** (0.122)
PET among friends/family		0.076 (0.075)	0.092 (0.072)	0.112* (0.068)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.031 (0.102)	-0.040 (0.093)
North-Western Switzerland			-0.103 (0.104)	-0.084 (0.092)
Zurich			-0.038 (0.107)	-0.055 (0.102)
Eastern Switzerland			0.082 (0.108)	0.012 (0.108)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.178* (0.102)	0.225** (0.097)
VET: Sciences			0.254 (0.177)	0.316** (0.157)
VET: Arts			0.052 (0.152)	0.129 (0.129)
VET: Health and Welfare			0.157* (0.092)	0.241*** (0.086)
<b>Additional control variables III</b>				
Relevance of official information sources				0.011 (0.044)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Relevance of informal information sources				0.022 (0.041)
Reasons for TE				
Career upgrade				0.031 (0.036)
Career change				-0.109*** (0.036)
Recommendations				-0.018 (0.044)
Interest				0.085** (0.039)
Expectation of employer				0.061** (0.029)
Decision-making process				
Duration of decision				-0.052* (0.028)
Difficulty of decision				-0.011 (0.027)
N	180	180	180	180
Pseudo R2	0.14	0.19	0.23	0.33
Log-likelihood	-105.97	-98.95	-94.07	-82.01

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

**Table A.16:** Heterogeneous effects estimations with parents' education differentiated into PET and university

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.055 (0.039)	0.055 (0.038)	0.085** (0.039)	0.053 (0.036)
Uncertainty about eligibility: university	0.095*** (0.021)	0.086*** (0.021)	0.086*** (0.020)	0.093*** (0.020)
Uncertainty about eligibility: PET	-0.072** (0.035)	-0.063* (0.033)	-0.072** (0.034)	-0.062** (0.028)
Difference uncertainty: PET vs. university	15.00***	13.16***	13.90***	14.55***
Misinformation on wage benefits: university	0.009*** (0.003)	0.010*** (0.003)	0.011*** (0.003)	0.011*** (0.003)
Misinformation on wage benefits: PET	-0.011* (0.006)	-0.010 (0.006)	-0.007 (0.006)	-0.010 (0.006)
Difference misinformation: PET vs. university	6.63*	6.93**	7.23*	7.66***
<b>Control variables</b>				
Parents TE: PET	-0.193*** (0.063)	-0.184*** (0.064)	-0.150** (0.063)	-0.172*** (0.059)
Parents TE: University	-0.102 (0.077)	-0.060 (0.074)	-0.097 (0.070)	-0.122* (0.066)
Female	0.088 (0.071)	0.130* (0.071)	0.174** (0.087)	0.264*** (0.087)
Age	0.027*** (0.009)	0.017 (0.011)	0.020** (0.010)	0.016 (0.010)
Holding a baccalaureate	-0.231** (0.097)	-0.173* (0.096)	-0.116 (0.095)	-0.069 (0.095)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.095 (0.065)	0.147** (0.063)	0.122** (0.062)
Not enough financial resources		-0.022 (0.021)	-0.037* (0.020)	-0.019 (0.021)
Born in Switzerland		-0.040 (0.117)	-0.019 (0.112)	-0.037 (0.096)
Living with family		0.180* (0.095)	0.161* (0.096)	0.126 (0.101)
Employed		0.073 (0.088)	0.107 (0.085)	0.023 (0.086)
University education among friends/family		-0.262** (0.120)	-0.342*** (0.121)	-0.397*** (0.117)
PET among friends/family		0.050 (0.071)	0.065 (0.067)	0.091 (0.063)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.019 (0.097)	-0.021 (0.086)
North-Western Switzerland			-0.055 (0.102)	-0.015 (0.094)
Zurich			0.014 (0.104)	0.023 (0.095)
Eastern Switzerland			0.116 (0.107)	0.050 (0.106)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.184* (0.100)	0.247*** (0.095)
VET: Sciences			0.335**	0.395***

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
			(0.164)	(0.141)
VET: Arts			0.059	0.182
			(0.158)	(0.118)
VET: Health and Welfare			0.156*	0.238***
			(0.090)	(0.084)
<b>Additional control variables III</b>				
Relevance of official information sources				0.022
				(0.042)
Relevance of informal information sources				0.040
				(0.044)
Reasons for TE				
Career upgrade				0.041
				(0.033)
Career change				-0.098***
				(0.035)
Recommendations				-0.003
				(0.043)
Interest				0.063*
				(0.036)
Expectation of employer				0.052*
				(0.029)
Decision-making process				
Duration of decision				-0.057**
				(0.026)
Difficulty of decision				-0.015
				(0.027)
N	180	180	180	180
Pseudo R2	0.20	0.24	0.29	0.39
Log-likelihood	-98.60	-92.81	-87.25	-74.83

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. ‘Difference misinformation’ and ‘Difference uncertainty’ report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET.



**Table A.17:** Baseline estimations for respondents younger than 26 years

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.092** (0.044)	0.089** (0.045)	0.119*** (0.041)	0.061 (0.043)
Uncertainty about eligibility	0.012 (0.021)	0.009 (0.019)	0.006 (0.020)	0.004 (0.018)
Misinformation on wage benefits	0.008* (0.005)	0.010** (0.004)	0.015*** (0.005)	0.012*** (0.005)
<b>Control variables</b>				
Female	-0.048 (0.080)	0.023 (0.082)	0.063 (0.097)	0.145 (0.092)
Parents with tertiary education	-0.245*** (0.067)	-0.248*** (0.066)	-0.263*** (0.061)	-0.255*** (0.056)
Holding a baccalaureate	-0.259** (0.120)	-0.223* (0.120)	-0.157 (0.123)	-0.102 (0.105)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.061 (0.077)	0.120 (0.077)	0.101 (0.072)
Not enough financial resources		-0.012 (0.024)	-0.026 (0.024)	-0.018 (0.024)
Born in Switzerland		0.051 (0.151)	0.080 (0.136)	0.023 (0.124)
Living with family		0.329*** (0.117)	0.321** (0.126)	0.254** (0.118)
Employed		0.121 (0.092)	0.152* (0.091)	0.118 (0.097)
University education among friends/family		-0.274** (0.122)	-0.357*** (0.118)	-0.335*** (0.111)
PET among friends/family		0.083 (0.081)	0.103 (0.075)	0.113 (0.071)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.054 (0.102)	-0.071 (0.102)
North-Western Switzerland			-0.121 (0.107)	-0.152* (0.089)
Zurich			-0.085 (0.117)	-0.153 (0.114)
Eastern Switzerland			0.058 (0.116)	-0.015 (0.117)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.182 (0.115)	0.183* (0.106)
VET: Sciences			0.347** (0.173)	0.422*** (0.144)
VET: Arts			0.077 (0.149)	0.104 (0.119)
VET: Health and Welfare			0.206** (0.093)	0.246*** (0.087)
<b>Additional control variables III</b>				
Relevance of official information sources				0.007 (0.050)
Relevance of informal information sources				0.049 (0.046)
Reasons for TE				
Career upgrade				0.004 (0.045)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Career change				-0.092** (0.046)
Recommendations				-0.063 (0.059)
Interest				0.073* (0.044)
Expectation of employer				0.046 (0.034)
Decision-making process				
Duration of decision				-0.077*** (0.029)
Difficulty of decision				0.004 (0.028)
N	145	145	145	145
Pseudo R2	0.126	0.211	0.272	0.362
Log-likelihood	-84.504	-76.353	-70.449	-61.708

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

**Table A.18:** Baseline estimations for respondents younger than 30 years

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.084** (0.041)	0.075* (0.040)	0.103*** (0.040)	0.052 (0.038)
Uncertainty about eligibility	0.018 (0.020)	0.019 (0.019)	0.011 (0.019)	0.017 (0.017)
Misinformation on wage benefits	0.006 (0.004)	0.007* (0.004)	0.012*** (0.004)	0.011*** (0.004)
<b>Control variables</b>				
Female	-0.010 (0.078)	0.067 (0.078)	0.132 (0.095)	0.197** (0.085)
Parents with tertiary education	-0.254*** (0.063)	-0.220*** (0.063)	-0.234*** (0.058)	-0.243*** (0.053)
Holding a baccalaureate	-0.281*** (0.108)	-0.261** (0.113)	-0.197* (0.109)	-0.164* (0.095)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.059 (0.070)	0.127* (0.070)	0.091 (0.068)
Not enough financial resources		-0.012 (0.023)	-0.026 (0.021)	-0.006 (0.023)
Born in Switzerland		0.007 (0.143)	0.024 (0.133)	-0.019 (0.111)
Living with family		0.291*** (0.096)	0.285*** (0.098)	0.199** (0.099)
Employed		0.143 (0.090)	0.186** (0.091)	0.132 (0.093)
University education among friends/family		-0.249** (0.124)	-0.329*** (0.120)	-0.332*** (0.111)
PET among friends/family		0.098 (0.074)	0.136* (0.070)	0.146** (0.064)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.094 (0.096)	-0.110 (0.094)
North-Western Switzerland			-0.174* (0.102)	-0.170* (0.087)
Zurich			-0.140 (0.109)	-0.202* (0.109)
Eastern Switzerland			-0.009 (0.109)	-0.081 (0.111)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.206* (0.105)	0.206** (0.094)
VET: Sciences			0.316* (0.166)	0.382*** (0.142)
VET: Arts			0.139 (0.143)	0.181 (0.112)
VET: Health and Welfare			0.206** (0.084)	0.276*** (0.079)
<b>Additional control variables III</b>				
Relevance of official information sources				0.019 (0.048)
Relevance of informal information sources				0.036 (0.042)
Reasons for TE				
Career upgrade				0.016 (0.041)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Career change				-0.113*** (0.038)
Recommendations				-0.060 (0.048)
Interest				0.074* (0.043)
Expectation of employer				0.056* (0.031)
Decision-making process				
Duration of decision				-0.063** (0.026)
Difficulty of decision				-0.011 (0.027)
N	165	165	165	165
Pseudo R2	0.127	0.209	0.275	0.385
Log-likelihood	-97.942	-88.692	-81.365	-69.020

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

**Table A.19:** Heterogeneous effects estimations for respondents younger than 26 years

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.096** (0.043)	0.094** (0.044)	0.142*** (0.040)	0.096** (0.044)
Uncertainty about eligibility: university	0.069*** (0.023)	0.064*** (0.023)	0.072*** (0.022)	0.063*** (0.019)
Uncertainty about eligibility: PET	-0.104*** (0.037)	-0.094*** (0.032)	-0.121*** (0.035)	-0.103*** (0.029)
Difference uncertainty: PET vs. university	15.00***	14.66***	21.66***	21.50***
Misinformation on wage benefits: university	0.011*** (0.004)	0.012*** (0.004)	0.015*** (0.004)	0.014*** (0.004)
Misinformation on wage benefits: PET	-0.013* (0.007)	-0.012* (0.007)	-0.009 (0.007)	-0.011* (0.006)
Difference misinformation: PET vs. university	6.92***	7.39***	6.26**	8.18**
<b>Control variables</b>				
Female	0.012 (0.076)	0.065 (0.076)	0.116 (0.093)	0.203** (0.087)
Parents with tertiary education	-0.250*** (0.065)	-0.256*** (0.066)	-0.278*** (0.058)	-0.269*** (0.050)
Holding a baccalaureate	-0.199* (0.116)	-0.168 (0.112)	-0.071 (0.106)	-0.024 (0.094)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.048 (0.070)	0.110* (0.066)	0.101* (0.062)
Not enough financial resources		-0.008 (0.023)	-0.027 (0.021)	-0.018 (0.021)
Born in Switzerland		0.007 (0.142)	0.066 (0.121)	0.004 (0.112)
Living with family		0.335*** (0.110)	0.331*** (0.115)	0.276*** (0.105)
Employed		0.070 (0.089)	0.091 (0.083)	0.041 (0.086)
University education among friends/family		-0.249** (0.113)	-0.367*** (0.111)	-0.341*** (0.105)
PET among friends/family		0.074 (0.080)	0.083 (0.069)	0.095 (0.061)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.021 (0.090)	-0.035 (0.090)
North-Western Switzerland			-0.042 (0.103)	-0.038 (0.089)
Zurich			-0.043 (0.111)	-0.072 (0.099)
Eastern Switzerland			0.114 (0.110)	0.063 (0.111)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.199* (0.106)	0.225** (0.094)
VET: Sciences			0.470*** (0.167)	0.478*** (0.146)
VET: Arts			0.031 (0.167)	0.109 (0.127)
VET: Health and Welfare			0.219** (0.096)	0.250*** (0.090)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
<b>Additional control variables III</b>				
Relevance of official information sources				0.018 (0.046)
Relevance of informal information sources				0.065 (0.044)
Reasons for TE				
Career upgrade				0.015 (0.038)
Career change				-0.067 (0.042)
Recommendations				-0.045 (0.059)
Interest				0.037 (0.036)
Expectation of employer				0.031 (0.034)
Decision-making process				
Duration of decision				-0.075*** (0.025)
Difficulty of decision				-0.001 (0.027)
N	145	145	145	145
Pseudo R2	0.20	0.277	0.36	0.442
Log-likelihood	-77.394	-69.912	-61.942	-53.949

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. ‘Difference misinformation’ and ‘Difference uncertainty’ report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET.

**Table A.20:** Heterogeneous effects estimations for respondents younger than 30 years

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level	0.083** (0.040)	0.076* (0.039)	0.108*** (0.037)	0.065* (0.035)
Uncertainty about eligibility: university	0.071*** (0.022)	0.070*** (0.022)	0.063*** (0.021)	0.066*** (0.020)
Uncertainty about eligibility: PET	-0.087** (0.036)	-0.070** (0.033)	-0.079** (0.034)	-0.066** (0.028)
Difference uncertainty: PET vs. university	13.42***	12.18***	12.05***	13.42***
Misinformation on wage benefits: university	0.008** (0.003)	0.010*** (0.003)	0.012*** (0.003)	0.012*** (0.003)
Misinformation on wage benefits: PET	-0.014** (0.007)	-0.013** (0.006)	-0.011 (0.007)	-0.013** (0.006)
Difference misinformation: PET vs. university	7.14**	7.62**	7.71**	9.63**
<b>Control variables</b>				
Female	0.056 (0.075)	0.114 (0.074)	0.179** (0.090)	0.261*** (0.084)
Parents with tertiary education	-0.257*** (0.061)	-0.232*** (0.062)	-0.244*** (0.057)	-0.251*** (0.047)
Holding a baccalaureate	-0.218** (0.104)	-0.206* (0.105)	-0.130 (0.098)	-0.069 (0.092)
<b>Additional control variables I</b>				
Intention to enrol in TE		0.042 (0.066)	0.108* (0.063)	0.085 (0.061)
Not enough financial resources		-0.004 (0.022)	-0.019 (0.021)	-0.003 (0.022)
Born in Switzerland		-0.032 (0.137)	-0.007 (0.126)	-0.053 (0.106)
Living with family		0.297*** (0.094)	0.289*** (0.091)	0.212** (0.098)
Employed		0.102 (0.087)	0.144* (0.086)	0.079 (0.084)
University education among friends/family		-0.223* (0.115)	-0.311*** (0.111)	-0.331*** (0.106)
PET among friends/family		0.082 (0.071)	0.116* (0.065)	0.127** (0.058)
<b>Additional control variables II</b>				
Region of residence (ref.: Central Switzerland)				
Espace Mittelland			-0.080 (0.089)	-0.082 (0.088)
North-Western Switzerland			-0.138 (0.101)	-0.099 (0.091)
Zurich			-0.108 (0.105)	-0.130 (0.099)
Eastern Switzerland			0.022 (0.105)	-0.029 (0.112)
Type of VET programme (ref.: VET: Business)				
VET: Engineering			0.210** (0.101)	0.245*** (0.093)
VET: Sciences			0.365** (0.162)	0.409*** (0.141)
VET: Arts			0.129 (0.157)	0.219** (0.111)
VET: Health and Welfare			0.191** (0.083)	0.263*** (0.075)

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
<b>Additional control variables III</b>				
Relevance of official information sources				0.042 (0.045)
Relevance of informal information sources				0.048 (0.044)
Reasons for TE				
Career upgrade				0.028 (0.036)
Career change				-0.105*** (0.036)
Recommendations				-0.046 (0.048)
Interest				0.042 (0.038)
Expectation of employer				0.047 (0.030)
Decision-making process				
Duration of decision				-0.062*** (0.024)
Difficulty of decision				-0.013 (0.027)
N	165	165	165	165
Pseudo R2	0.188	0.262	0.332	0.444
Log-likelihood	-91.013	-82.711	-74.88	-62.406

*Notes:* Table displays average marginal effects of probit estimations and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. ‘Difference misinformation’ and ‘Difference uncertainty’ report the Chi<sup>2</sup>-values for the Wald-test of equality of coefficients for university and PET.



## A.7 KHB-model for Mediation Analysis

**Table A.21:** Bivariate OLS regressions of explanatory variables on tertiary educated parents

<b>INDEPENDENT VARIABLE = Parents' tertiary education</b>			
Subjective information level	-0.033 (0.125)		
Uncertainty about eligibility: overall		-0.228 (0.273)	
Misinformation on wage benefits: average			-1.413 (1.212)
Constant	3.753 (0.099)	2.412 (0.226)	13.577 (1.004)
<b>N</b>	210	210	210
<b>R<sup>2</sup></b>	0.0003	0.0036	0.0070

*Notes:* Table displays results of OLS regressions of our explanatory variables on whether at least one of the parents has a tertiary education and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively.

**Table A.22:** Estimates of KHB models for parents' tertiary education and subjective information level

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Subjective information level				
Total effect (reduced model)	-0.683*** (-3.33)	-0.690** (-3.20)	-0.829*** (-3.85)	-0.918*** (-3.74)
Direct effect (full model)	-0.691*** (-3.37)	-0.697** (-3.23)	-0.848*** (-3.93)	-0.927*** (-3.78)
Indirect effect (mediation)	0.00793 (0.34)	0.00685 (0.30)	0.0191 (0.60)	0.00858 (0.50)
Control variables	Yes	Yes	Yes	Yes
Additional control variables I	No	Yes	Yes	Yes
Additional control variables II	No	No	Yes	Yes
Additional control variables III	No	No	No	Yes
<b>N</b>	180	180	180	180

*Notes:* Table displays results of KHB models to assess mediation effects of parents' tertiary education on the variable 'subjective information level' and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. Control variables include gender, age, holding a baccalaureate and intention to enrol. Additional control variables I include control variables, monetary restrictions, born in Switzerland, living with family, employed, friends with university and friends with PET. Additional control variables II include additional control variables I, region in Switzerland and type of apprenticeship. Additional control variables III include control variables II and relevance of official information sources and relevance of informal information sources, duration and difficulty of decision-making process, and a list of reasons for or against enrolling in TE.

**Table A.23:** Estimates of KHB models for parents' tertiary education and overall uncertainty about eligibility

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Uncertainty about eligibility: overall				
Total effect (reduced model)	-0.715*** (-3.50)	-0.720*** (-3.36)	-0.871*** (-4.06)	-0.958*** (-3.99)
Direct effect (full model)	-0.682*** (-3.33)	-0.694** (-3.22)	-0.845*** (-3.92)	-0.934*** (-3.88)
Indirect effect (mediation)	-0.0332 (-1.01)	-0.0255 (-0.86)	-0.0257 (-0.87)	-0.0244 (-0.77)
Control variables	Yes	Yes	Yes	Yes
Additional control variables I	No	Yes	Yes	Yes
Additional control variables II	No	No	Yes	Yes
Additional control variables III	No	No	No	Yes
<b>N</b>	180	180	180	180

*Notes:* Table displays results of KHB models to assess mediation effects of parents' tertiary education on the variable 'uncertainty about eligibility: overall' and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. Control variables include gender, age, holding a baccalaureate and intention to enrol. Additional control variables I include control variables, monetary restrictions, born in Switzerland, living with family, employed, friends with university and friends with PET. Additional control variables II include additional control variables I, region in Switzerland and type of apprenticeship. Additional control variables III include control variables II and relevance of official information sources and relevance of informal information sources, duration and difficulty of decision-making process, and a list of reasons for or against enrolling in TE.

**Table A.24:** Estimates of KHB models for parent's tertiary education and average misinformation on wage benefits

<b>TERTIARY EDUCATION: PET</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
Misinformation on wage benefits: average				
Total effect (reduced model)	-0.706*** (-3.47)	-0.721*** (-3.36)	-0.858*** (-3.98)	-0.942*** (-3.94)
Direct effect (full model)	-0.709*** (-3.48)	-0.721*** (-3.35)	-0.863*** (-4.00)	-0.943*** (-3.94)
Indirect effect (mediation)	0.00358 (0.28)	-0.000261 (-0.02)	0.00459 (0.17)	0.00135 (0.03)
Control variables	Yes	Yes	Yes	Yes
Additional control variables I	No	Yes	Yes	Yes
Additional control variables II	No	No	Yes	Yes
Additional control variables III	No	No	No	Yes
<b>N</b>	180	180	180	180

*Notes:* Table displays results of KHB models to assess mediation effects of parents' tertiary education on the variable 'misinformation on wage benefits: average' and robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10 per cent level, 5 per cent level and 1 per cent level, respectively. Control variables include gender, age, holding a baccalaureate and intention to enrol. Additional control variables I include control variables, monetary restrictions, born in Switzerland, living with family, employed, friends with university and friends with PET. Additional control variables II include additional control variables I, region in Switzerland and type of apprenticeship. Additional control variables III include control variables II and relevance of official information sources and relevance of informal information sources, duration and difficulty of decision-making process, and a list of reasons for or against enrolling in TE.

## A.8 Generating the Variable “Misinformation on Wage Benefits”

To illustrate the process behind the operationalization of the variables regarding misinformation on wage benefits, we list the steps to generate the variables in the following:

- i) Take the true monthly average salary for VET, and the true monthly average salary for [TE programme] (official figures from Swiss Earnings Structure Survey, FSO, 2018a)
- ii) Subtract the true monthly average salary for VET from the true monthly average salary for [TE programme] → difference is called ‘true benefit: [TE programme]’
- iii) Take the respondents’ estimations of monthly average salary for VET, and the estimations of monthly average salary for [TE programme]
- iv) Subtract the estimation for VET from the estimation for [TE programme] → difference is called ‘estimated benefit: [TE programme]’
- v) Subtract the estimated benefit from the true benefit, divide by 100 and take its absolute value to assess the correctness of estimations (Abbiati & Barone, 2017) → variable is called ‘misinformation on benefits of [TE programme]’

## A.9 Heterogeneity of explanatory variables by respondent characteristics

**Table A.25:** Heterogeneity of explanatory variables by respondent characteristics

<b>Two-sample t-test</b>				
	Male	Female	Diff. from t-test	p-value
Gender				
Subjective information level	3.88	3.67	0.20	0.14
Uncertainty about eligibility	2.25	2.12	0.12	0.67
Misinformation on wage benefits	12.01	12.20	-0.19	0.89
<b>Two-sample t-test</b>				
	Parents without TE	Parents with TE	Diff. from t-test	p-value
Parents' education				
Subjective information level	3.75	3.73	0.02	0.89
Uncertainty about eligibility	2.29	2.07	0.22	0.43
Misinformation on wage benefits	12.92	11.62	1.29	0.29
<b>Two-sample t-test</b>				
	Born abroad	Born in Switzerland	Diff. from t-test	p-value
Country of birth				
Subjective information level	4.06	3.71	0.36	0.12
Uncertainty about eligibility	1.88	2.19	-0.31	0.51
Misinformation on wage benefits	14.02	11.96	2.06	0.33
<b>Two-sample t-test</b>				
	Not employed	Employed	Diff. from t-test	p-value
Employment status				
Subjective information level	3.50	3.80	-0.30*	0.06
Uncertainty about eligibility	1.72	2.27	-0.55*	0.10
Misinformation on wage benefits	11.79	12.23	-0.44	0.77
<b>Two-sample t-test</b>				
	Without baccalaureate	With baccalaureate	Diff. from t-test	p-value
Holding a baccalaureate				
Subjective information level	3.76	3.63	0.13	0.48
Uncertainty about eligibility	2.34	1.15	1.19**	0.00
Misinformation on wage benefits	11.93	13.36	-1.43	0.40
<b>Chi-square test</b>				
Age group			Pearson's Chi <sup>2</sup>	p-value
Subjective information level			5.12	0.745
Uncertainty about eligibility			15.217	0.364
<b>Linear regression</b>				
Misinformation on wage benefits	beta		SE	p-value
Age group				
18-23	<i>Ref.</i>			
24-29	0.511		1.818	0.779
30-35	-1.982		1.79	0.270

*Notes:* Table shows two-sample t-tests, Chi-square tests and regression analyses to display the heterogeneity in explanatory variables by selected covariates. N=180.

# Appendix B

## B.1 Detailed Information on Applicant Profiles and Correlation Tables

### B.1.1 Job Descriptions for Hypothetical Vacancies (English translation)

**Table B.1:** Job description of hypothetical vacancies

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#### JOB DESCRIPTION

##### **ADMINISTRATIVE ASSISTANT**

Please imagine you have a vacancy for the position of ‘Administrative assistant’. This position involves administrative support in the preparation of documents for meetings, presentations and protocols, as well as support for correspondence, appointment coordination and organisation of meetings and client visits.

##### **IT ASSISTANT**

Please imagine you have a vacancy for the position of ‘IT assistant’. This position involves evaluation and co-decision-making in the selection of the IT infrastructure and IT partners in cooperation with the management and the responsible persons for applications, as well as the operation and further development of the infrastructure.

##### **SALES MANAGER**

Please imagine you have a vacancy for the position of ‘sales manager’. This position includes the management and responsibility for sales tasks, the preparation of market analyses, the operative development and implementation of sales-relevant measures (incl. marketing measures) and the support and new acquisition of customers.

##### **IT DIRECTOR**

Please imagine you have a vacancy for the position of ‘IT director’. This position includes the definition and implementation of the IT strategy, responsibility for the IT budget and cost controlling.

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## B.1.2 Dimensions and Levels of Applicant Profiles

**Table B.2:** Education variables and their levels

<b>DIMENSIONS</b>	<b>EDUCATION FOR COMMERCIAL JOBS</b>	<b>EDUCATION FOR JOBS IN IT</b>
<b>Variable</b>	<b>Administrative assistant</b>	<b>IT assistant</b>
<b>Upper-secondary education</b>	<p>General upper secondary education:</p> <ul style="list-style-type: none"> <li>- Academic baccalaureate with focus on Economics and Law</li> </ul> <p>Upper-secondary vocational education and training:</p> <ul style="list-style-type: none"> <li>- Federal VET diploma as Commercial Employee</li> <li>- Federal VET diploma as Commercial Employee with federal vocational baccalaureate</li> </ul>	<p>General upper secondary education:</p> <ul style="list-style-type: none"> <li>- Academic baccalaureate with focus on Physics and Applied Mathematics</li> </ul> <p>Upper-secondary vocational education and training:</p> <ul style="list-style-type: none"> <li>- Federal VET diploma as Information Technologist</li> <li>- Federal VET diploma as Information Technologist with vocational baccalaureate</li> </ul>
<b>Variable</b>	<b>Sales manager</b>	<b>IT director</b>
<b>Upper-secondary education</b>	<p>General upper secondary education:</p> <ul style="list-style-type: none"> <li>- Academic baccalaureate with focus on Economics and Law</li> </ul> <p>Upper-secondary vocational education and training:</p> <ul style="list-style-type: none"> <li>- Federal VET diploma as Commercial Employee</li> <li>- Federal VET diploma as Commercial Employee with federal vocational baccalaureate</li> </ul>	<p>General upper secondary education:</p> <ul style="list-style-type: none"> <li>- Academic baccalaureate with focus on Physics and Applied Mathematics</li> </ul> <p>Upper-secondary vocational education and training:</p> <ul style="list-style-type: none"> <li>- Federal VET diploma as Information Technologist</li> <li>- Federal VET diploma as Information Technologist with vocational baccalaureate</li> </ul>
<b>Tertiary and continuing education</b>	<p>Tertiary academic education:</p> <ul style="list-style-type: none"> <li>- Master's degree from a traditional academic university in Business Administration</li> <li>- Master's degree from a UAS in Business Administration</li> <li>- Bachelor's degree from a traditional academic university in Business Administration with a continuing education certificate in Marketing Management</li> </ul> <p>Tertiary professional education and training:</p> <ul style="list-style-type: none"> <li>- Advanced Federal Diploma (HFP) in Sales Management</li> <li>- Advanced Federal Diploma (HFP) in Sales Management with a continuing education certificate in Marketing Management</li> </ul>	<p>Tertiary academic education:</p> <ul style="list-style-type: none"> <li>- Master's degree from a traditional academic university in Business Information Technology</li> <li>- Master's degree from a UAS in Business Information Technology</li> <li>- Bachelor's degree from a traditional academic university in Business Information Technology with a continuing education certificate in Information Systems Management</li> </ul> <p>Tertiary professional education and training:</p> <ul style="list-style-type: none"> <li>- Advanced Federal Diploma (HFP) as ICT Manager</li> <li>- Advanced Federal Diploma (HFP) as ICT Manager with a continuing education certificate in Information Systems Management</li> </ul>

Table B.3: Dimensions and levels of applicant profiles

<b>DIMENSIONS</b>	<b>LEVELS FOR ENTRY-LEVEL JOBS</b>	<b>LEVELS FOR HIGH-LEVEL JOBS</b>
<b>Randomised CV elements</b>		
Upper-secondary education	<ul style="list-style-type: none"> <li>- Academic baccalaureate</li> <li>- Federal VET diploma</li> <li>- Federal VET diploma with federal vocational baccalaureate</li> </ul>	<ul style="list-style-type: none"> <li>- Academic baccalaureate</li> <li>- Federal VET diploma with federal vocational baccalaureate</li> </ul>
Tertiary and continuing education	<i>Not relevant</i>	<ul style="list-style-type: none"> <li>- Master's degree from university</li> <li>- Master's degree from university of applied sciences (<i>UAS</i>)</li> <li>- Advanced Federal Diploma (<i>HFP</i>)</li> </ul>
Gender	<ul style="list-style-type: none"> <li>- Female</li> <li>- Male</li> </ul>	<ul style="list-style-type: none"> <li>- Female</li> <li>- Male</li> </ul>
Nationality	<ul style="list-style-type: none"> <li>- Swiss citizen</li> <li>- German or French, depending on language region of employer</li> <li>- Portuguese</li> <li>- Turkish</li> </ul>	<ul style="list-style-type: none"> <li>- Swiss citizen</li> </ul>
Social skills	<ul style="list-style-type: none"> <li>- None</li> <li>- Communal work: neighbourhood help</li> </ul>	<ul style="list-style-type: none"> <li>- None</li> <li>- Communal work: neighbourhood help</li> </ul>
Total work experience	<i>Not relevant</i>	<ul style="list-style-type: none"> <li>- 8 years (age: 32 years)</li> <li>- 10 years (age: 34 years)</li> <li>- 12 years (age: 36 years)</li> </ul>
Occupation-specific experience	<ul style="list-style-type: none"> <li>- None (age: 19 years)</li> <li>- 1 year (age: 20 years)</li> <li>- 2 years (age: 21 years)</li> <li>- 3 years (age: 22 years)</li> <li>- 4 years (age: 23 years)</li> </ul>	Thereof: <ul style="list-style-type: none"> <li>- 4 years</li> <li>- 6 years</li> <li>- 8 years</li> </ul>
Experience in relevant sector	<ul style="list-style-type: none"> <li>- Yes (experience relevant to the sector of the open job position)</li> <li>- No (work experience in another sector)</li> </ul>	<i>Not relevant</i>

*Example of Applicant profile (English translation)*

**Figure B.1:** Example of applicant profile for entry-level positions

<p>The following qualified persons are among the applicants. All of them have sent you a written application with a letter of motivation, have <b>above-average grades, obtained their degree in Switzerland</b>, are <b>available</b> for the date you are looking for an applicant and <b>live in the region</b> of your firm.</p>									
<p>The curriculum vitae of [candidate 1] contains the following information:</p> <p><b>Personal information</b></p> <p>Age: [20]          Nationality: [German]</p> <p><b>Education</b></p> <p>[Federal VET diploma as Commercial Employee]</p> <p><b>Work experience since graduation (incl. internships, trainee programmes, etc.)</b></p> <p>[1 year of clerical work in the sector of your firm]</p> <p><b>Language skills</b></p> <p>German: Native Language          French: Fluent          English: Fluent</p> <p><b>Voluntary work</b></p> <p>[Communal work]</p>									
<p><b>How likely is it that your firm will invite this candidate to an interview?</b></p> <p>Very unlikely <span style="float: right;">Very likely</span></p>									
1	2	3	4	5	6	7	8	9	10

*Notes:* Dimensions in brackets vary at the levels shown in Table B.3, other aspects of the profile are fixed.



**Figure B.2:** Example of applicant profile for high-level positions

<p>The following qualified persons are among the applicants. All of them have sent you a written application with a letter of motivation, have <b>above-average grades, obtained their degree in Switzerland</b>, are <b>available</b> for the date you are looking for an applicant and <b>live in the region</b> of your firm.</p>									
<p>The curriculum vitae of [candidate 2] contains the following information:</p> <p><b>Personal information</b>  Age: [36]  Nationality: Swiss</p> <p><b>Education</b>  [Master's degree in Computer Science from a university]  [Academic baccalaureate with a focus in Physics and Mathematics]</p> <p><b>Total work experience</b>  [12 years]  Of which: [8 years] in the relevant field</p> <p><b>Language skills</b>  German: [Native]  French: [Fluent]  English: Fluent</p> <p><b>Voluntary work</b>  [None]</p>									
<p><b>How likely is it that your firm will invite this candidate to an interview?</b></p> <p>Very unlikely <span style="float: right;">Very likely</span></p>									
1	2	3	4	5	6	7	8	9	10

Notes: Dimensions in brackets vary at the levels shown in Table B.3, other aspects of the profile are fixed.

### B.1.3 Correlation Tables of Applicant Profile Dimensions

**Table B.4:** Pairwise correlations among applicant profile dimensions for entry-level positions

Applicant profile dimension	1	2	3	4	5	6
1 Upper-secondary education	1					
2 Gender	0.0059	1				
3 Nationality	0.0240*	0.0175	1			
4 Volunteering	0.0167	-0.0065	0.0222	1		
5 <i>Years of general work experience</i>	0.0304**	0.0124	0.0076	0.0054	1	
6 <i>Years of sector-specific work experience</i>	0.0042	-0.0047	-0.0061	-0.0002	0.1810**	1

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in Italic), and the Cramér's V measure for categorical variables. We excluded profiles of applicants with the implausible combination of no work experience with sector-specific work experience.

**Table B.5:** Pairwise correlations among applicant profile dimensions for high-level positions

Applicant profile dimension	1	2	3	4	5	6	7
1 Tertiary education	1						
2 Upper-secondary education	0.0234	1					
3 Continuing education	1.0000***	-0.0108	1				
4 Gender	0.0159	-0.0120	-0.0048	1			
5 Volunteering	0.0218	0.0019	-0.0060	-0.0055	1		
6 <i>Years of general work experience</i>	-0.0257**	-0.0054	-0.0140	-0.0069	-0.0008	1	
7 <i>Years of occupation-specific work experience</i>	0.0053	0.0013	0.0033	0.0185	0.0013	0.0096	1

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in Italic), and the Cramér's V measure for categorical variables. Our applicant profiles only included cases with a PET or with a bachelor's degree from an academic university and a continuing education, but not with a tertiary degree from a university of applied sciences and continuing education.

### B.1.4 Correlation tables of applicant profile variables with respondent variables

**Table B.6:** Pairwise correlations of applicant profile variables (level 1) and respondent-level variables (level 2) for entry-level positions

Variables	Upper-secondary education	Gender	Nationality	Years of general work experience	Years of sector-specific work experience	Volunteering
Respondent born in CH	0.0166	-0.0017	0.0006	-0.0123	-0.0031	0.0005
Age of respondent	0.0398	0.0147	0.0092	0.0023	0.0123	0.0070
Educational career respondent	0.0077	0.0010	0.0034	0.0013	-0.0038	0.0019
Female respondent	0.0156	0.0004	0.0033	0.0067	0.0171	-0.0007
Respondent working in HR	0.0118	-0.0003	0.0025	0.0100	0.0108	0.0003
Respondent from German-speaking CH	0.0080	0.0010	0.0029	-0.0077	-0.0001	-0.0005
Relevance apprentice training for firm	0.0083	0.0029	0.0025	0.0060	0.0067	0.0028
Recruitment experience of respondent	0.0115	-0.0020	0.0020	0.0063	0.0076	0.0003
Firm size	0.0133	0.0025	0.0010	-0.0008	0.0129	0.0023
Region of firm in Switzerland	0.0140	0.0033	0.0036	-0.0090	0.0005	0.0012
Industry of firm	0.0262	0.0079	0.0061	-0.0039	0.0170	0.0040
Firm is active internationally	0.0029	0.0008	0.0029	0.0026	-0.0042	-0.0003

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in *Italic*), and the Cramér's V measure for categorical variables.

**Table B.7:** Pairwise correlations of applicant profile variables (level 1) and respondent-level variables (level 2) for high-level positions

Variables	Tertiary education	Upper-secondary education	Continuing education	Gender	Years of general work experience	Years of occupation-specific work experience	Volunteering
Respondent born in CH	0.0256	-0.0006	-0.0104	0.0019	0.0084	-0.0014	0.0005
Age of respondent	0.0437	0.0129	0.0344	0.0104	0.0005	-0.0044	0.0043
Educational career respondent	0.0212	0.0038	0.0125	0.0035	0.0046	0.0106	0.0003
Female respondent	0.0274	-0.0016	0.0109	-0.0007	-0.0033	-0.0102	-0.0014
Respondent working in HR	0.0242	-0.0030	-0.0120	-0.0001	0.0007	-0.0068	0.0008
Respondent from German-speaking CH	0.0083	-0.0013	-0.0029	-0.0001	0.0066	-0.0002	0.0001
Relevance apprentice training for firm	0.0143	0.0035	0.0116	0.0023	0.0014	-0.0015	0.0021
Recruitment experience of respondent	0.0218	-0.0021	0.0084	-0.0004	0.0004	-0.0117	-0.0004
Firm size	0.0196	0.0059	0.0163	0.0022	0.0050	-0.0118	0.0020
Region of firm in Switzerland	0.0136	0.0026	0.0199	0.0018	-0.0020	-0.0059	0.0009
Industry of firm	0.0819	0.0046	0.0660	0.0044	-0.0011	-0.0020	0.0018
Firm is active internationally	0.0162	-0.0030	-0.0095	0.0003	-0.0076	-0.0041	0.0002

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in *Italic*), and the Cramér's V measure for categorical variables.

## B.2 Robustness Tests

**Table B.8:** Summary statistics of variables for robustness tests

	N	Mean	Std. Dev.	Min	Max
<b>Administrative assistant</b>					
Time to evaluate applicant profile 1 (in minutes)	1,342	1.37	1.29	0.19	14.29 <sup>1</sup>
Time to evaluate applicant profile 2 (in minutes)	1,342	0.69	0.76	0.09	12.05
Time to evaluate applicant profile 3 (in minutes)	1,342	0.56	0.53	0.07	7.78
Time to evaluate applicant profile 4 (in minutes)	1,342	0.49	0.50	0.09	8.96
Ranking of applicant profiles	1,342	2.49	0.95	1	4
Likelihood of job interview (excluding cases with no variation)	1,342	6.8	2.36	1	10
Likelihood of job interview (excluding cases where hypothetical vacancy does not match real position in firm)	1,342	7.14	2.28	1	10
<b>IT assistant</b>					
Time to evaluate applicant profile 1 (in minutes)	412	1.25	1.17	0.09	15.52
Time to evaluate applicant profile 2 (in minutes)	412	0.65	0.64	0.06	8.45
Time to evaluate applicant profile 3 (in minutes)	412	0.51	0.42	0.06	4.89
Time to evaluate applicant profile 4 (in minutes)	412	0.47	0.83	0.01	16.02
Ranking of applicant profiles	412	2.49	0.96	1	4
Likelihood of job interview (excluding cases with no variation)	412	6.43	2.59	1	10
Likelihood of job interview (excluding cases where hypothetical vacancy does not match real position in firm)	412	6.87	2.46	1	10
<b>Sales manager</b>					
Time to evaluate applicant profile 1 (in minutes)	1,231	0.96	1.15	0.08	11.69
Time to evaluate applicant profile 2 (in minutes)	1,231	0.54	0.71	0.06	11.91
Time to evaluate applicant profile 3 (in minutes)	1,231	0.46	0.42	0.06	6.81
Time to evaluate applicant profile 4 (in minutes)	1,231	0.43	0.50	0.02	10.97
Ranking of applicant profiles	1,231	2.49	0.84	1	4
Likelihood of job interview (excluding cases with no variation)	1,231	7.83	1.82	1	10
Likelihood of job interview (excluding cases where hypothetical vacancy does not match real position in firm)	1,231	8.19	1.67	1	10
<b>IT director</b>					
Time to evaluate applicant profile 1 (in minutes)	505	0.90	1.11	0.10	9.92
Time to evaluate applicant profile 2 (in minutes)	505	0.57	0.97	0.07	11.24
Time to evaluate applicant profile 3 (in minutes)	505	0.47	0.58	0.07	8.33
Time to evaluate applicant profile 4 (in minutes)	505	0.40	0.36	0.06	4.02
Ranking of applicant profiles	505	2.48	0.82	1	4
Likelihood of job interview (excluding cases with no variation)	505	7.83	1.8	1	10
Likelihood of job interview (excluding cases where hypothetical vacancy does not match real position in firm)	505	8.18	1.65	1	10

*Notes:* We excluded cases where the respondent needed more than 15 minutes.

## B.2.1 Excluding Cases Where Vacancy Does Not Match Real Positions in Firm

**Table B.9:** Results of baseline regression models for entry-level positions with cases excluded where vacancy does not match real position in firm

Likelihood for job Interview (1-10)	Administrative assistant			IT assistant		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant upper-secondary education:						
General	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	0.879*** (0.059)	0.926*** (0.104)	0.915*** (0.104)	1.086*** (0.113)	1.007*** (0.202)	1.006*** (0.202)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	5.187*** (0.111)	4.547*** (0.353)	5.393*** (0.756)	4.701*** (0.217)	4.039*** (0.718)	4.926*** (1.422)
Std. Dev. Random intercept	1.420*** (0.046)	1.416*** (0.045)	1.343*** (0.044)	1.586*** (0.090)	1.582*** (0.090)	1.389*** (0.085)
Std. Dev. residual	1.599*** (0.022)	1.599*** (0.022)	1.599*** (0.022)	1.644*** (0.042)	1.643*** (0.042)	1.644*** (0.042)
N of observations	3,433	3,433	3,433	1,004	1,004	1,004
N of respondents	868	868	868	254	254	254
Log-Likelihood	-7,096.81	-7,094.612	-7,060.456	-2,119.365	-2,118.722	-2,093.696

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.10:** Results of baseline regression models for high-level positions with cases excluded where vacancy does not match real position in firm

Likelihood for job interview (1-10)	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant tertiary education:						
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
PET	0.244*** (0.043)	0.239*** (0.046)	0.239*** (0.046)	-0.089 (0.058)	-0.083 (0.064)	-0.089 (0.064)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	7.310*** (0.100)	6.747*** (0.352)	6.366*** (0.806)	7.605*** (0.137)	7.983*** (0.516)	7.805*** (0.900)
Std. Dev. Random intercept	1.290*** (0.041)	1.287*** (0.041)	1.236*** (0.040)	1.338*** (0.061)	1.336*** (0.061)	1.187*** (0.056)
Std. Dev. residual	1.038** (0.017)	1.038** (0.017)	1.038** (0.017)	0.941*** (0.022)	0.941*** (0.022)	0.941*** (0.022)
N of observations	2,619	2,619	2,619	1,219	1,219	1,219
N of respondents	662	662	662	308	308	308
Log-Likelihood	-4,463.424	-4,462.027	-4,439.355	-1,993.645	-1,993.347	-1,961.287

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## B.2.2 Ranking of Applicant Profiles as Dependent Variable

**Table B.11:** Results of baseline regression models for entry-level positions with ranking of applicant profiles as dependent variable

Ranking of applicant profiles by respondent (1-4)	Administrative assistant			IT assistant		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant upper-secondary education:						
General	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	0.421*** (0.031)	0.349*** (0.042)	0.353*** (0.043)	0.546*** (0.056)	0.345*** (0.074)	0.353*** (0.075)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	1.454*** (0.046)	1.423*** (0.050)	1.425*** (0.068)	1.286*** (0.085)	1.176*** (0.095)	1.104*** (0.115)
Std. Dev. Random intercept	0.000*** (0.000)	0.000 (2.393)	0.000*** (0.000)	0.000 (4.384)	0.000*** (0.000)	0.000*** (0.000)
Std. Dev. residual	0.829*** (0.007)	0.829*** (0.009)	0.828*** (0.007)	0.817*** (0.017)	0.814*** (0.015)	0.813*** (0.015)
N of observations	5,315	5,315	5,315	1,626	1,626	1,626
N of respondents	1,342	1,342	1,342	412	412	412
Log-Likelihood	-6545.007	-6542.197	-6539.984	-1978.840	-1972.676	-1970.054

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.12:** Results of baseline regression models for high-level positions with ranking of applicant profiles as dependent variable

Ranking of applicant profiles by respondent (1-4)	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant tertiary education:						
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
PET	0.185*** (0.030)	0.162*** (0.031)	0.162*** (0.031)	-0.086* (0.045)	-0.115** (0.050)	-0.115** (0.050)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	1.832*** (0.054)	1.722*** (0.066)	1.710*** (0.071)	1.917*** (0.082)	1.795*** (0.104)	1.824*** (0.113)
Std. Dev. Random intercept	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Std. Dev. residual	0.818*** (0.008)	0.818*** (0.008)	0.818*** (0.008)	0.799*** (0.013)	0.799*** (0.013)	0.798*** (0.013)
N of observations	4,869	4,869	4,869	1,989	1,989	1,989
N of respondents	1,231	1,231	1,231	505	505	505
Log-Likelihood	-5,932.485	-5,928.46	-5,927.862	-2,376.73	-2,374.811	-2,373.583

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

### B.2.3 Including Variables Controlling for Responding Time

**Table B.13:** Results of baseline regression models for entry-level positions including time variables

Likelihood for job inter- view (1-10)	Administrative assistant			IT assistant		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant upper-second- ary education:						
General	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	0.916*** (0.063)	0.970*** (0.088)	0.964*** (0.088)	1.122*** (0.114)	0.860*** (0.159)	0.852*** (0.157)
Time to evaluate applicant profile 1	0.039 (0.039)	0.028 (0.039)	0.044 (0.038)	-0.043 (0.070)	-0.084 (0.070)	-0.071 (0.067)
Time to evaluate applicant profile 2	-0.098 (0.078)	-0.106 (0.074)	-0.097 (0.068)	-0.055 (0.210)	0.069 (0.201)	0.037 (0.220)
Time to evaluate applicant profile 3	0.078 (0.090)	0.055 (0.091)	0.102 (0.074)	0.333 (0.266)	0.275 (0.229)	0.232 (0.239)
Time to evaluate applicant profile 4	0.078 (0.094)	0.096 (0.091)	0.112 (0.091)	0.027 (0.052)	0.020 (0.046)	0.058 (0.063)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	5.078*** (0.124)	4.436*** (0.201)	5.695*** (0.531)	4.325*** (0.248)	2.802*** (0.421)	3.275*** (1.078)
Std. Dev. Random intercept	1.519*** (0.044)	1.503*** (0.043)	1.415*** (0.043)	1.840*** (0.081)	1.775*** (0.079)	1.622*** (0.071)
Std. Dev. residual	1.633*** (0.030)	1.633*** (0.030)	1.633*** (0.030)	1.677*** (0.053)	1.674*** (0.053)	1.674*** (0.053)
N of observations	5,239	5,239	5,239	1,614	1,614	1,614
N of respondents	1,323	1,323	1,323	409	409	409
Log-Likelihood	-10,985.78	-10,974.05	-10,913.63	-3,481.768	-3,467.587	-3,438.105

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.14:** Results of baseline regression models for high-level positions including time variables

Likelihood for job interview (1-10)	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant tertiary education:						
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
PET	0.251*** (0.037)	0.241*** (0.040)	0.241*** (0.040)	-0.067 (0.054)	-0.087 (0.064)	-0.091 (0.064)
Time to evaluate applicant profile 1	0.100*** (0.027)	0.085*** (0.026)	0.083*** (0.027)	0.067 (0.062)	0.056 (0.061)	0.033 (0.062)
Time to evaluate applicant profile 2	0.112** (0.050)	0.113** (0.048)	0.116*** (0.045)	0.048 (0.074)	0.055 (0.074)	0.041 (0.077)
Time to evaluate applicant profile 3	0.035 (0.111)	0.001 (0.108)	0.062 (0.113)	0.018 (0.142)	0.024 (0.138)	0.042 (0.143)
Time to evaluate applicant profile 4	0.055 (0.099)	0.053 (0.095)	0.031 (0.096)	0.050 (0.267)	0.034 (0.280)	0.137 (0.274)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	7.080*** (0.106)	6.456*** (0.201)	6.677*** (0.653)	7.414*** (0.155)	6.926*** (0.329)	6.799*** (0.935)
Std. Dev. Random intercept	1.565*** (0.065)	1.549*** (0.062)	1.509*** (0.060)	1.619*** (0.109)	1.612*** (0.107)	1.511*** (0.099)
Std. Dev. residual	1.068** (0.030)	1.068** (0.030)	1.068** (0.030)	0.991 (0.042)	0.991 (0.042)	0.991 (0.042)
N of observations	4,617	4,617	4,617	1,889	1,889	1,889
N of respondents	1,167	1,167	1,167	480	480	480
Log-Likelihood	-8,166.681	-8,155.688	-8,128.645	-3,249.043	-3,246.747	-3,218.735

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.



## B.2.4 Excluding Cases without Variation in Evaluations

**Table B.15:** Results of baseline regression models for entry-level positions excluding cases with no variation in dependent variable over all evaluated applicant profiles

Likelihood for job interview (1-10)	Administrative assistant			IT assistant		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant upper-secondary education:						
General	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	1.038*** (0.070)	1.066*** (0.098)	1.066*** (0.098)	1.273*** (0.126)	0.970*** (0.173)	0.956*** (0.172)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	4.734*** (0.109)	3.958*** (0.194)	5.411*** (0.540)	4.122*** (0.208)	2.991*** (0.388)	3.649*** (1.043)
Std. Dev. random intercept	1.355*** (0.043)	1.329*** (0.042)	1.253*** (0.043)	1.623*** (0.074)	1.584*** (0.075)	1.404*** (0.068)
Std. Dev. residual	1.716*** (0.031)	1.715*** (0.031)	1.715*** (0.031)	1.741*** (0.056)	1.737*** (0.056)	1.737*** (0.056)
N of observations	4,604	4,604	4,604	1,433	1,433	1,433
N of respondents	1,160	1,160	1,160	363	363	363
Log-Likelihood	-9739.816	-9723.653	-9675.906	-3097.523	-3088.349	-3056.047

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.16:** Results of baseline regression models for high-level positions excluding cases with no variation in dependent variable over all evaluated applicant profiles

Likelihood for job interview (1-10)	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Applicant tertiary education:						
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
PET	0.324*** (0.048)	0.315*** (0.051)	0.313*** (0.051)	-0.117 (0.076)	-0.158* (0.092)	-0.159* (0.091)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	6.889*** (0.097)	6.512*** (0.182)	6.762*** (0.603)	7.063*** (0.143)	6.959*** (0.329)	8.047*** (0.873)
Std. Dev. Random intercept	1.306*** (0.061)	1.300*** (0.060)	1.243*** (0.057)	1.346*** (0.111)	1.344*** (0.111)	1.216** (0.095)
Std. Dev. residual	1.229*** (0.033)	1.229*** (0.033)	1.229*** (0.033)	1.170*** (0.046)	1.169*** (0.046)	1.169*** (0.046)
N of observations	3,588	3,588	3,588	1,366	1,366	1,366
N of respondents	906	906	906	345	345	345
Log-Likelihood	-6600.243	-6596.719	-6563.898	-2467.968	-2467.048	-2438.699

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## B.2.5 Baseline Results with Differentiated Explanatory Variables

**Table B.17:** Baseline regression models for entry-level positions – VET and VET+FVB

Likelihood for job inter- view (1-10)	Administrative assistant			IT assistant		
	(1)	(2)	(3)	(4)	(5)	(6)
Upper-secondary educa- tion of applicant:						
General education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	0.912*** (0.067)	1.003*** (0.103)	0.998*** (0.103)	1.015*** (0.119)	0.961*** (0.192)	0.942*** (0.189)
VET + federal voca- tional baccalaureate	0.905*** (0.067)	1.090*** (0.173)	1.083*** (0.173)	1.236*** (0.126)	1.135*** (0.330)	1.100*** (0.326)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	5.123*** (0.104)	4.494*** (0.200)	5.815*** (0.522)	4.380*** (0.200)	2.946*** (0.400)	3.465*** (1.084)
N of observations		5,315			1,626	
N of respondents		1,342			412	
Log-likelihood	-11,148.93	-11,136.6	-11,076.41	-3,504.477	-3,491.722	-3,461.861

*Notes:* Table displays results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. Models (1) through (3) display results for the entry-level position ‘administrative assistant’, while models (4) through (6) display results for the entry-level position ‘IT assistant’. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.18:** Baseline regression models for high-level positions – UAS and university

Likelihood for job interview (1-10)	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Tertiary education of applicant:						
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
UAS	0.073 (0.045)	0.070 (0.048)	0.070 (0.048)	0.154** (0.065)	0.145** (0.067)	0.146** (0.067)
PET	0.264*** (0.040)	0.261*** (0.045)	0.260*** (0.045)	-0.043 (0.054)	-0.058 (0.067)	-0.060 (0.067)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey design controls	No	Yes	Yes	No	Yes	Yes
Respondent controls	No	No	Yes	No	No	Yes
Constant	7.252*** (0.086)	6.596*** (0.184)	6.549*** (0.654)	7.413*** (0.121)	6.906*** (0.314)	6.883*** (0.903)
N of observations		4,869			1,989	
N of respondents		1,231			505	
Log-likelihood	-8,612.261	-8,599.751	-8,569.698	-3,421.429	-3,418.646	-3,394.194

*Notes:* Table displays results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. Models (1) through (3) display results for the entry-level position as ‘sales manager’, while models (4) through (6) display results for the entry-level position as ‘IT director’. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

### B.3 Summary Statistics and External Validity

**Table B.19:** Summary statistics of the variables included in the estimations for the entry-level position ‘Administrative assistant’

	N of respondents	Mean	Std. Dev.	Min	Max
<b>Dependent variable</b>					
Likelihood for invitation to job interview	1,342	6.96	2.37	1	10
<b>Explanatory variable</b>					
Upper-secondary education: VET or VET with federal vocational baccalaureate (versus general education)	1,342	0.66	-	0	1
<b>Respondent-level variables approximating familiarity</b>					
Working in HR	1,342	0.49	-	0	1
Recruitment experience					
Little experience	1,342	0.48	-	0	1
Much experience	1,342	0.52	-	0	1
Born in Switzerland	1,342	0.91	-	0	1
Educational career	1,342				
General	1,342	0.16	-	0	1
Mixed education	1,342	0.32	-	0	1
VET/PET	1,342	0.52	-	0	1
Respondent from German-speaking part	1,342	0.94	-	0	1
Familiarity through employment	1,342				
Low familiarity	1,342	0.34	-	0	1
Medium familiarity	1,342	0.31	-	0	1
High familiarity	1,342	0.35	-	0	1
Familiarity through biography					
Low familiarity		0.05	-	0	1
Medium familiarity	1,342	0.21	-	0	1
High familiarity	1,342	0.75	-	0	1
<b>Survey design variables</b>					
Position of applicant profile within set of four applicant profiles	1,342	2.49	1.12	1	4
Hypothetical position matching positions in firm	1,342	2.82	1.04	1	5
Respondent received support letter or not	1,342	0.68	-	0	1
<b>Other respondent-level variables</b>					
Female	1,342	0.51	-	0	1
Age	1,342	45.94	10.45	20	70
Firm is internationally active	1,342	0.17	-	0	1
Relevance of training apprentices for firm	1,342	2.62	1.20	1	4
Firm size					
<10 employees	1,342	0.12	-	0	1
10-49 employees	1,342	0.37	-	0	1
50-249 employees	1,342	0.33	-	0	1
250+ employees	1,342	0.18	-	0	1
Firm industry					
Agriculture, forestry and fishing	1,342	0.02	-	0	1
Mining and quarrying	1,342	0.00	-	0	1
Manufacturing/production of goods	1,342	0.19	-	0	1
Energy supply	1,342	0.02	-	0	1
Water supply; sewage and waste disposal	1,342	0.01	-	0	1
Construction/building	1,342	0.20	-	0	1
Wholesale and retail trade; repair of motorcycles	1,342	0.10	-	0	1

	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Transport and storage	1,342	0.02	-	0	1
Hospitality/accommodation and gastronomy	1,342	0.04	-	0	1
Information and communication	1,342	0.02	-	0	1
Provision of financial and other services	1,342	0.04	-	0	1
Real estate and housing	1,342	0.02	-	0	1
Provision of professional, scientific and technical services	1,342	0.04	-	0	1
Provision of other services	1,342	0.05	-	0	1
Public administration, defence, social security	1,342	0.15	-	0	1
Education and teaching	1,342	0.02	-	0	1
Health and social services	1,342	0.03	-	0	1
Art, entertainment and recreation	1,342	0.01	-	0	1
Other services	1,342	0.04	-	0	1
<b>Firm region</b>					
Région lémanique	1,342	0.04	-	0	1
Espace Mittelland	1,342	0.20	-	0	1
North-Western Switzerland	1,342	0.15	-	0	1
Zürich	1,342	0.24	-	0	1
Eastern Switzerland	1,342	0.22	-	0	1
Central Switzerland	1,342	0.13	-	0	1
Ticino	1,342	0.01	-	0	1

*Notes:* Table does not include applicant control variables.

**Table B.20:** Summary statistics of the variables included in the estimations for the entry-level position ‘IT assistant’

	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Dependent variable</b>					
Likelihood for invitation to job interview	412	6.53	2.66	1	10
<b>Explanatory variable</b>					
Upper-secondary education: VET or VET with federal vocational baccalaureate (versus general education)	412	0.66	-	0	1
<b>Respondent-level variables approximating familiarity</b>					
Working in HR	412	0.47	-	0	1
Recruitment experience					
Little experience	412	0.46	-	0	1
Much experience	412	0.54	-	0	1
Born in Switzerland	412	0.88	-	0	1
Educational career					
General	412	0.21	-	0	1
Mixed education	412	0.36	-	0	1
VET/PET	412	0.42	-	0	1
Respondent from German-speaking part	412	0.86	-	0	1
Familiarity through employment					
Low familiarity	412	0.33	-	0	1
Medium familiarity	412	0.33	-	0	1
High familiarity	412	0.34	-	0	1
Familiarity through biography					
Low familiarity	412	0.1	-	0	1
Medium familiarity	412	0.28	-	0	1
High familiarity	412	0.63	-	0	1
<b>Survey design variables</b>					
Position of applicant profile within set of four applicant profiles	412	2.50	1.12	1	4
Hypothetical position matching positions in firm	412	2.72	1.03	1	5
Respondent received support letter or not	412	0.67	-	0	1
<b>Other respondent-level variables</b>					
Female	412	0.33	-	0	1
Age	412	46.16	10.44	19	77
Firm is internationally active	412	0.22	-	0	1
Relevance of training apprentices for firm	412	4.53	0.80	1	5
Firm size					
<10 employees	412	0.16	-	0	1
10-49 employees	412	0.39	-	0	1
50-249 employees	412	0.26	-	0	1
250+ employees	412	0.20	-	0	1
Firm industry					
Agriculture, forestry and fishing	412	0.03	-	0	1
Mining and quarrying	412	0.00	-	0	1
Manufacturing/production of goods	412	0.18	-	0	1
Energy supply	412	0.02	-	0	1
Water supply; sewage and waste disposal	412	0.01	-	0	1
Construction/building	412	0.14	-	0	1
Wholesale and retail trade; repair of motor-cycles	412	0.06	-	0	1
Transport and storage	412	0.02	-	0	1

	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Hospitality/accommodation and gastronomy	412	0.02	-	0	1
Information and communication	412	0.23	-	0	1
Provision of financial and other services	412	0.03	-	0	1
Real estate and housing	412	0.01	-	0	1
Provision of professional, scientific and technical services	412	0.07	-	0	1
Provision of other services	412	0.04	-	0	1
Public administration, defence, social security	412	0.07	-	0	1
Education and teaching	412	0.02	-	0	1
Health and social services	412	0.02	-	0	1
Art, entertainment and recreation	412	0.00	-	0	1
Other services	412	0.04	-	0	1
<b>Firm region</b>					
Région lémanique	412	0.09	-	0	1
Espace Mittelland	412	0.23	-	0	1
North-Western Switzerland	412	0.12	-	0	1
Zürich	412	0.20	-	0	1
Eastern Switzerland	412	0.19	-	0	1
Central Switzerland	412	0.16	-	0	1
Ticino	412	0.01	-	0	1

*Notes:* Table does not include applicant control variables.

**Table B.21:** Summary statistics of the variables included in the estimations for the high-level position ‘sales manager’

	N of respondents	Mean	Std. Dev.	Min	Max
<b>Dependent variable</b>					
Likelihood for invitation to job interview	1,231	8.00	1.92	1	10
<b>Explanatory variable</b>					
Tertiary education: PET (versus degree from university or university of applied sciences)	1,231	0.40	-	0	1
<b>Respondent-level variables approximating familiarity</b>					
Working in HR	1,231	0.46	-	0	1
Recruitment experience					
Little experience	1,231	0.48	-	0	1
Much experience	1,231	0.52	-	0	1
Born in Switzerland	1,231	0.91	-	0	1
Educational career					
General	1,231	0.16	-	0	1
Mixed education	1,231	0.30	-	0	1
VET/PET	1,231	0.53	-	0	1
Respondent from German-speaking part	1,231	0.93	-	0	1
Familiarity through employment					
Low familiarity	1,231	0.36	-	0	1
Medium familiarity	1,231	0.31	-	0	1
High familiarity	1,231	0.33	-	0	1
Familiarity through biography					
Low familiarity	1,231	0.05	-	0	1
Medium familiarity	1,231	0.21	-	0	1
High familiarity	1,231	0.74	-	0	1
<b>Survey design variables</b>					
Position of applicant profile within set of four applicant profiles	1,231	2.49	1.12	1	4
Hypothetical position matching positions in firm	1,231	2.55	1.06	1	5
Respondent received support letter or not	1,231	0.67	-	0	1
<b>Other respondent-level variables</b>					
Female	1,231	0.48	-	0	1
Age	1,231	45.80	10.40	19	74
Firm is internationally active	1,231	0.18	-	0	1
Relevance of training apprentices for firm	1,231	4.65	0.68	1	5
Firm size					
<10 employees	1,231	0.14	-	0	1
10-49 employees	1,231	0.39	-	0	1
50-249 employees	1,231	0.30	-	0	1
250+ employees	1,231	0.17	-	0	1
Firm industry					
Agriculture, forestry and fishing	1,231	0.02	-	0	1
Mining and quarrying	1,231	0.00	-	0	1
Manufacturing/production of goods	1,231	0.22	-	0	1
Energy supply	1,231	0.01	-	0	1
Water supply; sewage and waste disposal	1,231	0.01	-	0	1
Construction/building	1,231	0.19	-	0	1
Wholesale and retail trade; repair of motor-cycles	1,231	0.12	-	0	1
Transport and storage	1,231	0.02	-	0	1



	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Hospitality/accommodation and gastronomy	1,231	0.04	-	0	1
Information and communication	1,231	0.02	-	0	1
Provision of financial and other services	1,231	0.03	-	0	1
Real estate and housing	1,231	0.02	-	0	1
Provision of professional, scientific and technical services	1,231	0.02	-	0	1
Provision of other services	1,231	0.04	-	0	1
Public administration, defence, social security	1,231	0.16	-	0	1
Education and teaching	1,231	0.01	-	0	1
Health and social services	1,231	0.02	-	0	1
Art, entertainment and recreation	1,231	0.01	-	0	1
Other services	1,231	0.04	-	0	1
<b>Firm region</b>					
Région lémanique	1,231	0.05	-	0	1
Espace Mittelland	1,231	0.20	-	0	1
North-Western Switzerland	1,231	0.14	-	0	1
Zürich	1,231	0.22	-	0	1
Eastern Switzerland	1,231	0.23	-	0	1
Central Switzerland	1,231	0.15	-	0	1
Ticino	1,231	0.01	-	0	1

*Notes:* Table does not include applicant control variables.

**Table B.22:** Summary statistics of the variables included in the estimations for the high-level position ‘IT director’

	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Dependent variable</b>					
Likelihood for invitation to job interview	505	8.02	1.95	1	10
<b>Explanatory variable</b>					
Tertiary education: PET (versus degree from university or university of applied sciences)	505	0.40	-	0	1
<b>Respondent-level variables approximating familiarity</b>					
Working in HR	505	0.53	-	0	1
Recruitment experience				0	1
Little experience	505	0.46	-	0	1
Much experience	505	0.54	-	0	1
Born in Switzerland	505	0.87	-	0	1
Educational career					
General	505	0.21	-	0	1
Mixed education	505	0.39	-	0	1
VET/PET	505	0.40	-	0	1
Respondent from German-speaking part	505	0.91	-	0	1
Familiarity through employment					
Low familiarity	505	0.31	-	0	1
Medium familiarity	505	0.31	-	0	1
High familiarity	505	0.38	-	0	1
Familiarity through biography					
Low familiarity	505	0.08	-	0	1
Medium familiarity	505	0.27	-	0	1
High familiarity	505	0.66	-	0	1
<b>Survey design variables</b>					
Position of applicant profile within set of four applicant profiles	505	2.50	1.12	1	4
Hypothetical position matching positions in firm	505	2.69	1.04	1	5
Respondent received support letter or not	505	0.68	-	0	1
<b>Other respondent-level variables</b>					
Female	505	0.48	-	0	1
Age	505	45.80	10.40	19	74
Firm is internationally active	505	0.18	-	0	1
Relevance of training apprentices for firm	505	4.56	0.79	1	5
Firm size					
<10 employees	505	0.12	-	0	1
10-49 employees	505	0.34	-	0	1
50-249 employees	505	0.33	-	0	1
250+ employees	505	0.20	-	0	1
Firm industry					
Agriculture, forestry and fishing	505	0.03	-	0	1
Mining and quarrying	505	0.00	-	0	1
Manufacturing/production of goods	505	0.12	-	0	1
Energy supply	505	0.04	-	0	1
Water supply; sewage and waste disposal	505	0.01	-	0	1
Construction/building	505	0.15	-	0	1
Wholesale and retail trade; repair of motorcycles	505	0.03	-	0	1
Transport and storage	505	0.02	-	0	1

	<b>N of respondents</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Hospitality/accommodation and gastronomy	505	0.02	-	0	1
Information and communication	505	0.18	-	0	1
Provision of financial and other services	505	0.05	-	0	1
Real estate and housing	505	0.01	-	0	1
Provision of professional, scientific and technical services	505	0.10	-	0	1
Provision of other services	505	0.06	-	0	1
Public administration, defence, social security	505	0.05	-	0	1
Education and teaching	505	0.04	-	0	1
Health and social services	505	0.04	-	0	1
Art, entertainment and recreation	505	0.01	-	0	1
Other services	505	0.05	-	0	1
<b>Firm region</b>					
Région lémanique	505	0.05	-	0	1
Espace Mittelland	505	0.20	-	0	1
North-Western Switzerland	505	0.15	-	0	1
Zürich	505	0.25	-	0	1
Eastern Switzerland	505	0.19	-	0	1
Central Switzerland	505	0.14	-	0	1
Ticino	505	0.01	-	0	1

*Notes:* Table does not include applicant control variables.

### B.3.1 Comparison of Sample Characteristics to Population Characteristics

**Table B.23:** Comparison of shares in population and sample characteristics

	Population of firms that train apprentices (N=191'973)	Contacted sample (N=49,906)	Responding sample (N=2,384)
<b>Gender of respondent</b>			
Female	<i>Not applicable</i>	50.15%	48.41%
Male	<i>Not applicable</i>	38.66%	39.68%
No indication	<i>Not applicable</i>	11.19%	11.91%
Total		100.00%	100.00%
<b>Firm size</b>			
<10	25.62%	<i>No information</i>	12.75%
10-49	35.64%	<i>No information</i>	32.97%
50-250	25.56%	<i>No information</i>	30.33%
250+	13.18%	<i>No information</i>	17.70%
No indication	0.00%	<i>No information</i>	6.25%
Total	100.00%		100.00%
<b>Language of respondent</b>			
German-speaking Switzerland	<i>No information</i>	76.14%	85.99%
French-/Italian-speaking regions	<i>No information</i>	17.05%	6.8%
No indication	<i>No information</i>	6.81%	7.21%
Total		100.00%	100.00%
<b>Region of firm in Switzerland</b>			
Région lémanique	14.03%	11.07%	5.45%
Espace Mittelland	23.5%	19.42%	20.22%
North-western Switzerland	13.55%	12.11%	14.01%
Zürich	17.89%	17.79%	22.99%
Eastern Switzerland	16.66%	17.18%	21.6%
Central Switzerland	12.32%	14.05%	14.39%
Ticino	3.24%	3.08%	0.8%
No indication	0.00%	5.3%	0.55%
Total	100.00%	100.00%	100.00%

*Notes:* Data on the population of firms that train apprentices stems from the Swiss Federal Statistical Office (FSO, 2019b, 2019c).

## B.4 Principal-Factor Analysis for Familiarity Variables

### B.4.1 Factor Analysis for Familiarity Variables

**Table B.24:** Factor analysis for familiarity variables

<b>Factor</b>	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
Factor1	1.326	0.109	0.265	0.265
Factor2	1.216	0.243	0.243	0.508
Factor3	0.973	0.154	0.195	0.703
Factor4	0.819	0.153	0.164	0.867
Factor5	0.666	.	0.133	1.000

*Notes:* Table displays results of principal-factor analysis of the familiarity variables. N=2,384.

**Table B.25:** Factor analysis for familiarity variables: rotated factor loadings and unique variances

<b>Factor</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Uniqueness</b>
Working in HR	0.812	-0.043	0.339
Recruitment experience	0.811	-0.042	0.341
Born in Switzerland	-0.015	0.508	0.742
Respondent from German-speaking part	0.011	0.638	0.593
Respondent with VET/PET career	0.094	0.740	0.443

*Notes:* Table displays results of principal-factor analysis of the familiarity variables after rotation. N=2,384.

## B.5 Individual Fixed Effects Models

### B.5.1 Results of Fixed-Effects Models

**Table B.26:** Results of baseline regression models for entry-level positions with respondent fixed effects

Likelihood for job interview (1-10)	Administrative assistant		IT assistant	
	(1)	(2)	(3)	(4)
General	Ref.	Ref.	Ref.	Ref.
VET	0.918*** (0.063)	0.989*** (0.088)	1.130*** (0.114)	0.869*** (0.158)
Applicant controls				
Female applicant	0.160*** (0.045)	0.173*** (0.048)	0.054 (0.084)	0.009 (0.090)
Nationality				
CH	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
DE/FR	-0.414*** (0.065)	-0.411*** (0.065)	-0.438*** (0.121)	-0.445*** (0.120)
PT	-0.312*** (0.063)	-0.306*** (0.064)	-0.247** (0.117)	-0.259** (0.117)
TK	-0.391*** (0.066)	-0.383*** (0.067)	-0.453*** (0.124)	-0.471*** (0.123)
Volunteering applicant	0.033 (0.046)	0.034 (0.046)	0.153* (0.086)	0.154* (0.086)
Duration of work experience of applicant	0.390*** (0.020)	0.390*** (0.020)	0.469*** (0.038)	0.468*** (0.038)
Sector-specific experience of applicant	0.534*** (0.051)	0.536*** (0.051)	0.319*** (0.087)	0.317*** (0.087)
Survey design controls				
Position of applicant profile within set of four applicant profiles		-0.036 (0.032)		0.130** (0.060)
Constant	5.096*** (0.089)	5.127*** (0.090)	4.363*** (0.178)	4.243*** (0.189)
N of observations	5,315	5,315	1,626	1,626
N of respondents	1,342	1,342	412	412
Log-likelihood	-9364.128	-9363.491	-2907.095	-2904.597

*Notes:* Table displays results of respondent fixed-effects regression models with robust standard errors in parentheses. Models (1) and (2) display results for the entry-level position ‘administrative assistant’, while models (3) and (4) display results for ‘IT assistant’. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.27:** Results of baseline regression models for high-level positions with respondent fixed effects

Likelihood for job inter- view (1-10)	Sales manager		IT director	
	(1)	(2)	(3)	(4)
University	Ref.	Ref.	Ref.	Ref.
PET	0.243*** (0.036)	0.237*** (0.03)	-0.090* (0.053)	-0.110* (0.063)
Applicant controls				
Upper-secondary education of applicant	0.196*** (0.035)	0.155* (0.083)	0.287*** (0.052)	0.173 (0.143)
Completed continuing edu- cation	0.118*** (0.031)	0.105*** (0.040)	0.243*** (0.045)	0.211*** (0.061)
Gender of applicant	0.089*** (0.032)	0.089*** (0.032)	0.032 (0.047)	0.032 (0.047)
Social skills of applicant	0.062** (0.028)	0.063** (0.028)	0.034 (0.044)	0.035 (0.044)
Duration of work experience of applicant	0.060*** (0.019)	0.060*** (0.019)	0.034 (0.027)	0.034 (0.027)
Occupation-specific experi- ence of applicant	0.134*** (0.019)	0.134*** (0.019)	0.117*** (0.028)	0.117*** (0.028)
Survey design controls				
Position of applicant profile within set of four applicant profiles		0.021 (0.037)		0.056 (0.064)
Constant	7.093*** (0.083)	7.110*** (0.090)	7.190*** (0.118)	7.240*** (0.137)
N of observations	4,869	4,869	1,989	1,989
N of respondents	1,231	1,231	505	505
Log-likelihood	-6503.865	-6503.700	-2496.033	-2495.449

*Notes:* Table displays results of respondent fixed-effects regression models with robust standard errors in parentheses. Models (1) and (2) display results for the high-level position ‘sales manager’, while models (3) and (4) display results for ‘IT director’. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## B.6 Result Tables of Baseline Regressions

**Table B.28:** Detailed regression results for position ‘Administrative assistant’

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
General education	Ref.	Ref.	Ref.
VET or VET with federal vocational baccalaureate	0.909*** (0.063)	0.958*** (0.087)	0.953*** (0.087)
<b>Applicant controls</b>			
Female applicant	0.158*** (0.045)	0.167*** (0.048)	0.166*** (0.048)
Nationality of applicant			
CH	Ref.	Ref.	Ref.
DE/FR	-0.415*** (0.065)	-0.414*** (0.065)	-0.414*** (0.065)
PT	-0.315*** (0.063)	-0.312*** (0.064)	-0.314*** (0.064)
TK	-0.392*** (0.066)	-0.387*** (0.066)	-0.388*** (0.066)
Volunteering applicant	0.030 (0.046)	0.030 (0.046)	0.029 (0.046)
General work experience of applicant	0.386*** (0.020)	0.386*** (0.020)	0.386*** (0.020)
Sector-specific work experience of applicant	0.532*** (0.050)	0.533*** (0.050)	0.533*** (0.050)
<b>Survey design controls</b>			
Position of applicant profile within set of four applicant profiles		-0.025 (0.032)	-0.023 (0.032)
Hypothetical position matching positions in firm		0.208*** (0.047)	0.178*** (0.046)
Respondent received support letter		0.160 (0.107)	0.086 (0.103)
<b>Respondent controls</b>			
Age of respondent			-0.029*** (0.005)
Female respondent			-0.002 (0.104)
Respondent born in Switzerland			-0.053 (0.163)
Educational career of respondent			
General education			Ref.
Mixed education			0.004 (0.135)
VPET			-0.252* (0.132)
Recruitment experience			
Little experience			Ref.
Much experience			-0.004 (0.110)
Respondent from German-speaking part of CH			0.249 (0.288)
Respondent working in HR			0.101 (0.120)
Relevance of apprentice training for respondent's firm			0.099 (0.066)
Firm size			
<10 employees			Ref.
10-49 employees			-0.112 (0.175)
50-249 employees			-0.307 (0.195)
250+ employees			-0.215 (0.213)
Firm region			



<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Région lémanique			Ref.
Espace Mittelland			0.012 (0.328)
North-Western Switzerland			-0.095 (0.356)
Zurich			-0.133 (0.350)
Eastern Switzerland			0.138 (0.345)
Central Switzerland			-0.009 (0.355)
Ticino			-0.452 (0.407)
Firm industry			Ref.
Agriculture, forestry and fishing			Ref.
Mining and quarrying			-0.474 (0.858)
Manufacturing/production of goods			-0.324 (0.276)
Energy supply			-0.729* (0.439)
Water supply; sewage and waste disposal and pollution abatement			-0.681 (0.443)
Construction/building			-0.531* (0.275)
Wholesale and retail trade; repair of motor vehicles and motorcycles			-0.056 (0.282)
Transport and storage			-0.636 (0.447)
Hospitality/accommodation and gastronomy			0.540 (0.335)
Information and communication			-0.241 (0.413)
Provision of financial and other services			0.204 (0.329)
Real estate and housing			-0.231 (0.405)
Provision of professional, scientific and technical services			-0.710** (0.361)
Provision of other services			0.127 (0.309)
Public administration, defence, social security			-0.033 (0.269)
Education and teaching			-0.208 (0.493)
Health and social services			-0.305 (0.390)
Art, entertainment and recreation			1.168*** (0.374)
Other services			-0.334 (0.345)
Firm is internationally active			0.208 (0.129)
Constant	5.123*** (0.104)	4.452*** (0.194)	5.771*** (0.523)
Std. Dev. random intercept	1.536*** (0.038)	1.519*** (0.038)	1.433*** (0.037)
Std. Dev. residual	1.630*** (0.018)	1.630*** (0.018)	1.630*** (0.018)
N of observations	5,315	5,315	5,315
N of respondents	1,342	1,342	1,342
Log-likelihood	-11148.942	-11136.979	-11076.777

Notes: Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.29:** Detailed regression results for position ‘IT assistant’

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
General education	Ref.	Ref.	Ref.
VET or VET with federal vocational baccalaureate	1.125*** (0.114)	0.864*** (0.158)	0.856*** (0.156)
<b>Applicant controls</b>			
Female applicant	0.053 (0.083)	0.006 (0.089)	0.003 (0.089)
Nationality of applicant			
CH	Ref.	Ref.	Ref.
DE/FR	- 0.445*** (0.121)	- 0.452*** (0.120)	- 0.452*** (0.120)
PT	-0.252** (0.117)	-0.265** (0.116)	-0.267** (0.116)
TK	- 0.467*** (0.124)	- 0.484*** (0.123)	- 0.484*** (0.123)
Volunteering applicant	0.154* (0.086)	0.155* (0.086)	0.154* (0.086)
General work experience of applicant	0.465*** (0.037)	0.465*** (0.037)	0.467*** (0.037)
Sector-specific work experience of applicant	0.317*** (0.086)	0.315*** (0.086)	0.315*** (0.086)
<b>Survey design controls</b>			
Position of applicant profile within set of four applicant profiles		0.132** (0.059)	0.135** (0.059)
Hypothetical position matching positions in firm		0.466*** (0.106)	0.455*** (0.102)
Respondent received support letter		0.189 (0.208)	0.086 (0.207)
<b>Respondent controls</b>			
Age of respondent			- 0.034*** (0.010)
Female respondent			-0.053 (0.216)
Respondent born in Switzerland			-0.285 (0.304)
Educational career of respondent			
General education			Ref.
Mixed education			-0.021 (0.261)
VPET			0.176 (0.261)
Recruitment experience			
Little experience			Ref.
Much experience			-0.349 (0.211)
Respondent from German-speaking part of CH			0.661 (0.425)
Respondent working in HR			-0.193 (0.231)
Relevance of apprentice training for respondent's firm			0.110 (0.113)
Firm size			
<10 employees			Ref.
10-49 employees			0.020 (0.339)
50-249 employees			0.019 (0.357)
250+ employees			-0.001 (0.421)

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
<b>Firm region</b>			
Région lémanique			Ref.
Espace Mittelland			0.647 (0.527)
North-Western Switzerland			0.741 (0.641)
Zurich			0.526 (0.607)
Eastern Switzerland			0.011 (0.593)
Central Switzerland			0.100 (0.616)
Ticino			0.051 (0.623)
<b>Firm industry</b>			
Agriculture, forestry and fishing			Ref.
Manufacturing/production of goods			0.468 (0.842)
Energy supply			0.139 (1.003)
Water supply; sewage and waste disposal and pollution abatement			-1.301 (1.183)
Construction/building			-0.032 (0.847)
Wholesale and retail trade; repair of motor vehicles and motorcycles			0.216 (0.906)
Transport and storage			-0.905 (1.004)
Hospitality/accommodation and gastronomy			0.930 (0.898)
Information and communication			0.401 (0.823)
Provision of financial and other services			-0.605 (1.121)
Real estate and housing			-0.087 (1.169)
Provision of professional, scientific and technical services			0.544 (0.857)
Provision of other services			-0.042 (0.870)
Public administration, defence, social security			-0.225 (0.882)
Education and teaching			1.716* (0.918)
Health and social services			0.585 (1.095)
Art, entertainment and recreation			2.041* (1.169)
Other services			0.077 (0.896)
Firm is internationally active			-0.018 (0.236)
Constant	4.386*** (0.178)	2.868*** (0.339)	3.393*** (0.963)
Std. Dev. random intercept	1.849*** (0.078)	1.782*** (0.076)	1.628*** (0.072)
Std. Dev. residual	1.673*** (0.034)	1.671*** (0.034)	1.671*** (0.034)
N of observations	1,626	1,626	1,626
N of respondents	412	412	412
Log-likelihood	-	-	-
	3506.703	3492.128	3462.195

Notes: Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.30:** Detailed regression results for position ‘sales manager’

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
University	Ref.	Ref.	Ref.
PET	0.243*** (0.036)	0.236*** (0.038)	0.236*** (0.038)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.194*** (0.035)	0.147* (0.082)	0.145* (0.082)
Continuing education of applicant	0.118*** (0.031)	0.103*** (0.040)	0.102** (0.040)
Female applicant	0.089*** (0.032)	0.089*** (0.032)	0.089*** (0.032)
Volunteering applicant	0.062** (0.028)	0.063** (0.028)	0.063** (0.028)
General work experience of applicant	0.061*** (0.019)	0.061*** (0.019)	0.061*** (0.019)
Occupation-specific work experience of applicant	0.135*** (0.019)	0.135*** (0.019)	0.136*** (0.019)
<b>Survey design controls</b>			
Position of applicant profile within set of four applicant profiles		0.024 (0.037)	0.025 (0.037)
Hypothetical position matching positions in firm		0.209*** (0.050)	0.225*** (0.051)
Respondent received support letter		0.172 (0.106)	0.124 (0.106)
<b>Respondent controls</b>			
Age of respondent			-0.017*** (0.005)
Female respondent			0.220** (0.107)
Respondent born in Switzerland			-0.113 (0.170)
Educational career of respondent			Ref.
General education			
Mixed education			-0.158 (0.139)
VPET			-0.253** (0.128)
Recruitment experience			Ref.
Little experience			
Much experience			-0.002 (0.109)
Respondent from German-speaking part of CH			0.840** (0.408)
Respondent working in HR			-0.043 (0.119)
Relevance of apprentice training for respondent's firm			0.098 (0.080)
Firm size			Ref.
<10 employees			
10-49 employees			0.012 (0.185)
50-249 employees			0.038 (0.201)
250+ employees			-0.091 (0.221)

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
Region of firm in Switzerland			
Région lémanique			Ref.
Espace Mittelland			-0.235 (0.474)
North-Western Switzerland			-0.187 (0.501)
Zurich			-0.324 (0.497)
Eastern Switzerland			-0.270 (0.493)
Central Switzerland			-0.218 (0.501)
Ticino			0.219 (0.436)
Industry of firm			
Agriculture, forestry and fishing			Ref.
Mining and quarrying			-0.555 (0.704)
Manufacturing/production of goods			-0.245 (0.393)
Energy supply			0.036 (0.487)
Water supply; sewage and waste disposal and pollution abatement			-0.757 (0.517)
Construction/building			-0.062 (0.391)
Wholesale and retail trade; repair of motor vehicles and motorcycles			-0.150 (0.391)
Transport and storage			0.086 (0.470)
Hospitality/accommodation and gastron- omy			0.240 (0.429)
Information and communication			-0.013 (0.425)
Provision of financial and other services			0.471 (0.435)
Real estate and housing			0.130 (0.429)
Provision of professional, scientific and technical services			0.220 (0.511)
Provision of other services			-0.142 (0.440)
Public administration, defence, social secu- rity			-0.058 (0.385)
Education and teaching			0.009 (0.819)
Health and social services			0.085 (0.417)
Art, entertainment and recreation			1.022** (0.455)
Other services			0.072 (0.443)
Firm is internationally active			0.129 (0.120)
Constant	7.092*** (0.100)	6.463*** (0.193)	6.413*** (0.656)
Std. Dev. random intercept	1.582*** (0.064)	1.565*** (0.061)	1.522*** (0.059)
Std. Dev. residual	1.065** (0.030)	1.065** (0.030)	1.065** (0.030)

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
N of observations	4,869	4,869	4,869
N of respondents	1,231	1,231	1,231
Log-likelihood	-8,613.487	-8,600.812	-8,570.756

*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.31:** Detailed regression results for position ‘IT director

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
University	Ref.	Ref.	Ref.
PET	-0.088* (0.053)	-0.110* (0.063)	-0.113* (0.063)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.287*** (0.052)	0.160 (0.142)	0.155 (0.142)
Continuing education of applicant	0.243*** (0.045)	0.207*** (0.060)	0.204*** (0.060)
Female applicant	0.031 (0.047)	0.031 (0.047)	0.032 (0.047)
Volunteering applicant	0.036 (0.044)	0.037 (0.044)	0.037 (0.044)
General work experience of applicant	0.033 (0.027)	0.034 (0.027)	0.034 (0.027)
Occupation-specific work experience of applicant	0.113*** (0.028)	0.113*** (0.028)	0.112*** (0.028)
<b>Survey design controls</b>			
Position of applicant profile within set of four applicant profiles		0.062 (0.064)	0.065 (0.064)
Hypothetical position matching positions in firm		0.171* (0.089)	0.150* (0.089)
Respondent received support letter		0.026 (0.176)	-0.047 (0.171)
<b>Respondent controls</b>			
Age of respondent			-0.006 (0.008)
Female respondent			0.190 (0.160)
Respondent born in Switzerland			-0.297 (0.247)
Educational career of respondent			
General education			Ref.
Mixed education			0.137 (0.205)
VPET			0.047 (0.218)
Recruitment experience			
Little experience			Ref.
Much experience			-0.352 (0.211)
Respondent from German-speaking part of CH			-0.193 (0.312)
Respondent working in HR			-0.284 (0.203)
Relevance of apprentice training for respondent's firm			-0.031 (0.100)
Firm size			
<10 employees			Ref.
10-49 employees			0.465 (0.346)
50-249 employees			0.348 (0.355)
250+ employees			0.129 (0.367)
Firm region			

<b>Likelihood for job interview (1-10)</b>	(1)	(2)	(3)
Région lémanique			Ref.
Espace Mittelland			0.844** (0.395)
North-Western Switzerland			0.472 (0.486)
Zurich			0.764* (0.430)
Eastern Switzerland			0.889** (0.434)
Central Switzerland			0.765* (0.432)
Ticino			-0.464 (0.786)
Firm industry			Ref.
Agriculture, forestry and fishing			
Manufacturing/production of goods			-0.106 (0.688)
Energy supply			-0.264 (0.750)
Water supply; sewage and waste disposal and pollution abatement			0.661 (0.970)
Construction/building			-0.068 (0.685)
Wholesale and retail trade; repair of motor vehicles and motorcycles			-0.028 (0.800)
Transport and storage			-1.897 (1.275)
Hospitality/accommodation and gastron- omy			0.719 (0.697)
Information and communication			0.110 (0.651)
Provision of financial and other services			-0.352 (0.731)
Real estate and housing			-0.232 (1.295)
Provision of professional, scientific and technical services			-0.553 (0.677)
Provision of other services			-0.009 (0.679)
Public administration, defence, social secu- rity			-0.207 (0.705)
Education and teaching			0.222 (0.712)
Health and social services			-0.111 (0.754)
Art, entertainment and recreation			0.851 (0.740)
Other services			-0.599 (0.763)
Firm is internationally active			-0.240 (0.211)
Constant	7.199*** (0.139)	6.779*** (0.322)	6.762*** (0.898)
Std. Dev. random intercept	1.677*** (0.106)	1.667*** (0.103)	1.581*** (0.095)
Std. Dev. residual	0.983 (0.040)	0.983 (0.040)	0.983 (0.040)
N of observations	1,989	1,989	1,989
N of respondents	505	505	505
Log-likelihood	-3,424.04	-3,420.827	-3,396.429



*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## B.7 Result Tables of Interaction Regressions

**Table B.32:** Detailed regression results including interactions for entry-level position of ‘Administrative assistant’

Likelihood for job interview (1-10)	(1)	(2)	(3)	(4)	(5)	(6)
General education	Ref.	Ref.	Ref.	Ref.	Ref.	
VET	0.746*** (0.104)	0.846*** (0.105)	0.666*** (0.176)	0.622*** (0.147)	0.499** (0.240)	0.158 (0.204)
VET # Not working in HR	Ref.					
VET # Working in HR	0.431*** (0.124)					
VET # Little recruitment experience		Ref.				
VET # Much recruitment experience		0.222* (0.124)				
VET # Born abroad			Ref.			
VET # Born in Switzerland			0.323* (0.178)			
VET # General education				Ref.		
VET # Mixed education				0.448*** (0.176)		
VET # VPET				0.375*** (0.160)		
VET # French/Italian Speaking CH					Ref.	
VET # German Speaking CH					0.489** (0.242)	
Familiarity through employment						
VET # Low familiarity						Ref.
VET # Medium familiarity						0.444***

VET # High familiarity										(0.156)
										0.472***
										(0.143)
Familiarity through biography										Ref.
VET # Low familiarity										
VET # Medium familiarity										0.223
										(0.220)
VET # High familiarity										0.609***
										(0.194)
Respondent working in HR										0.079
										(0.107)
Respondent with much recruitment experience										-0.083
										(0.108)
Respondent born in Switzerland										-0.154
										(0.177)
Educational career of respondent										Ref.
General education										
Mixed education										-0.004
										(0.145)
VPET										-0.231*
										(0.137)
Respondent from German-speaking part of Switzerland										0.205
										(0.186)
Familiarity through employment										Ref.
Low familiarity										
Medium familiarity										-0.269
										(0.166)
High familiarity										-0.211
										(0.157)
Familiarity through biography										Ref.
Low familiarity										
Medium familiarity										0.073

(0.287)  
-0.312

High familiarity

**Applicant controls**

Female applicant	0.149*** (0.046)	Ref.	0.155*** (0.046)	0.153*** (0.046)	0.154*** (0.046)	0.159*** (0.046)
Nationality of applicant		Ref.			Ref.	0.000 ( <sup>c</sup> )
CH						
DE/FR	-0.414*** (0.063)		-0.416*** (0.063)	-0.417*** (0.063)	-0.418*** (0.063)	-0.413*** (0.063)
PT	-0.307*** (0.061)		-0.307*** (0.061)	-0.308*** (0.061)	-0.307*** (0.061)	-0.303*** (0.061)
TK	-0.388*** (0.064)		-0.388*** (0.064)	-0.389*** (0.064)	-0.387*** (0.064)	-0.386*** (0.064)
Applicant volunteers	0.042 (0.045)		0.042 (0.045)	0.040 (0.045)	0.041 (0.045)	0.038 (0.044)
General work experience of applicant	0.381*** (0.019)		0.381*** (0.019)	0.380*** (0.019)	0.380*** (0.019)	0.380*** (0.019)
Sector-specific work experience of applicant	0.534*** (0.049)		0.534*** (0.049)	0.534*** (0.049)	0.535*** (0.049)	0.536*** (0.049)

**Survey design controls**

Position of applicant profile within set of four applicant profiles	-0.026 (0.031)		-0.027 (0.031)	-0.027 (0.031)	-0.027 (0.031)	-0.028 (0.031)
Applicant profile matching entry position in firm	0.201*** (0.050)		0.202*** (0.050)	0.201*** (0.050)	0.202*** (0.050)	0.213*** (0.050)
Respondent received support letter	0.131 (0.112)		0.131 (0.112)	0.132 (0.112)	0.132 (0.112)	0.138 (0.112)
Constant	4.689*** (0.310)		4.643*** (0.311)	4.741*** (0.335)	4.755*** (0.319)	4.819*** (0.340)
Std. Dev. random slope	0.984 (0.087)		0.993 (0.086)	0.995 (0.087)	0.990 (0.087)	0.993 (0.086)
Constant						4.855*** (0.326)
Std. Dev. random intercept						
Constant	1.536*** (0.048)		1.537*** (0.049)	1.538*** (0.049)	1.537*** (0.049)	1.538*** (0.049)
						1.540*** (0.048)

Std. Dev. residual								
Constant	1.505*** (0.036)	1.506*** (0.036)	1.505*** (0.036)	1.505*** (0.036)	1.505*** (0.036)	1.506*** (0.036)	1.503*** (0.036)	
Likelihood-ratio test								
Chi2	79.05***	80.78***	81.27***	79.21***	80.86***	78.42***		
N of observations	5,315	5,315	5,315	5,315	5,315	5,315		
N of respondents	1,342	1,342	1,342	1,342	1,342	1,342		
Log-likelihood	-11,083.05	-11,089.29	-11,090.01	-11,087.36	-11,089.18	-11,078.65		

Notes: Results of mixed linear models for the entry-level position 'administrative assistant' with cross-level interaction terms, each model including one interaction term. Models furthermore include applicant controls, survey design controls and the other familiarity variables (except in model 6 due to multicollinearity). Likelihood-ratio tests compare models with only a random intercept to those with a random intercept and random slope. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.33:** Detailed regression results including interactions for entry-level position of 'IT assistant'

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
General education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
VET	0.585*** (0.190) Ref.	0.556*** (0.200)	1.313*** (0.323)	0.886*** (0.289)	0.486 (0.312)	1.092** (0.453)
VET # Not working in HR						
VET # Working in HR	0.585** (0.228)					
VET # Little recruitment experience		Ref.				
VET # Much recruitment experience		0.559** (0.229)				
VET # Born abroad			Ref.			
VET # Born in Switzerland			-0.519 (0.327)			
VET # General education				Ref.		
VET # Mixed education				-0.021 (0.325)		
VET # VPET				-0.051 (0.321)		
VET # French/Italian Speaking CH					Ref.	
VET # German Speaking CH					0.437 (0.325)	
Familiarity through employment						Ref.
VET # Low familiarity						
VET # Medium familiarity						-0.083 (0.294)
VET # High familiarity						0.847***



High familiarity						0.645 (0.417)
<b>Applicant controls</b>						
Female applicant	0.003 (0.085)	0.005 (0.085)	-0.000 (0.085)	-0.001 (0.085)	0.005 (0.085)	0.007 (0.085)
Nationality of applicant	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
CH						
DE/FR	-0.508*** (0.112)	-0.507*** (0.112)	-0.514*** (0.112)	-0.506*** (0.112)	-0.505*** (0.112)	-0.515*** (0.113)
PT	-0.321*** (0.113)	-0.326*** (0.113)	-0.336*** (0.113)	-0.327*** (0.113)	-0.325*** (0.113)	-0.323*** (0.112)
TK	-0.539*** (0.117)	-0.537*** (0.118)	-0.540*** (0.117)	-0.538*** (0.118)	-0.531*** (0.118)	-0.546*** (0.117)
Applicant volunteers	0.144* (0.081)	0.147* (0.081)	0.140* (0.081)	0.142* (0.081)	0.146* (0.081)	0.148* (0.080)
General work experience of applicant	0.446*** (0.036)	0.447*** (0.036)	0.448*** (0.036)	0.448*** (0.036)	0.448*** (0.036)	0.444*** (0.036)
Sector-specific work experience of applicant	0.344*** (0.084)	0.347*** (0.084)	0.348*** (0.084)	0.347*** (0.084)	0.347*** (0.084)	0.347*** (0.083)
<b>Survey design controls</b>						
Position of applicant profile within set of four applicant profiles	0.134** (0.058)	0.133** (0.058)	0.135** (0.058)	0.135** (0.058)	0.133** (0.058)	0.134** (0.059)
Applicant profile matching entry position in firm	0.478*** (0.102)	0.478*** (0.102)	0.479*** (0.102)	0.480*** (0.102)	0.480*** (0.102)	0.491*** (0.102)
Respondent received support letter	0.175 (0.214)	0.176 (0.214)	0.174 (0.214)	0.172 (0.214)	0.169 (0.214)	0.201 (0.212)
Constant	2.942*** (0.516)	2.951*** (0.515)	2.641*** (0.550)	2.814*** (0.535)	2.972*** (0.533)	2.716*** (0.545)
Std. Dev. random slope	1.289** (0.133)	1.292** (0.133)	1.307*** (0.133)	1.314*** (0.134)	1.306*** (0.134)	1.280** (0.132)
Std. Dev. random intercept	1.705*** (0.080)	1.706*** (0.080)	1.707*** (0.080)	1.707*** (0.080)	1.706*** (0.080)	1.726*** (0.081)
Std. Dev. residual						



Constant	1.484*** (0.066)	1.484*** (0.066)	1.484*** (0.066)	1.484*** (0.066)	1.485*** (0.066)	1.476*** (0.065)
Likelihood-ratio test						
Chi2	57.35***	57.70***	59.56***	60.22***	59.12***	57.31***
N of observations	1,626	1,626	1,626	1,626	1,626	1,626
N of respondents	412	412	412	412	412	412
Log-likelihood	-3,449.73	-3,450.1	-3,452.42	-3,453.73	-3,452.66	-3,446.28

Notes: Results of mixed linear models for the entry-level position 'IT assistant' with cross-level interaction term, each model including one interaction term. Models furthermore include applicant controls, survey design controls and the other familiarity variables (except for model 6 due to multicollinearity). Likelihood-ratio tests compare models with only a random intercept to those with a random intercept and random slope. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.34:** Detailed regression results including interactions for high-level position of ‘sales manager’

	(1)	(2)	(3)	(4)	(5)	(6)
University	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
PET	0.146*** (0.049)	0.246*** (0.052)	0.025 (0.114)	-0.252*** (0.088)	-0.239* (0.126)	-0.391** (0.158)
PET # Not working in HR	Ref.					
PET # Working in HR	0.189*** (0.073)					
PET # Little recruitment experience	Ref.					
PET # Much recruitment experience		-0.024 (0.072)				
PET # Born abroad			Ref.			
PET # Born in Switzerland			0.230* (0.120)			
PET # General education				Ref.		
PET # Mixed education				0.439*** (0.109)		
PET # VPET				0.665*** (0.100)		
PET # French/Italian Speaking CH					Ref.	
PET # German Speaking CH					0.511*** (0.132)	
Familiarity through employment						
PET # Low familiarity						Ref.
PET # Medium familiarity						-0.088 (0.087)
PET # High familiarity						0.128 (0.085)



<b>Applicant controls</b>						
Upper-secondary VET of applicant	0.149*	0.144*	0.147*	0.152*	0.151*	0.164**
	(0.083)	(0.083)	(0.082)	(0.082)	(0.082)	(0.082)
Completed continuing education of applicant	0.107***	0.107***	0.107***	0.108***	0.107***	0.110***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Gender of applicant	0.083***	0.088***	0.088***	0.085***	0.086***	0.082***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Applicant volunteers	0.069**	0.069**	0.067**	0.072***	0.066**	0.068**
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
General work experience of applicant	0.061***	0.060***	0.061***	0.060***	0.059***	0.063***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Occupation-specific work experience of applicant	0.134***	0.135***	0.135***	0.134***	0.135***	0.134***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
<b>Survey design controls</b>						
Position of applicant profile within set of four applicant profiles	0.023	0.024	0.022	0.022	0.021	0.017
	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
Applicant profile matching high-level position in firm	0.195***	0.196***	0.196***	0.195***	0.196***	0.203***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Respondent received support letter	0.136	0.136	0.136	0.138	0.138	0.167
	(0.106)	(0.106)	(0.106)	(0.106)	(0.106)	(0.107)
Constant	6.485***	6.450***	6.518***	6.593***	6.593***	6.668***
	(0.300)	(0.300)	(0.301)	(0.300)	(0.304)	(0.286)
Std. Dev. random slope	0.608***	0.614***	0.612***	0.575***	0.604***	0.576***
Constant	(0.084)	(0.084)	(0.083)	(0.085)	(0.084)	(0.085)
Std. Dev. random intercept	1.561***	1.561***	1.561***	1.562***	1.563***	1.574***
Constant	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)
Std. Dev. residual	1.006	1.006	1.006	1.005	1.005	1.004
Constant	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Likelihood-ratio test						
Chi2	38.84***	40.29***	39.86***	32.54***	38.21***	32.86***
N of observations	4,869	4,869	4,869	4,869	4,869	4,869
N of respondents	1,231	1,231	1,231	1,231	1,231	1,231
Log-likelihood	-8,568.702	-8,572.239	-8,570.591	-8,548.875	-8,565.127	-8,556.288

*Notes:* Results of mixed linear models for the high-level position 'sales manager' with cross-level interaction terms, each model including one interaction term. Models furthermore include applicant controls, survey design controls and the other familiarity variables (except for model 6 due to multicollinearity). Likelihood-ratio tests compare models with only a random intercept to those with a random intercept and random slope. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table B.35:** Detailed regression results including interactions for high-level position of ‘IT director’

	(1)	(2)	(3)	(4)	(5)	(6)
Likelihood for job interview (1-10)	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
University						
PET	-0.115 (0.077) Ref.	-0.024 (0.072)	-0.306* (0.163)	-0.350*** (0.105)	-0.001 (0.146)	-0.341* (0.195)
PET # Not working in HR						
PET # Working in HR	0.016 (0.102)					
PET # Little recruitment experience		Ref.				
PET # Much recruitment experience		-0.150 (0.100)				
PET # Born abroad			Ref.			
PET # Born in Switzerland			0.229 (0.168)			
PET # General education				Ref.		
PET # Mixed education				0.277** (0.134)		
PET # VPET				0.341*** (0.132)		
PET # French/Italian Speaking CH					Ref.	
PET # German Speaking CH					-0.116 (0.152)	
Familiarity through employment						Ref.
PET # Low familiarity						
PET # Medium familiarity						0.045 (0.114)
PET # High familiarity						-0.088 (0.128)



<b>Applicant controls</b>						
Upper-secondary VET of applicant	0.179 (0.138)	0.180 (0.138)	0.178 (0.139)	0.180 (0.138)	0.177 (0.138)	0.176 (0.140)
Completed continuing education of applicant	0.207*** (0.060)	0.206*** (0.060)	0.205*** (0.060)	0.207*** (0.060)	0.206*** (0.060)	0.205*** (0.060)
Gender of applicant	0.028 (0.046)	0.028 (0.046)	0.027 (0.046)	0.030 (0.046)	0.029 (0.046)	0.028 (0.046)
Applicant volunteers	0.042 (0.044)	0.042 (0.044)	0.041 (0.044)	0.041 (0.044)	0.041 (0.045)	0.044 (0.044)
General work experience of applicant	0.031 (0.027)	0.034 (0.027)	0.032 (0.027)	0.029 (0.027)	0.031 (0.026)	0.032 (0.027)
Occupation-specific work experience of applicant	0.116*** (0.027)	0.115*** (0.027)	0.116*** (0.028)	0.118*** (0.028)	0.116*** (0.028)	0.115*** (0.027)
<b>Survey design controls</b>						
Position of applicant profile within set of four applicant profiles	0.057 (0.062)	0.057 (0.062)	0.059 (0.063)	0.056 (0.062)	0.058 (0.062)	0.059 (0.063)
Applicant profile matching high-level position in firm	0.174* (0.089)	0.174* (0.089)	0.175* (0.089)	0.174* (0.089)	0.174* (0.089)	0.164* (0.089)
Respondent received support letter	0.009 (0.175)	0.010 (0.175)	0.007 (0.175)	0.007 (0.175)	0.009 (0.175)	0.019 (0.176)
Constant	6.756*** (0.452)	6.726*** (0.454)	6.812*** (0.454)	6.829*** (0.455)	6.719*** (0.453)	7.160*** (0.389)
Std. Dev. random slope	0.558*** (0.107)	0.553*** (0.106)	0.553*** (0.107)	0.543*** (0.111)	0.556*** (0.107)	0.542*** (0.109)
Constant	1.644*** (0.103)	1.644*** (0.103)	1.643*** (0.102)	1.644*** (0.102)	1.644*** (0.103)	1.654*** (0.103)
Std. Dev. random intercept	0.933 (0.041)	0.933 (0.041)	0.933 (0.041)	0.933 (0.041)	0.933 (0.041)	0.934 (0.041)
Std. Dev. residual	16.84*** 1,989	16.41*** 1,989	16.34*** 1,989	15.24*** 1,989	16.69*** 1,989	15.08*** 1,989
Likelihood-ratio test	505	505	505	505	505	505
Chi2	-3,408.291	-3,407.223	-3,407.164	-3,405.035	-3,408.098	-3,408.738
N of observations						
N of respondents						
Log-likelihood						



*Notes:* Results of mixed linear models for the high-level position 'IT director' with cross-level interaction terms, each model including one interaction term. Models furthermore include applicant controls, survey design controls and the other familiarity variables (except for model 6 due to multicollinearity). Likelihood-ratio tests compare models with only a random intercept to those with a random intercept and random slope. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

# Appendix C

## C.1 Detailed Information on Applicant Profiles

**Table C.1:** Applicant profile dimensions and levels

DIMENSIONS	LEVELS FOR HIGH-LEVEL JOBS
<b>Randomised CV elements</b>	
Tertiary education and non-formal continuing education	For the position ‘sales manager’: <ul style="list-style-type: none"> <li>- Master’s degree from an academic university in Business Administration<sup>1</sup></li> <li>- Master’s degree from a university of applied sciences in Business Administration<sup>1</sup></li> <li>- Bachelor’s degree from an academic university in Business Administration with a MAS in Marketing Management</li> </ul> For the position ‘IT director’ <ul style="list-style-type: none"> <li>- Master’s degree from an academic university in Business Information Technology<sup>1</sup></li> <li>- Master’s degree from a university of applied sciences in Business Information Technology<sup>1</sup></li> <li>- Bachelor’s degree from an academic university in Business Information Technology with a MAS in Information Systems Management</li> </ul>
Upper-secondary education	<ul style="list-style-type: none"> <li>- Academic baccalaureate in Business and Law</li> <li>- Academic baccalaureate in Mathematics and Physics</li> <li>- Federal VET diploma as Commercial Employee with vocational baccalaureate</li> <li>- Federal VET diploma as Information Technologist with vocational baccalaureate</li> </ul>
Gender	<ul style="list-style-type: none"> <li>- Female</li> <li>- Male</li> </ul>
Volunteering	<ul style="list-style-type: none"> <li>- None</li> <li>- Communal work: neighbourhood help</li> </ul>
Total work experience	<ul style="list-style-type: none"> <li>- 8 years (age: 32 years)</li> <li>- 10 years (age: 34 years)</li> <li>- 12 years (age: 36 years)</li> </ul>
Occupation-specific work experience	Thereof: <ul style="list-style-type: none"> <li>- 4 years</li> <li>- 6 years</li> <li>- 8 years</li> </ul>

*Notes:* Table displays the applicant profiles’ dimensions and levels as displayed to respondents; levels randomly varied between respondents; <sup>1</sup>In Switzerland, a bachelor’s degree is required to enter any master’s programme, thus this credential was not explicitly mentioned in the profiles of those applicant with a master’s degree.

*Job descriptions for hypothetical vacancies*

**SALES MANAGER**

Please imagine you have a vacancy for the position of '**Sales Manager**'. This position includes the management and responsibility for sales tasks, the preparation of market analyses, the operative development and implementation of sales-relevant measures (incl. marketing measures) and the support and new acquisition of customers.

**IT DIRECTOR**

Please imagine you have a vacancy for the position of '**IT director**'. This position includes the definition and implementation of the IT strategy, responsibility for the IT budget and cost controlling.

**Table C.2:** Example of applicant profile for ‘Sales manager’ position (English translation)

<p>The following qualified persons are among the applicants. All of them have sent you a written application with a letter of motivation, have <b>above-average grades</b>, obtained their <b>degree in Switzerland</b>, are <b>available</b> for the date you are looking for an applicant and live in the <b>region of your company</b>.</p>										
<p>The curriculum vitae of <b>[candidate 1]</b> contains the following information:</p> <p><b>Personal information</b></p> <p>Age [32]</p> <p>Gender [Female]</p> <p><b>Education</b></p> <p>[Master’s degree from an academic university in Business Administration]</p> <p>[Academic baccalaureate in Business and Law]</p> <p><b>Work experience (incl. internships, trainee programmes, etc.)</b></p> <p>[8 years]</p> <p>Of which [4 years] in the relevant professional field</p> <p><b>Language skills</b></p> <p>German Native Language</p> <p>French Fluent</p> <p>English Fluent</p> <p><b>Voluntary work</b></p> <p>[None]</p>										
<p><b>How likely is it that your company will invite [candidate 1] to an interview?</b></p>										
<p>Very unlikely <span style="float: right;">Very likely</span></p>										
1	2	3	4	5	6	7	8	9	10	
<p><b>What income would you recommend for this person? Gross monthly income in CHF (100%):</b></p>										
<p> </p>										

*Notes:* Exemplary applicant profile for the position of ‘sales manager’. Dimensions in brackets randomly varied between respondents, the rest of the information was fixed.

## C.2 Summary Statistics

**Table C.3:** Summary statistics for variables included in regression models for the position ‘Sales manager’

Variable	Likelihood for job interview				(log) monthly salary			
	N of resp.	Mean	Std. Dev.	Min. Max.	N of resp.	Mean	Std. Dev.	Min. Max.
<b>Explanatory variable</b>								
MAS vs. Master’s degree	1,216	0.5	-	0 1	1,084	0.5	-	0 1
<b>Applicant controls</b>								
Upper-secondary education	1,216	0.5	-	0 1	1,084	0.5	-	0 1
Female applicant	1,216	0.5	-	0 1	1,084	0.5	-	0 1
Volunteering applicant	1,216	0.5	-	0 1	1,084	0.5	-	0 1
Occupation-specific work experience of applicant								
4 years	1,216	0.34	-	0 1	1,084	0.34	-	0 1
6 years	1,216	0.33	-	0 1	1,084	0.33	-	0 1
8 years	1,216	0.34	-	0 1	1,084	0.34	-	0 1
General work experience of applicant								
8 years	1,216	0.33	-	0 1	1,084	0.33	-	0 1
10 years	1,216	0.33	-	0 1	1,084	0.33	-	0 1
12 years	1,216	0.34	-	0 1	1,084	0.34	-	0 1
<b>Survey-design controls</b>								
Order of applicant profile within deck of applicant profiles	1,216	2.38	1.09	1 4	1,084	2.39	1.10	1 4
Applicant profile matching vacancy in firm	1,216	2.55	1.07	1 5	1,084	2.59	1.06	1 5
Respondent received support letter	1,216	0.67	-	0 1	1,084	0.67	-	0 1
<b>Respondent-level controls</b>								
Age of Respondent	1,216	45.66	10.33	19 74	1,084	45.68	10.18	19 77
Female Respondent	1,216	0.49	-	0 1	1,084	0.49	-	0 1
Swiss Respondent	1,216	0.92	-	0 1	1,084	0.92	-	0 1
Educational career of respondent								
General education	1,216	0.17	-	0 1	1,084	0.17	-	0 1
Mixed education	1,216	0.30	-	0 1	1,084	0.31	-	0 1
VPET	1,216	0.53	-	0 1	1,084	0.52	-	0 1
Number of recruitment processes in last five years								
1-5	1,216	0.25	-	0 1	1,084	0.23	-	0 1
6-10	1,216	0.23	-	0 1	1,084	0.23	-	0 1
11-25	1,216	0.18	-	0 1	1,084	0.19	-	0 1
>25	1,216	0.34	-	0 1	1,084	0.35	-	0 1
Respondent working in HR	1,216	0.45	-	0 1	1,084	0.47	-	0 1

Variable	Likelihood for job interview				(log) monthly salary				
	N of resp.	Mean	Std. Dev.	Min. Max.	N of resp.	Mean	Std. Dev.	Min. Max.	
<b>Firm size</b>									
<10 employees	1,216	0.14	-	0	1	1,084	0.13	0	1
10-49 employees	1,216	0.39	-	0	1	1,084	0.40	0	1
50-249 employees	1,216	0.30	-	0	1	1,084	0.30	0	1
250+ employees	1,216	0.17	-	0	1	1,084	0.17	0	1
<b>Firm region</b>									
Région lémanique	1,216	0.05	-	0	1	1,084	0.04	0	1
Espace Mittelland	1,216	0.21	-	0	1	1,084	0.21	0	1
North-Western Switzerland	1,216	0.14	-	0	1	1,084	0.14	0	1
Zurich	1,216	0.21	-	0	1	1,084	0.22	0	1
Eastern Switzerland	1,216	0.23	-	0	1	1,084	0.23	0	1
Central Switzerland	1,216	0.15	-	0	1	1,084	0.15	0	1
Ticino	1,216	0.01	-	0	1	1,084	0.01	0	1
Internationally active firm	1,216	0.17	-	0	1	1,084	0.18	0	1
<b>Firm sector</b>									
Agriculture, forestry and fishing	1,216	0.03	-	0	1	1,084	0.03	0	1
Mining and quarrying	1,216	0.00	-	0	1	1,084	0.00	0	1
Manufacturing/production of goods	1,216	0.22	-	0	1	1,084	0.23	0	1
Energy supply	1,216	0.01	-	0	1	1,084	0.01	0	1
Water supply; sewage and waste disposal and pollution abatement	1,216	0.01	-	0	1	1,084	0.01	0	1
Construction/building	1,216	0.19	-	0	1	1,084	0.18	0	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	1,216	0.11	-	0	1	1,084	0.11	0	1
Transport and storage	1,216	0.02	-	0	1	1,084	0.02	0	1
Hospitality/accommodation and gastronomy	1,216	0.05	-	0	1	1,084	0.05	0	1
Information and communication	1,216	0.02	-	0	1	1,084	0.02	0	1
Provision of financial and other services	1,216	0.03	-	0	1	1,084	0.03	0	1
Real estate and housing	1,216	0.02	-	0	1	1,084	0.02	0	1
Provision of professional, scientific and technical services	1,216	0.02	-	0	1	1,084	0.02	0	1
Provision of other services	1,216	0.04	-	0	1	1,084	0.04	0	1
Public administration, defence, social security	1,216	0.16	-	0	1	1,084	0.16	0	1
Education and teaching	1,216	0.01	-	0	1	1,084	0.01	0	1
Health and social services	1,216	0.02	-	0	1	1,084	0.02	0	1
Art, entertainment and recreation	1,216	0.01	-	0	1	1,084	0.01	0	1
Other services	1,216	0.03	-	0	1	1,084	0.03	0	1
<b>Items on knowledge about higher and non-formal continuing education in Switzerland</b>									
I am well informed about opportunities for further qualification after compulsory education.	1,216	4.26	0.74	1	5	1,084	4.29	0.73	1
I know the various Professional Education and Training (PET) degrees well.	1,216	3.90	0.91	1	5	1,084	3.91	0.90	1
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.	1,216	3.34	1.33	1	5	1,084	3.38	1.32	1

Variable	Likelihood for job interview				(log) monthly salary			
	N of resp.	Mean	Std. Dev.	Min. Max.	N of resp.	Mean	Std. Dev.	Min. Max.
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.	1,216	3.62	0.99	1 5	1,084	3.65	0.98	1 5
A non-formal continuing education course is increasingly necessary to obtain higher positions.	1,216	4.05	0.86	1 5	1,084	4.06	0.87	1 5
<b>Time variables</b>								
Time to evaluate applicant profile 1	1,177	1.91	13.02	0.08 282.22	1,039	2.12	13.88	0.15 282.22
Time to evaluate applicant profile 2	1,177	0.74	3.80	0.06 108.95	1,039	0.80	4.05	0.10 108.95
Time to evaluate applicant profile 3	1,177	0.57	3.67	0.06 150.04	1,039	0.53	1.28	0.08 48.95
Time to evaluate applicant profile 4	1,177	0.51	1.51	0.02 35.36	1,039	0.54	1.60	0.02 35.36

Notes: summary statistics of all variables included in the regression models and the robustness tests.

**Table C.4:** Summary statistics for variables included in regression models for the position ‘IT director’

Variable	Likelihood for job interview			(log) monthly salary						
	N of resp.	Mean	Std. Dev.	Min.	Max.	N of resp.	Mean	Std. Dev.	Min.	Max.
<b>Explanatory variable</b>										
MAS vs. Master's degree	491	0.5	-	0	1	427	0.5	-	0	1
<b>Applicant controls</b>										
Upper-secondary education	491	0.5	-	0	1	427	0.5	-	0	1
Female applicant	491	0.5	-	0	1	427	0.5	-	0	1
Volunteering applicant	491	0.5	-	0	1	427	0.5	-	0	1
Occupation-specific work experience of applicant										
4 years	491	0.34	-	0	1	427	0.34	-	0	1
6 years	491	0.33	-	0	1	427	0.33	-	0	1
8 years	491	0.34	-	0	1	427	0.34	-	0	1
General work experience of applicant										
8 years	491	0.33	-	0	1	427	0.33	-	0	1
10 years	491	0.33	-	0	1	427	0.33	-	0	1
12 years	491	0.34	-	0	1	427	0.34	-	0	1
<b>Survey-design controls</b>										
Order of applicant profile within deck of applicant profiles	491	2.36	1.12	1	4	427	2.38	1.12	1	4
Applicant profile matching vacancy in firm	491	2.67	1.04	1	5	427	2.68	1.02	1	5
Respondent received support letter	491	0.47	-	0	1	427	0.68	-	0	1
<b>Respondent-level controls</b>										
Age of Respondent	491	46.46	10.44	23	77	427	46.59	10.20	24	77
Female Respondent	491	0.44	-	0	1	427	0.43	-	0	1
Swiss Respondent	491	0.88	-	0	1	427	0.87	-	0	1
Educational career of respondent										
General education	491	0.23	-	0	1	427	0.21	-	0	1
Mixed education	491	0.38	-	0	1	427	0.39	-	0	1
VPET	491	0.39	-	0	1	427	0.40	-	0	1
Number of recruitment processes in last five years										
1-5	491	0.23	-	0	1	427	0.21	-	0	1
6-10	491	0.22	-	0	1	427	0.23	-	0	1
11-25	491	0.16	-	0	1	427	0.16	-	0	1
>25	491	0.39	-	0	1	427	0.40	-	0	1
Respondent working in HR	491	0.53	-	0	1	427	0.52	-	0	1
Firm size										
<10 employees	491	0.13	-	0	1	427	0.13	-	0	1
10-49 employees	491	0.35	-	0	1	427	0.34	-	0	1
50-249 employees	491	0.33	-	0	1	427	0.33	-	0	1
250+ employees	491	0.19	-	0	1	427	0.20	-	0	1
Firm region										



Variable	Likelihood for job interview				(log) monthly salary				
	N of resp.	Mean	Std. Dev.	Min. Max.	N of resp.	Mean	Std. Dev.	Min. Max.	
Région lémanique	491	0.06	-	0	1	0.05	-	0	1
Espace Mittelland	491	0.20	-	0	1	0.19	-	0	1
North-Western Switzerland	491	0.15	-	0	1	0.15	-	0	1
Zurich	491	0.26	-	0	1	0.27	-	0	1
Eastern Switzerland	491	0.17	-	0	1	0.18	-	0	1
Central Switzerland	491	0.15	-	0	1	0.15	-	0	1
Ticino	491	0.01	-	0	1	0.01	-	0	1
Internationally active firm	491	0.18	-	0	1	0.19	-	0	1
Firm sector									
Agriculture, forestry and fishing	491	0.02	-	0	1	0.03	-	0	1
Mining and quarrying	491	0.00	-	0	1	0.00	-	0	1
Manufacturing/production of goods	491	0.12	-	0	1	0.13	-	0	1
Energy supply	491	0.05	-	0	1	0.04	-	0	1
Water supply; sewage and waste disposal and pollution abatement	491	0.01	-	0	1	0.01	-	0	1
Construction/building	491	0.15	-	0	1	0.15	-	0	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	491	0.04	-	0	1	0.04	-	0	1
Transport and storage	491	0.02	-	0	1	0.02	-	0	1
Hospitality/accommodation and gastronomy	491	0.02	-	0	1	0.02	-	0	1
Information and communication	491	0.18	-	0	1	0.18	-	0	1
Provision of financial and other services	491	0.05	-	0	1	0.05	-	0	1
Real estate and housing	491	0.01	-	0	1	0.01	-	0	1
Provision of professional, scientific and technical services	491	0.09	-	0	1	0.09	-	0	1
Provision of other services	491	0.06	-	0	1	0.06	-	0	1
Public administration, defence, social security	491	0.05	-	0	1	0.05	-	0	1
Education and teaching	491	0.04	-	0	1	0.04	-	0	1
Health and social services	491	0.03	-	0	1	0.02	-	0	1
Art, entertainment and recreation	491	0.01	-	0	1	0.01	-	0	1
Other services	491	0.05	-	0	1	0.05	-	0	1
<b>Items on knowledge about higher and non-formal continuing education in Switzerland</b>									
I am well informed about opportunities for further qualification after compulsory education.	491	0.18	0.39	1	5	4.34	0.71	1	5
I know the various Professional Education and Training (PET) degrees well.	491	4.31	0.73	1	5	3.95	0.90	1	5
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.	491	3.95	0.90	1	5	3.56	1.29	1	5
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.	491	3.58	1.30	1	5	3.77	0.95	1	5
A non-formal continuing education course is increasingly necessary to obtain higher positions.	491	3.75	0.97	1	5	4.03	0.86	1	5
<b>Time variables</b>									
Time to evaluate applicant profile 1	474	1.95	12.02	0.10	240.92	2.19	12.92	0.10	240.92

Variable	Likelihood for job interview				(log) monthly salary			
	N of resp.	Mean	Std. Dev.	Min. Max.	N of resp.	Mean	Std. Dev.	Min. Max.
Time to evaluate applicant profile 2	474	0.55	0.87	0.07 11.24	409	0.57	0.86	0.14 11.24
Time to evaluate applicant profile 3	474	0.81	4.40	0.07 59.58	409	0.88	4.72	0.13 59.58
Time to evaluate applicant profile 4	474	0.41	0.43	0.06 7.02	409	0.43	0.45	0.07 7.02

Notes: summary statistics of all variables included in the regression models and the robustness tests.

### C.3 Full Results Tables

**Table C.5:** Detailed results of regression models on likelihood for job interview for ‘sales manager’

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Master’s degree	Ref.	Ref.	Ref.
MAS	0.153*** (0.054)	0.070 (0.096)	0.075 (0.098)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.174*** (0.060)	-0.018 (0.211)	-0.018 (0.215)
Female applicant	0.146** (0.062)	0.140** (0.062)	0.143** (0.062)
Volunteering applicant	0.117* (0.062)	0.117* (0.062)	0.119* (0.063)
Occupation-specific work experience of applicant	0.198*** (0.038)	0.200*** (0.038)	0.196*** (0.038)
General work experience of applicant	0.093** (0.041)	0.098** (0.041)	0.100** (0.040)
<b>Survey-design controls</b>			
Order of applicant profile within deck of applicant profiles		0.105 (0.105)	0.103 (0.108)
Applicant profile matching high-level position in firm		0.207*** (0.055)	0.202*** (0.057)
Respondent received support letter		0.136 (0.118)	0.097 (0.117)
<b>Respondent-level controls</b>			
Age of respondent			-0.017*** (0.005)
Female respondent			0.111 (0.118)
Respondent born in Switzerland			-0.298 (0.183)
<b>Educational career of respondent</b>			
General education			Ref.
Mixed education			-0.272* (0.153)
VPET			-0.282** (0.142)
<b>Number of recruitment processes in last five years</b>			
1-5			Ref.
6-10			0.087 (0.167)
11-25			0.186 (0.170)
>25			0.103 (0.180)
Respondent working in HR			0.087 (0.167)
<b>Firm size</b>			
<10 employees			Ref.
10-49 employees			-0.090 (0.198)
50-249 employees			-0.143 (0.225)
250+ employees			-0.229 (0.244)

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Region of firm in Switzerland			
Région lémanique			Ref.
Espace Mittelland			0.260 (0.331)
North-Western Switzerland			0.509 (0.335)
Zurich			0.191 (0.334)
Eastern Switzerland			0.379 (0.327)
Central Switzerland			0.397 (0.339)
Ticino			0.016 (0.574)
Industry of firm			
Agriculture, forestry and fishing			Ref.
Mining and quarrying			1.095 (0.803)
Manufacturing/production of goods			-0.336 (0.481)
Energy supply			0.055 (0.645)
Water supply; sewage and waste disposal and pollution abatement			-0.929 (0.661)
Construction/building			-0.096 (0.480)
Wholesale and retail trade; repair of motor vehicles and motorcycles			-0.184 (0.483)
Transport and storage			0.352 (0.569)
Hospitality/accommodation and gastronomy			0.267 (0.514)
Information and communication			-0.117 (0.506)
Provision of financial and other services			0.473 (0.526)
Real estate and housing			0.244 (0.530)
Provision of professional, scientific and technical services			0.291 (0.567)
Provision of other services			-0.366 (0.533)
Public administration, defence, social security			0.140 (0.471)
Education and teaching			-0.132 (0.882)
Health and social services			0.058 (0.506)
Art, entertainment and recreation			1.242** (0.537)
Other services			-0.130 (0.541)
Firm is internationally active			
Items on knowledge about further and higher education			
I am well informed about opportunities for further qualification after compulsory education.			0.144 (0.093)
I know the various Professional Education and Training (PET) degrees well.			-0.064 (0.081)
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.			0.105**

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
			(0.052)
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.			0.193***
			(0.060)
A non-formal continuing education course is increasingly necessary to obtain higher positions.			-0.005
			(0.066)
Constant	7.006*** (0.150)	6.265*** (0.262)	5.959*** (0.763)
Std. Dev. random intercept			
Constant	1.650*** (0.071)	1.633*** (0.068)	1.560*** (0.067)
Std. Dev. residual			
Constant	1.053 (0.053)	1.053 (0.053)	1.054 (0.053)
N of observations	1,918	1,918	1,918
N of respondents	1,216	1,216	1,216
Log-likelihood	-3,762.496	-3,752.848	-3,711.06

*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table C.6:** Detailed results of regression models on likelihood for job interview for ‘IT director’

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Master’s degree	Ref.	Ref.	Ref.
MAS	0.076 (0.080)	0.087 (0.136)	0.081 (0.130)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.247*** (0.083)	0.283 (0.327)	0.247 (0.315)
Female applicant	0.087 (0.087)	0.090 (0.087)	0.100 (0.086)
Volunteering applicant	-0.004 (0.097)	-0.006 (0.097)	-0.004 (0.096)
Occupation-specific work experience of applicant	0.051 (0.055)	0.053 (0.055)	0.057 (0.055)
General work experience of applicant	-0.043 (0.052)	-0.041 (0.052)	-0.041 (0.052)
<b>Survey-design controls</b>			
Order of applicant profile within deck of applicant profiles		-0.017 (0.154)	0.001 (0.148)
Applicant profile matching high-level position in firm		0.163* (0.097)	0.162 (0.098)
Respondent received support letter		-0.132 (0.186)	-0.206 (0.170)
<b>Respondent-level controls</b>			
Age of respondent			-0.005 (0.008)
Female respondent			0.194 (0.172)
Respondent born in Switzerland			-0.465* (0.257)
Educational career of respondent			
General education			Ref.
Mixed education			-0.029 (0.217)
VPET			-0.196 (0.239)
Number of recruitment processes in last five years			
1-5			Ref.
6-10			-0.161 (0.247)
11-25			-0.113 (0.269)
>25			0.002 (0.267)
Respondent working in HR			-0.268 (0.227)
Firm size			
<10 employees			Ref.
10-49 employees			0.404 (0.332)
50-249 employees			0.338 (0.324)
250+ employees			0.226 (0.347)
Region of firm in Switzerland			
Région lémanique			Ref.

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Espace Mittelland			0.585 (0.441)
North-Western Switzerland			0.219 (0.477)
Zurich			0.632 (0.430)
Eastern Switzerland			0.552 (0.433)
Central Switzerland			0.455 (0.442)
Ticino			-0.205 (0.904)
<b>Industry of firm</b>			
Agriculture, forestry and fishing			Ref.
Mining and quarrying			-0.169 (0.720)
Manufacturing/production of goods			-0.073 (0.766)
Energy supply			0.866 (1.032)
Water supply; sewage and waste disposal and pollution abatement			-0.207 (0.703)
Construction/building			-0.151 (0.836)
Wholesale and retail trade; repair of motor vehicles and motorcycles			-1.919 (1.325)
Transport and storage			0.572 (0.742)
Hospitality/accommodation and gastronomy			0.216 (0.676)
Information and communication			-0.319 (0.746)
Provision of financial and other services			-0.374 (1.390)
Real estate and housing			-0.719 (0.714)
Provision of professional, scientific and technical services			-0.056 (0.728)
Provision of other services			-0.171 (0.740)
Public administration, defence, social security			0.082 (0.745)
Education and teaching			-0.406 (0.854)
Health and social services			0.175 (0.818)
Art, entertainment and recreation			-0.217 (0.771)
Other services			-0.218
<b>Firm is internationally active</b>			
Items on knowledge about further and higher education			
I am well informed about opportunities for further qualification after compulsory education.			0.313*
I know the various Professional Education and Training (PET) degrees well.			(0.162) -0.214*
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.			(0.121) -0.066
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.			(0.083) 0.060

<b>Likelihood for job interview (1-10)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
			(0.106)
A non-formal continuing education course is increasingly necessary to obtain higher positions.			0.322***
Constant	7.812*** (0.206)	7.471*** (0.410)	5.954*** (1.279)
Std. Dev. random intercept			
Constant	1.682*** (0.116)	1.673*** (0.114)	1.537*** (0.104)
Std. Dev. residual			
Constant	0.942 (0.079)	0.942 (0.079)	0.942 (0.079)
N of evaluations	778	778	778
N of employers	491	491	491
Log-likelihood	-1,490.587	-1,488.374	-1,454.603

*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.



**Table C.7:** Detailed results of regression models for recommended salary for ‘Sales manager’

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
	Ref.	Ref.	Ref.
Master’s degree			
MAS	0.015*** (0.002)	0.010* (0.005)	0.011** (0.005)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.013*** (0.003)	0.002 (0.012)	0.004 (0.012)
Female applicant	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)
Volunteering applicant	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
Occupation-specific work experience of applicant	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
General work experience of applicant	0.016*** (0.002)	0.016*** (0.002)	0.016*** (0.002)
<b>Survey-design controls</b>			
Order of applicant profile within deck of applicant profiles		0.006 (0.006)	0.005 (0.006)
Applicant profile matching high-level position in firm		0.035*** (0.006)	0.007 (0.005)
Respondent received support letter		-0.009 (0.014)	-0.006 (0.011)
<b>Respondent-level controls</b>			
Age of respondent			0.000 (0.001)
Female respondent			-0.032** (0.013)
Respondent born in Switzerland			0.011 (0.022)
Educational career of respondent			
General education			Ref.
Mixed education			0.001 (0.016)
VPET			-0.055*** (0.016)
Number of recruitment processes in last five years			
1-5			Ref.
6-10			0.030* (0.016)
11-25			0.031* (0.018)
>25			0.023 (0.018)
Respondent working in HR			0.041*** (0.013)
Firm size			
<10 employees			Ref.
10-49 employees			0.040** (0.020)
50-249 employees			0.088*** (0.022)
250+ employees			0.130*** (0.026)
Region of firm in Switzerland			
Région lémanique			Ref.
Espace Mittelland			0.121***

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
			(0.032)
North-Western Switzerland			0.120***
			(0.033)
Zurich			0.158***
			(0.032)
Eastern Switzerland			0.120***
			(0.032)
Central Switzerland			0.122***
			(0.033)
Ticino			-0.116*
			(0.070)
Industry of firm			
Agriculture, forestry and fishing			Ref.
Mining and quarrying			0.067
			(0.086)
Manufacturing/production of goods			0.095**
			(0.043)
Energy supply			0.125*
			(0.067)
Water supply; sewage and waste disposal and pollution abatement			0.146***
Construction/building			(0.052)
			0.058
Wholesale and retail trade; repair of motor vehicles and motorcycles			(0.044)
Transport and storage			0.067
			(0.045)
Hospitality/accommodation and gastronomy			0.061
			(0.058)
Information and communication			-0.057
			(0.049)
Provision of financial and other services			0.126**
			(0.056)
Real estate and housing			0.147***
			(0.055)
Provision of professional, scientific and technical services			0.109*
Provision of other services			(0.057)
			0.049
Public administration, defence, social security			(0.058)
			0.068
Education and teaching			(0.049)
			0.181***
Health and social services			(0.044)
			0.132
Art, entertainment and recreation			(0.082)
			0.043
Other services			(0.055)
			-0.006
Firm is internationally active			(0.060)
Items on knowledge about further and higher education			
I am well informed about opportunities for further qualification after compulsory education.			-0.003
			(0.010)
I know the various Professional Education and Training (PET) degrees well.			0.007
			(0.008)
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.			0.014***
			(0.005)
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.			0.020***

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
			(0.006)
A non-formal continuing education course is increasingly necessary to obtain higher positions.			-0.002
			(0.007)
Constant	8.829*** (0.009)	8.736*** (0.021)	8.378*** (0.076)
Std. Dev. random intercept			
Constant	0.205*** (0.005)	0.202*** (0.005)	0.164*** (0.004)
Std. Dev. residual			
Constant	0.041*** (0.002)	0.041*** (0.002)	0.041*** (0.002)
N of observations	1,710	1,710	1,710
N of respondents	1,084	1,084	1,084
Log-likelihood	1,058.36	1,076.578	1,290.828

*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table C.8:** Detailed results of regression models for recommended salary ‘IT director’

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Master’s degree	Ref.	Ref.	Ref.
MAS	0.013*** (0.004)	0.010 (0.006)	0.012* (0.006)
<b>Applicant controls</b>			
Upper-secondary VET of applicant	0.018*** (0.004)	0.012 (0.016)	0.015 (0.015)
Female applicant	-0.004 (0.005)	-0.004 (0.005)	-0.005 (0.005)
Volunteering applicant	-0.006 (0.005)	-0.006 (0.005)	-0.006 (0.005)
Occupation-specific work experience of applicant	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
General work experience of applicant	0.018*** (0.004)	0.018*** (0.004)	0.017*** (0.004)
<b>Survey-design controls</b>			
Order of applicant profile within deck of applicant profiles		0.003 (0.008)	0.001 (0.008)
Applicant profile matching high-level position in firm		0.048*** (0.010)	0.018* (0.009)
Respondent received support letter		0.004 (0.022)	0.011 (0.019)
<b>Respondent-level controls</b>			
Age of respondent			-0.001 (0.001)
Female respondent			-0.021 (0.020)
Respondent born in Switzerland			-0.013 (0.024)
Educational career of respondent			Ref.
General education			Ref.
Mixed education			-0.033 (0.021)
VPET			-0.077*** (0.023)
Number of recruitment processes in last five years			Ref.
1-5			Ref.
6-10			-0.000 (0.025)
11-25			0.013 (0.027)
>25			0.069** (0.027)
Respondent working in HR			-0.008 (0.023)
Firm size			Ref.
<10 employees			Ref.
10-49 employees			0.024 (0.032)
50-249 employees			0.079** (0.034)
250+ employees			0.135*** (0.038)
Region of firm in Switzerland			Ref.
Région lémanique			Ref.
Espace Mittelland			0.167*** (0.046)

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
North-Western Switzerland			0.180*** (0.052)
Zurich			0.207*** (0.049)
Eastern Switzerland			0.181*** (0.051)
Central Switzerland			0.206*** (0.050)
Ticino			-0.063 (0.087)
Industry of firm			
Agriculture, forestry and fishing			Ref.
Mining and quarrying			-0.011 (0.052)
Manufacturing/production of goods			0.138** (0.058)
Energy supply			0.074 (0.117)
Water supply; sewage and waste disposal and pollution abatement			0.001
Construction/building			0.095 (0.051)
Wholesale and retail trade; repair of motor vehicles and motorcycles			0.118* (0.066)
Transport and storage			0.013 (0.079)
Hospitality/accommodation and gastronomy			0.085 (0.052)
Information and communication			0.123* (0.063)
Provision of financial and other services			0.044 (0.130)
Real estate and housing			-0.004 (0.049)
Provision of professional, scientific and technical services			0.113** (0.055)
Provision of other services			0.132** (0.053)
Public administration, defence, social security			-0.002 (0.062)
Education and teaching			-0.003 (0.066)
Health and social services			-0.084 (0.065)
Art, entertainment and recreation			-0.037 (0.061)
Other services			-0.013
Firm is internationally active			
Items on knowledge about further and higher education			
I am well informed about opportunities for further qualification after compulsory education.			0.006 (0.016)
I know the various Professional Education and Training (PET) degrees well.			-0.011 (0.011)
I know the difference between the Master of Advanced Studies and the Master of Arts/Science.			0.013 (0.008)
A tertiary degree (PET or university) is increasingly necessary to obtain higher positions.			0.007 (0.009)
A non-formal continuing education course is increasingly necessary to obtain higher positions.			-0.004

<b>(log) Recommended monthly salary</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Constant	8.948*** (0.015)	8.812*** (0.036)	8.641*** (0.113)
Std. Dev. random intercept			
Constant	0.202*** (0.007)	0.196*** (0.007)	0.160*** (0.006)
Std. Dev. residual			
Constant	0.045*** (0.004)	0.045*** (0.004)	0.045*** (0.004)
N of evaluations	677	677	677
N of employers	427	427	427
Log-likelihood	401.847	414.235	497.263

*Notes:* Results of linear regressions with respondent-specific random intercept and robust standard errors clustered by respondent in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## C.4 Interaction Effects

**Table C.9:** Likelihood for a job interview: MAS (compared to master's degree) \* order of applicant profile within deck

	Sales manager			IT director		
	(1)	(2)	(3)	(4)	(5)	(6)
Master	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
MAS	0.624*** (0.192)	0.590*** (0.192)	0.594*** (0.192)	0.457* (0.267)	0.457* (0.266)	0.395 (0.268)
Order of applicant profile within deck	0.342*** (0.129)	0.332*** (0.128)	0.330** (0.129)	0.160 (0.203)	0.172 (0.202)	0.164 (0.192)
Master * Order of applicant profile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
MAS * Order of applicant profile	-0.265*** (0.079)	-0.251*** (0.079)	-0.250*** (0.078)	-0.182 (0.119)	-0.185 (0.119)	-0.158 (0.118)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Other survey-design controls	No	Yes	Yes	No	Yes	Yes
Respondent-level controls	No	No	Yes	No	No	Yes
Constant	6.550*** (0.221)	5.957*** (0.283)	5.609*** (0.771)	7.575*** (0.331)	7.196*** (0.439)	5.719*** (1.288)
Std. Dev. random intercept						
Constant	0.500*** (0.043)	0.491*** (0.042)	0.445*** (0.043)	0.524*** (0.069)	0.518*** (0.068)	0.433*** (0.068)
Std. Dev. residual						
Constant	0.046 (0.050)	0.046 (0.050)	0.047 (0.050)	-0.066 (0.084)	-0.066 (0.084)	-0.065 (0.084)
N of observations		1,918			778	
N of respondents		1,216			491	
Log-likelihood	-3756.693	-3747.993	-3706.152	-1489.499	-1487.253	-1453.785

*Notes:* Table displays random intercept regressions with robust standard errors clustered by respondent in parentheses. Table further displays interaction effects of having a MAS (compared to a master's degree) with survey design control 'Order of applicant profile within deck of applicant profiles'. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table C.10:** Likelihood for a job interview and recommended salary: MAS (compared to master’s degree) \* item on knowledge about difference between MAS and master’s degree

	Sales Manager: likelihood for job interview	Sales Manager: Salary (log)	IT director: likelihood for job interview	IT director: Salary (log)
Master	Ref.	Ref.	Ref.	Ref.
MAS	-0.199 (0.167)	0.009 (0.007)	-0.067 (0.239)	0.001 (0.014)
Item: “I know the difference between a MAS and Master of Art/Science”	0.064 (0.056)	0.014*** (0.005)	-0.087 (0.086)	0.011 (0.009)
Master * Item	Ref.	Ref.	Ref.	Ref.
MAS * Item	0.082** (0.039)	0.001 (0.002)	0.042 (0.059)	0.003 (0.003)
Applicant controls	Yes	Yes	Yes	Yes
Survey-design controls	Yes	Yes	Yes	Yes
Respondent-level controls	Yes	Yes	Yes	Yes
Constant	6.092*** (0.771)	8.379*** (0.076)	6.024*** (1.293)	8.647*** (0.113)
Std. Dev. random intercept				
Constant	1.559*** (0.067)	0.164*** (0.004)	1.536*** (0.104)	0.160*** (0.006)
Std. Dev. residual				
Constant	1.052 (0.053)	0.041*** (0.002)	0.942 (0.079)	0.045*** (0.004)
N of observations	1,918	1,710	778	677
N of respondents	1,216	1,084	491	427
Log-likelihood	-3,708.989	1,290.882	-1,454.347	497.744

*Notes:* Table displays mixed linear regressions with random intercepts and random slopes (to account for cross-level interactions) with robust standard errors clustered by respondent in parentheses. Table further displays interaction effects of having a MAS (compared to a master’s degree) with the item “I know the difference between a MAS and Master of Art/Science” (Likert-scale from 1 ‘completely disagree’ to 5 ‘completely agree’). \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.



**Table C.11:** Likelihood for a job interview and recommended salary: MAS (compared to master's degree) \* general work experience

	Sales Manager: likelihood for job interview	Sales Manager: salary	IT director: likelihood for job interview	IT director: salary
Master	Ref.	Ref.	Ref.	Ref.
MAS	0.163 (0.149)	0.027*** (0.009)	-0.110 (0.254)	0.021 (0.013)
General work experience				
8 years	Ref.	Ref.	Ref.	Ref.
10 years	0.168 (0.127)	0.025*** (0.006)	-0.052 (0.205)	0.024* (0.013)
12 years	0.316*** (0.121)	0.042*** (0.006)	-0.271 (0.172)	0.035*** (0.010)
Master * general work experience	Ref.	Ref.	Ref.	Ref.
MAS * 8 years	Ref.	Ref.	Ref.	Ref.
MAS * 10 years	-0.042 (0.188)	-0.020* (0.011)	0.136 (0.322)	-0.018 (0.020)
MAS * 12 years	-0.235 (0.172)	-0.020** (0.009)	0.391 (0.268)	-0.001 (0.013)
Applicant controls	Yes	Yes	Yes	Yes
Survey-design controls	Yes	Yes	Yes	Yes
Respondent-level con- trols	Yes	Yes	Yes	Yes
Constant	5.979*** (0.771)	8.386*** (0.075)	5.958*** (1.276)	8.663*** (0.113)
Std. Dev. random inter- cept				
Constant	1.561*** (0.067)	0.164*** (0.004)	1.544*** (0.105)	0.160*** (0.006)
Std. Dev. residual				
Constant	1.052 (0.053)	0.041*** (0.002)	0.934 (0.079)	0.045*** (0.004)
N of observations	1,918	1,710	778	677
N of respondents	1,216	1,084	491	427
Log-likelihood	-3,709.826	1,294.039	-1,453.235	498.022

*Notes:* Table displays random intercept regressions with robust standard errors clustered by respondent in parentheses. Table further displays interaction effects of an applicant with a MAS with general work experience (eight, ten or twelve years). \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

## C.5 Robustness Tests, Internal and External Validity

### C.5.1 Excluding low-matching applicant profiles

**Table C.12:** Likelihood for a job interview: excluding applicant profiles with a low match to real vacancies

Likelihood for job interview	Sales Manager			IT director		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
MAS	0.150**	0.085	0.097	0.114	0.074	0.062
(ref: master's degree)	(0.069)	(0.117)	(0.119)	(0.097)	(0.179)	(0.169)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey-design controls	No	Yes	Yes	No	Yes	Yes
Respondent-level controls	No	No	Yes	No	No	Yes
No. of evaluations		1,035			473	
No. of employers		656			300	
Log-Likelihood	-1902.051	-1901.661	-1871.640	-865.090	-864.355	-830.278

*Notes:* Table displays results of linear regressions with random intercepts and robust standard errors clustered by respondent in parentheses. Models with the suffix 'a' refer to the position 'sales manager', models with the suffix 'b' refer to the position IT director. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

**Table C.13:** Recommended monthly salary: excluding applicant profiles with a low match to real vacancies

Recommended salary	Sales Manager			IT director		
	(4a)	(5a)	(6a)	(4b)	(5b)	(6b)
MAS	0.015***	0.006	0.008	0.009*	-0.001	-0.002
(ref: master's degree)	(0.003)	(0.008)	(0.008)	(0.005)	(0.009)	(0.009)
Applicant controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey-design controls	No	Yes	Yes	No	Yes	Yes
Respondent-level controls	No	No	Yes	No	No	Yes
No. of evaluations		945			417	
No. of employers		598			264	
Log-Likelihood	635.500	614.374	744.490	264.254	258.735	321.600

*Notes:* Table displays results of linear regressions with random intercepts and robust standard errors clustered by respondent in parentheses. Models with the suffix 'a' refer to the position 'sales manager', models with the suffix 'b' refer to the position IT director. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

### C.5.2 Internal validity

In quasi-experimental research, it is important to ensure the internal validity of the experiment. An experiment has a high internal validity if its treatment (the applicant profile dimension in our case) causes the variation in the outcome variable of interest (Auspurg & Hinz, 2014). To check for internal validity, we first present correlations among the applicant profile variables (see Table C.14) and between the applicant profile variables and the respondent-level variables (see Table C.15). Second, we examine whether the time a respondent takes to evaluate the applicant profile has an effect on the evaluation. As each respondent evaluated multiple applicant profiles, this test captures whether survey fatigue influences our results. The regressions including these time variables qualitatively yield the same results as our main regressions (see Table C.16).

**Table C.14:** Pairwise correlation of applicant profile variables

<b>Applicant profile variable</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1 MAS (vs. Master's degree)	1					
2 Upper-secondary education	-0.0322	1				
3 Gender	0.0053	-0.0086	1			
4 Volunteering	0.0024	-0.0041	-0.0074	1		
5 <i>General work experience</i>	-0.0346	0.0058	0.0375	-0.0251	1	
6 <i>Occupation-specific work experience</i>	0.0071	0.0114	0.0217	0.0246	0.0190	1

Notes: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in *Italic*), and the Cramér's V measure for categorical variables.

**Table C.15:** Pairwise correlations of applicant profile variables and respondent-level variables

<b>Variables</b>	<b>MAS (vs. Master's degree)</b>	<b>Upper-secondary education</b>	<b>Gender</b>	<b>Applicant volunteers</b>	<b>General work experience</b>	<b>Occupation-specific work experience</b>
Respondent born in Switzerland	-0.021	0.000	-0.001	0.000	0.010	0.003
Age of respondent	0.007	0.001	0.000	0.000	-0.001	-0.006
<i>Educational career respondent</i>	-0.012	-0.001	0.000	0.000	0.007	0.012
Female respondent	-0.009	-0.001	-0.001	0.000	-0.001	-0.008
Respondent working in HR	-0.003	-0.001	-0.002	0.000	-0.001	-0.007
Item on education 1	-0.011	0.001	-0.003	0.000	0.003	0.001
Item on education 2	-0.005	0.000	-0.003	0.000	-0.006	-0.003
Item on education 3	-0.014	0.000	-0.004	0.000	0.002	-0.008
Item on education 4	0.009	0.000	-0.003	0.000	0.003	-0.008
Item on education 5	-0.008	0.000	-0.002	0.000	-0.005	0.007
<i>Firm size</i>	0.003	-0.002	-0.003	0.000	0.005	-0.013
<i>Region of firm in Switzerland</i>	-0.003	0.001	-0.001	0.000	-0.001	-0.006
<i>Industry of firm</i>	-0.010	-0.001	0.000	0.000	-0.005	-0.002
Internationally active firm	0.003	0.001	-0.003	0.000	-0.006	-0.005

*Notes:* \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. We indicate the Pearson's correlation coefficient for metric variables (in Italic), and the Cramér's V measure for categorical variables. Items on education 1-5 refer to the items measuring knowledge about the higher and non-formal continuing education system in Switzerland. See Table C.3 to see the items in full length.

**Table C.16:** Random intercept regressions with time variables for both positions

	Sales manager		IT director	
	Likelihood for job interview (1-10)	Salary (log)	Likelihood for job interview (1-10)	Salary (log)
Master's degree	Ref.	Ref.	Ref.	Ref.
MAS	0.055 (0.099)	0.011* (0.006)	0.081 (0.132)	0.013** (0.006)
Constant	5.843*** (0.788)	8.355*** (0.080)	6.290*** (1.261)	8.597*** (0.118)
Time to evaluate applicant profile 1	0.003** (0.001)	0.001*** (0.000)	-0.008 (0.008)	0.000 (0.000)
Time to evaluate applicant profile 2	0.016** (0.007)	0.000 (0.001)	0.066 (0.094)	0.001 (0.005)
Time to evaluate applicant profile 3	-0.038*** (0.003)	0.004 (0.003)	0.043 (0.032)	0.003*** (0.001)
Time to evaluate applicant profile 4	0.044 (0.028)	0.010*** (0.003)	0.048 (0.186)	0.049*** (0.013)
Full set of control variables	Yes	Yes	Yes	Yes
No. of observations	1,857	1,631	751	648
No. of groups	1,177	1,039	474	409
Log-Likelihood	-3583.459	1233.250	-1396.764	488.218

*Notes:* Table displays results of random intercept regressions with robust standard errors in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively. Each model includes the full set of control variables.

### C.5.3 Fixed-effects regressions

To test whether some unobserved respondent-level variables bias our estimates, we additionally compute fixed-effects linear regressions for the models with only the applicant controls and the lower-level survey-design control variable (Order of applicant profile within deck of applicant profiles). Table C.17 shows that these regressions support the results from the random-effects linear regressions. As random-effects regressions are more efficient than fixed-effects regressions and allow the inclusion of respondent-level variables, we keep them as our main specifications.

**Table C.17:** Fixed-effects regressions for both dependent variables

	Sales manager Likelihood for job interview (1-10)		Sales manager (log) Monthly salary		IT director Likelihood for job interview (1-10)		IT director (log) Monthly salary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Master's degree	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
MAS	0.137** (0.058)	0.075 (0.129)	0.015*** (0.002)	0.009 (0.006)	0.049 (0.087)	0.173 (0.159)	0.013*** (0.004)	0.011 (0.007)
Constant	6.919*** (0.164)	6.827*** (0.243)	8.828*** (0.007)	8.820*** (0.010)	7.900*** (0.224)	8.084*** (0.313)	8.861*** (0.006)	8.854*** (0.008)
Applicant controls								
Upper-secondary VET of applicant	0.190*** (0.068)	0.041 (0.281)	0.013*** (0.003)	-0.001 (0.012)	0.245*** (0.090)	0.564 (0.383)	0.018*** (0.004)	0.013 (0.017)
Female applicant	0.199*** (0.070)	0.201*** (0.070)	0.001 (0.003)	0.001 (0.003)	0.066 (0.097)	0.064 (0.097)	-0.006 (0.005)	-0.006 (0.005)
Volunteering appli- cant	0.137** (0.068)	0.138** (0.068)	0.004 (0.003)	0.004 (0.003)	0.021 (0.111)	0.019 (0.111)	-0.003 (0.006)	-0.003 (0.006)
Occupation-specific work experience of applicant	0.205*** (0.044)	0.206*** (0.044)	0.009*** (0.002)	0.009*** (0.002)	0.028 (0.065)	0.025 (0.065)	0.004 (0.003)	0.004 (0.003)
General work expe- rience of applicant	0.109** (0.048)	0.111** (0.048)	0.016*** (0.002)	0.016*** (0.002)	-0.067 (0.058)	-0.072 (0.058)	0.018*** (0.004)	0.018*** (0.004)
Survey design control								
Order of applicant profile within deck		0.081 (0.147)		0.007 (0.006)		-0.165 (0.185)		0.003 (0.009)
No. of observations	1,915	1,915	1,707	1,707	778	778	677	677
No. of groups	1,214	1,214	1,082	1,082	491	491	427	427
Log-Likelihood	-1856.523	-1856.083	3887.522	3889.674	-676.156	-675.126	1471.849	1471.951

*Notes:* Table displays fixed effects regressions for models with both dependent variables with robust standard errors clustered by respondent in parentheses. Models (1) through (4) display results for the position 'sales manager'. models (5) through (8) display results for the position 'IT director'. \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1%-level, respectively.

# Appendix D

## D.1 Summary Statistics

**Table D.1:** Summary statistics of regression variables

	N	Mean	Std. Dev.	Min	Max
<b>Dependent variable</b>					
Wage growth in %	114,908	0.02	0.22	-1.37	1.35
<b>Explanatory variable: CET in t-1</b>					
Participation in CET	114,908	0.32	-	0	1
Length of CET course	114,908				
0	114,908	0.78	-	0	1
1 (1-12 h)	114,908	0.11	-	0	1
2 (12+ h)	114,908	0.11	-	0	1
<b>Proxies for skill level</b>					
Tertiary education	114,908	0.44	-	0	1
High-skilled occupation	114,908	0.53	-	0	1
High-skilled worker (factor analysis variable)	114,908	0.62	-	0	1
<b>Covariates in t-1</b>					
<b>Employment variables</b>					
Temporary contract	114,908	0.05	-	0	1
Tenure in firm	114,908				
3 years and less	114,908	0.25	-	0	1
Between 3 and 8 years	114,908	0.3	-	0	1
8 years and more	114,908	0.45	-	0	1
Leadership position	114,908	0.37	-	0	1
Part-time employment	114,908	0.35	-	0	1
<b>Firm variables</b>					
Firm size (Number of employees)	114,908				
1-10	114,908	0.19	-	0	1
11-99	114,908	0.41	-	0	1
>=100	114,908	0.4	-	0	1
Region of firm in Switzerland	114,908				
Geneva	114,908	0.18	-	0	1
Espace Mittelland	114,908	0.21	-	0	1
North-Western Switzerland	114,908	0.12	-	0	1
Zurich	114,908	0.21	-	0	1
Eastern Switzerland	114,908	0.12	-	0	1
Central Switzerland	114,908	0.11	-	0	1
Ticino	114,908	0.05	-	0	1
Firm sector NOGA 2008	114,908				
Agriculture, forestry and fishing	114,908	0.01	-	0	1
Mining and quarrying	114,908	0.00	-	0	1
Manufacture of goods	114,908	0.15	-	0	1

	N	Mean	Std. Dev.	Min	Max
Electricity, gas, steam and air-conditioning supply	114,908	0.01	-	0	1
Water supply, sewerage, waste management and remediation	114,908	0.00	-	0	1
Construction	114,908	0.05	-	0	1
Wholesale and retail trade, repair of motor vehicles and motorcycles	114,908	0.13	-	0	1
Transportation and storage	114,908	0.05	-	0	1
Accommodation and food service activities	114,908	0.03	-	0	1
IT, telecommunications and other information services	114,908	0.04	-	0	1
Financial and insurance activities	114,908	0.07	-	0	1
Real estate	114,908	0.01	-	0	1
Other professional, scientific and technical activities	114,908	0.08	-	0	1
Administrative and support service activities	114,908	0.03	-	0	1
Public administration and defence, compulsory social security	114,908	0.06	-	0	1
Education	114,908	0.09	-	0	1
Health and social work	114,908	0.15	-	0	1
Arts, entertainment and recreation	114,908	0.01	-	0	1
Other services	114,908	0.03	-	0	1
Activities of households as employers; undifferentiated goods- and services-producing, activities of households for own use	114,908	0.00	-	0	1
Activities of extra-territorial organisations and bodies	114,908	0.00	-	0	1
<b>Demographic variables</b>					
Age categories					
15-24	114,908	0.05	-	0	1
25-39	114,908	0.33	-	0	1
40-54	114,908	0.44	-	0	1
55-64	114,908	0.17	-	0	1
>=65	114,908	0.01	-	0	1
Gender: female	114,908	0.48	-	0	1
Swiss nationality	114,908	0.68	-	0	1
Civil status: married	114,908	0.58	-	0	1
Household size (number of persons in household)	114,908	2.78	1.29	1	9
<b>Variables for robustness tests</b>					
CET for work-related reasons (variable from 2010-2015)	14,685	0.82	-	0	1
CET for work-related reasons (variable from 2016 onwards)	15,572	0.87	-	0	1
Participation in CET (only one survey wave)	114,849	0.25	-	0	1

Notes: Summary statistics table for variables included in regressions for the baseline regressions in Table 5.3.



## D.2 Full Results Tables

**Table D.2:** Full results table of baseline regressions

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.005*** (0.001)	0.004*** (0.001)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.001 (0.002)	0.001 (0.002)
Long CET course			0.007*** (0.002)	0.004** (0.002)
<i>Survey years</i>				
2011	Ref.	Ref.	Ref.	Ref.
2012	-0.007** (0.003)	-0.007*** (0.003)	-0.007** (0.003)	-0.007*** (0.003)
2013	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)
2014	-0.009*** (0.003)	-0.008*** (0.003)	-0.009*** (0.003)	-0.008*** (0.003)
2015	-0.007*** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)
2016	-0.009*** (0.003)	-0.009*** (0.003)	-0.008*** (0.003)	-0.009*** (0.003)
2017	-0.009*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.009*** (0.003)
2018	-0.008*** (0.003)	-0.009*** (0.003)	-0.008*** (0.003)	-0.008*** (0.003)
2019	-0.006** (0.003)	-0.006** (0.003)	-0.006** (0.003)	-0.006** (0.003)
2020	-0.005* (0.003)	-0.004* (0.003)	-0.005* (0.003)	-0.004 (0.003)
<i>Employment variables</i>				
Temporary contract		0.030*** (0.004)		0.030*** (0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003* (0.002)		-0.003* (0.002)
8 years and more		-0.007*** (0.002)		-0.007*** (0.002)
Working part-time		-0.014*** (0.002)		-0.014*** (0.002)
In leadership position or self-employed		-0.003** (0.001)		-0.003** (0.001)
High-skilled occupation		0.001 (0.001)		0.001 (0.001)
<i>Firm variables</i>				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002		-0.002

	(0.002)	(0.002)
100+	-0.003	-0.003
	(0.002)	(0.002)
Industry sector		
Agriculture, forestry and fishing	Ref.	Ref.
Mining and quarrying	-0.011	-0.011
	(0.012)	(0.012)
Manufacture of goods	-0.016**	-0.016**
	(0.006)	(0.006)
Electricity, gas, steam and air-conditioning supply	-0.015*	-0.015*
	(0.008)	(0.008)
Water supply, sewerage, waste management and remediation	-0.006	-0.006
	(0.010)	(0.010)
Construction	-0.014**	-0.014**
	(0.007)	(0.007)
Wholesale and retail trade, repair of motor vehicles and motorcycles	-0.016**	-0.016**
	(0.006)	(0.006)
Transportation and storage	-0.014**	-0.014**
	(0.007)	(0.007)
Accommodation and food service activities	-0.019**	-0.019**
	(0.008)	(0.008)
IT, telecommunications and other information services	-0.011*	-0.011*
	(0.007)	(0.007)
Financial and insurance activities	-0.012*	-0.012*
	(0.007)	(0.007)
Real estate	-0.008	-0.008
	(0.010)	(0.010)
Other professional, scientific and technical activities	-0.009	-0.009
	(0.007)	(0.007)
Administrative and support service activities	-0.012	-0.012*
	(0.007)	(0.007)
Public administration and defence, compulsory social security	-0.013*	-0.013*
	(0.007)	(0.007)
Education	-0.013*	-0.013*
	(0.007)	(0.007)
Health and social work	-0.012*	-0.012*
	(0.007)	(0.007)
Arts, entertainment and recreation	-0.008	-0.008
	(0.009)	(0.009)
Other services	-0.016**	-0.016**
	(0.008)	(0.008)
Activities of households as employers; undifferentiated goods- and services-producing, activities of households for own use	-0.110	-0.110
	(0.109)	(0.109)
Activities of extra-territorial organisations and bodies	-0.036**	-0.037**
	(0.018)	(0.018)
Region of firm residence		
Geneva	Ref.	Ref.

Espace Mittelland		-0.002 (0.002)		-0.002 (0.002)
North-Western Switzerland		-0.001 (0.002)		-0.001 (0.002)
Zurich		-0.002 (0.002)		-0.002 (0.002)
Eastern Switzerland		-0.003 (0.002)		-0.003 (0.002)
Central Switzerland		-0.003 (0.002)		-0.003 (0.002)
Ticino		-0.003 (0.003)		-0.003 (0.003)
<i>Demographic variables</i>				
Tertiary education		0.004*** (0.001)		0.004*** (0.001)
Female		0.006*** (0.002)		0.006*** (0.002)
Age				
15-24		Ref.		Ref.
25-39		-0.013*** (0.004)		-0.013*** (0.004)
40-54		-0.025*** (0.004)		-0.025*** (0.004)
55-64		-0.030*** (0.004)		-0.030*** (0.004)
65		-0.019 (0.012)		-0.019 (0.012)
Swiss nationality		0.000 (0.001)		0.001 (0.001)
Married		-0.003* (0.001)		-0.003* (0.001)
Household size		0.001 (0.001)		0.001 (0.001)
Constant	0.022*** (0.002)	0.064*** (0.008)	0.023*** (0.002)	0.064*** (0.008)
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.000	0.006	0.000	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.3:** Full results table – interaction with ‘tertiary education’

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.006*** (0.002)	0.005*** (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.004 (0.003)	0.004 (0.003)
Long CET course			0.007** (0.003)	0.005 (0.003)
Tertiary education	0.008*** (0.001)	0.006*** (0.002)	0.008*** (0.001)	0.005*** (0.002)
Participation in CET # Tertiary education	-0.004* (0.002)	-0.004 (0.002)		
Length of CET course # Tertiary education				
No CET course			Ref.	Ref.
Short CET course # Tertiary education			-0.007* (0.004)	-0.007* (0.004)
Long CET course # Tertiary education			-0.002 (0.004)	-0.000 (0.004)
<i>Survey years</i>	Yes	Yes	Yes	Yes
<i>Employment variables</i>				
Temporary contract		0.030*** (0.004)		0.030*** (0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003* (0.002)		-0.003* (0.002)
8 years and more		-0.007*** (0.002)		-0.007*** (0.002)
Working part-time		-0.014*** (0.002)		-0.014*** (0.002)
In leadership position or self-employed		-0.003** (0.001)		-0.003** (0.001)
High-skilled occupation		0.001 (0.001)		0.001 (0.001)
<i>Firm variables</i>				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002 (0.002)		-0.002 (0.002)
100+		-0.003 (0.002)		-0.003 (0.002)
Industry sector	No	Yes	No	Yes
Region of firm residence	No	Yes	No	Yes
<i>Demographic variables</i>				
Female		0.006*** (0.002)		0.006*** (0.002)
Age				
15-24		Ref.		Ref.

25-39		-0.013***		-0.013***
		(0.004)		(0.004)
40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
Constant	0.020***	0.063***	0.020***	0.057***
	(0.002)	(0.008)	(0.002)	(0.008)
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.001	0.006	0.001	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.4:** Full results table – interaction with ‘high-skilled occupation’

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.008*** (0.002)	0.006*** (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.002 (0.003)	0.002 (0.003)
Long CET course			0.009*** (0.003)	0.004 (0.003)
High-skilled occupation	0.006*** (0.001)	0.002 (0.002)	0.005*** (0.001)	0.001 (0.002)
Participation in CET # High-skilled occupation	-0.006** (0.003)	-0.004* (0.003)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course # High-skilled occupation			-0.003 (0.004)	-0.002 (0.004)
Long CET course # High-skilled occupation			-0.003 (0.004)	-0.000 (0.004)
<i>Survey years</i>				
	Yes	Yes	Yes	Yes
<i>Employment variables</i>				
Temporary contract		0.030*** (0.004)		0.030*** (0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003* (0.002)		-0.003* (0.002)
8 years and more		-0.007*** (0.002)		-0.007*** (0.002)
Working part-time		-0.014*** (0.002)		-0.014*** (0.002)
In leadership position or self-employed		-0.003*** (0.001)		-0.003** (0.001)
Tertiary education of worker		0.004*** (0.001)		0.004*** (0.001)
<i>Firm variables</i>				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002 (0.002)		-0.002 (0.002)
100+		-0.003 (0.002)		-0.003 (0.002)
Industry sector	No	Yes	No	Yes
Region of firm residence	No	Yes	No	Yes
<i>Demographic variables</i>				
Female		0.006*** (0.002)		0.006*** (0.002)
Age				
15-24		Ref.		Ref.

25-39		-0.013***		-0.013***
		(0.004)		(0.004)
40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
Constant	0.020***	0.063***	0.021***	0.064***
	(0.002)	(0.008)	(0.002)	(0.008)
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.001	0.006	0.000	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.5:** ‘participation in CET’ interaction with ‘tertiary education’ over time (2011-2020)

Annual wage growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Participation in CET	0.016*** (0.006)	0.001 (0.006)	0.009 (0.006)	0.007 (0.007)	-0.001 (0.005)	0.012** (0.006)	0.005 (0.006)	0.000 (0.006)	0.010* (0.006)	-0.003 (0.006)
Tertiary education	0.016*** (0.006)	0.005 (0.005)	0.007 (0.005)	-0.005 (0.005)	0.007 (0.005)	0.020*** (0.005)	0.001 (0.005)	0.003 (0.005)	0.008 (0.005)	-0.004 (0.005)
Participation in CET # Tertiary education	-0.018** (0.008)	-0.002 (0.008)	-0.010 (0.008)	-0.006 (0.008)	0.004 (0.007)	-0.015** (0.007)	-0.004 (0.008)	0.002 (0.008)	-0.007 (0.008)	0.014* (0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.014

Notes: Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.



**Table D.6:** 'length of CET course' interaction with 'tertiary education' over time (2011-2020)

Annual wage growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	0.022** (0.009)	0.000 (0.008)	0.013 (0.009)	0.004 (0.010)	-0.013* (0.008)	0.011 (0.009)	0.003 (0.008)	-0.007 (0.010)	0.015** (0.008)	0.001 (0.008)
Long CET course	0.012 (0.008)	0.006 (0.008)	0.012 (0.009)	0.005 (0.011)	0.011 (0.008)	0.007 (0.010)	-0.011 (0.008)	0.006 (0.010)	-0.006 (0.009)	-0.002 (0.009)
Tertiary education	0.013** (0.005)	0.006 (0.005)	0.008 (0.005)	-0.005 (0.005)	0.007 (0.005)	0.016*** (0.005)	0.000 (0.005)	0.004 (0.005)	0.007 (0.005)	-0.002 (0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Tertiary education	-0.026** (0.012)	-0.007 (0.011)	-0.020* (0.011)	-0.017 (0.013)	0.010 (0.011)	-0.011 (0.011)	-0.001 (0.011)	-0.001 (0.012)	-0.016 (0.011)	0.009 (0.011)
Long CET course # Tertiary education	-0.003 (0.011)	-0.006 (0.010)	-0.015 (0.011)	-0.001 (0.014)	-0.001 (0.011)	-0.003 (0.012)	0.000 (0.011)	0.000 (0.012)	0.014 (0.011)	0.011 (0.012)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.7:** ‘participation in CET’ interaction with ‘high-skilled occupation’ over time (2011-2020)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Annual wage growth</b>										
Participation in CET	0.017*** (0.007)	-0.002 (0.006)	0.016** (0.007)	0.000 (0.007)	-0.003 (0.006)	0.019*** (0.006)	0.007 (0.007)	0.002 (0.007)	0.004 (0.007)	0.002 (0.007)
High-skilled occupation	0.008 (0.005)	0.001 (0.005)	0.001 (0.005)	0.006 (0.006)	-0.009* (0.005)	0.008 (0.005)	-0.001 (0.005)	0.004 (0.005)	0.000 (0.005)	0.006 (0.005)
Participation in CET # High-skilled occupation	-0.017** (0.008)	0.004 (0.008)	-0.020** (0.008)	0.006 (0.009)	0.006 (0.008)	-0.024*** (0.008)	-0.006 (0.008)	-0.000 (0.008)	0.003 (0.008)	0.004 (0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.007	0.011	0.007	0.014	0.007	0.010	0.013	0.013

*Notes:* Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.8:** 'length of CET course' interaction with 'high-skilled occupation' over time (2011-2020)

Annual wage growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Length of CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No CET course										
Short CET course	0.015 (0.010)	-0.004 (0.009)	0.010 (0.010)	-0.010 (0.012)	-0.015 (0.009)	0.019** (0.010)	0.015 (0.009)	-0.018 (0.011)	0.004 (0.009)	0.007 (0.009)
Long CET course	0.015 (0.010)	0.001 (0.009)	0.019* (0.011)	-0.011 (0.012)	0.014 (0.010)	0.012 (0.011)	-0.008 (0.011)	0.005 (0.011)	-0.012 (0.010)	0.001 (0.012)
High-skilled occupation	0.004 (0.005)	0.002 (0.005)	-0.001 (0.005)	0.005 (0.005)	-0.008 (0.005)	0.004 (0.005)	0.000 (0.005)	0.002 (0.005)	-0.001 (0.005)	0.007 (0.005)
Length of CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No CET course										
Short CET course # High-skilled occupation	-0.009 (0.013)	0.002 (0.012)	-0.012 (0.012)	0.008 (0.014)	0.011 (0.012)	-0.023* (0.012)	-0.019 (0.012)	0.016 (0.013)	0.005 (0.011)	-0.003 (0.011)
Long CET course # High-skilled occupation	-0.007 (0.012)	0.003 (0.011)	-0.023* (0.013)	0.023 (0.014)	-0.005 (0.012)	-0.010 (0.013)	-0.005 (0.012)	0.001 (0.012)	0.021* (0.012)	0.005 (0.014)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.010	0.010	0.006	0.012	0.007	0.014	0.008	0.010	0.013	0.013

Notes: Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.9:** ‘participation in CET’ interaction with ‘below tertiary education’ over time (2011-2020)

Annual wage growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Participation in CET	-0.002 (0.006)	-0.001 (0.005)	-0.002 (0.005)	0.001 (0.005)	0.002 (0.005)	-0.003 (0.005)	0.001 (0.005)	0.003 (0.005)	0.003 (0.005)	0.012** (0.005)
Below tertiary education	-0.016*** (0.006)	-0.005 (0.005)	-0.007 (0.005)	0.005 (0.005)	-0.007 (0.005)	-0.020*** (0.005)	-0.001 (0.005)	-0.003 (0.005)	-0.008 (0.005)	0.004 (0.005)
Participation in CET # Below tertiary education	0.018** (0.008)	0.002 (0.008)	0.010 (0.008)	0.006 (0.008)	-0.004 (0.007)	0.015** (0.007)	0.004 (0.008)	-0.002 (0.008)	0.007 (0.008)	-0.014* (0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.014

*Notes:* Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.10:** 'length of CET course' interaction with 'below tertiary education' over time (2011-2020)

Annual wage growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	-0.004 (0.008)	-0.007 (0.008)	-0.007 (0.007)	-0.013 (0.008)	-0.003 (0.008)	0.000 (0.007)	0.002 (0.007)	-0.008 (0.007)	-0.000 (0.007)	0.010 (0.007)
Long CET course	0.009 (0.008)	0.000 (0.007)	-0.003 (0.007)	0.004 (0.007)	0.010 (0.007)	0.004 (0.006)	-0.011 (0.007)	0.006 (0.006)	0.008 (0.007)	0.009 (0.008)
Below tertiary education	-0.013** (0.005)	-0.006 (0.005)	-0.008 (0.005)	0.005 (0.005)	-0.007 (0.005)	-0.016*** (0.005)	-0.000 (0.005)	-0.004 (0.005)	-0.007 (0.005)	0.002 (0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Below tertiary education	0.026**	0.007	0.020*	0.017	-0.010	0.011	0.001	0.001	0.016	-0.009
Long CET course # Below tertiary education	(0.012) 0.003	(0.011) 0.006	(0.011) 0.015	(0.013) 0.001	(0.011) 0.001	(0.011) 0.003	(0.011) -0.000	(0.012) -0.000	(0.011) -0.014	(0.011) -0.011
All control variables	(0.011) Yes	(0.010) Yes	(0.011) Yes	(0.014) Yes	(0.011) Yes	(0.012) Yes	(0.011) Yes	(0.012) Yes	(0.011) Yes	(0.012) Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.11:** ‘participation in CET’ interaction with ‘lower-skilled occupation’ over time (2011-2020)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Annual wage growth</b>										
Participation in CET	0.001 (0.005)	0.001 (0.005)	-0.005 (0.005)	0.006 (0.005)	0.003 (0.005)	-0.005 (0.005)	0.001 (0.005)	0.002 (0.005)	0.007 (0.005)	0.007 (0.005)
Lower-skilled occupation	-0.008 (0.005)	-0.001 (0.005)	-0.001 (0.005)	-0.006 (0.006)	0.009* (0.005)	-0.008 (0.005)	0.001 (0.005)	-0.004 (0.005)	-0.000 (0.005)	-0.006 (0.005)
Participation in CET # Lower-skilled occupation	0.017**	-0.004	0.020**	-0.006	-0.006	0.024***	0.006	0.000	-0.003	-0.004
All control variables	(0.008) Yes	(0.008) Yes	(0.008) Yes	(0.009) Yes	(0.008) Yes	(0.008) Yes	(0.008) Yes	(0.008) Yes	(0.008) Yes	(0.008) Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.011	0.010	0.007	0.011	0.007	0.014	0.007	0.010	0.013	0.013

*Notes:* Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.12:** 'length of CET course' interaction with 'lower-skilled occupation' over time (2011-2020)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Annual wage growth</b>										
Length of CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No CET course										
Short CET course	0.006 (0.008)	-0.002 (0.007)	-0.002 (0.007)	-0.002 (0.007)	-0.004 (0.007)	-0.003 (0.007)	-0.004 (0.007)	-0.002 (0.007)	0.009 (0.007)	0.005 (0.006)
Long CET course	0.008 (0.007)	0.004 (0.006)	-0.004 (0.006)	0.012 (0.007)	0.009 (0.007)	0.002 (0.006)	-0.013** (0.006)	0.006 (0.006)	0.009 (0.007)	0.005 (0.007)
Lower-skilled occupation	-0.004 (0.005)	-0.002 (0.005)	0.001 (0.005)	-0.005 (0.005)	0.008 (0.005)	-0.004 (0.005)	-0.000 (0.005)	-0.002 (0.005)	0.001 (0.005)	-0.007 (0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Lower-skilled occupation	0.009 (0.013)	-0.002 (0.012)	0.012 (0.012)	-0.008 (0.014)	-0.011 (0.012)	0.023* (0.012)	0.019 (0.012)	-0.016 (0.013)	-0.005 (0.011)	0.003 (0.011)
Long CET course # Lower-skilled occupation	0.007 (0.012)	-0.003 (0.011)	0.023* (0.013)	-0.023 (0.014)	0.005 (0.012)	0.010 (0.013)	0.005 (0.012)	-0.001 (0.012)	-0.021* (0.012)	-0.005 (0.014)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R <sup>2</sup>	0.010	0.010	0.006	0.012	0.007	0.014	0.008	0.010	0.013	0.013

*Notes:* Results of linear regressions with robust standard errors in parentheses. All models include the full set of control variables as defined in Table D.1. \* = 10%, \*\* = 5%, \*\*\* = 1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.13:** Three-way interaction with CET variables \* skill proxy \* time – tertiary education

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>
Survey year	0.000 (0.000)	0.000 (0.000)
Tertiary education	0.009*** (0.003)	0.008*** (0.003)
Tertiary education # Survey year	-0.001 (0.000)	-0.001 (0.000)
Participation in CET	0.011*** (0.004)	
Length of CET course		
No CET course		Ref.
Short CET course		0.010 (0.006)
Long CET course		0.015** (0.006)
Participation in CET # Tertiary education	-0.014*** (0.005)	
Length of CET course		
No CET course		Ref.
Short CET course # Tertiary education		-0.019** (0.008)
Long CET course # Tertiary education		-0.012 (0.008)
Participation in CET # Survey year	-0.001 (0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Survey year		-0.001 (0.001)
Long CET course # Survey year		-0.002** (0.001)
Participation in CET # Tertiary education # Survey year	0.002** (0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Tertiary education # Survey year		0.002* (0.001)
Long CET course # Tertiary education # Survey year		0.002* (0.001)
All control variables	Yes	Yes
N of observations	114,908	114,908
R <sup>2</sup>	0.006	0.006

Notes: Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.



**Table D.14:** Three-way interaction with CET variables \* skill proxy \* time – high-skilled occupation

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>
Survey year	-0.000 (0.000)	-0.000 (0.000)
High-skilled occupation	0.004 (0.003)	0.002 (0.003)
High-skilled occupation # Survey year	-0.000 (0.000)	-0.000 (0.000)
Participation in CET	0.010** (0.004)	
Length of CET course		
No CET course		Ref.
Short CET course		0.004 (0.007)
Long CET course		0.014** (0.007)
Participation in CET # High-skilled occupation	-0.011** (0.005)	
Length of CET course		
No CET course		Ref.
Short CET course # High-skilled occupation		-0.005 (0.008)
Long CET course # High-skilled occupation		-0.008 (0.008)
Participation in CET # Survey year	-0.001 (0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Survey year		-0.000 (0.001)
Long CET course # Survey year		-0.002 (0.001)
Participation in CET # High-skilled occupation # Survey year	0.001 (0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # High-skilled occupation # Survey year		0.001 (0.001)
Long CET course # High-skilled occupation # Survey year		0.001 (0.001)
All control variables	Yes	Yes
N of observations	114,908	114,908
R <sup>2</sup>	0.006	0.006

Notes: Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

### D.3 Results of Robustness Tests

**Table D.15:** Baseline regressions – absolute wage values

<b>Annual wage growth (absolute values)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	541.222*** (102.906)	247.497** (106.776)		
Length of CET course				
Short CET course			257.903* (155.152)	98.933 (156.478)
Long CET course			712.996*** (160.370)	307.295* (163.465)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.000	0.006	0.000	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.16:** Regressing current annual wage on CET variables and lagged dependent variable

<b>Annual wage</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.020*** (0.001)	0.010*** (0.001)		
Length of CET course				
Short CET course			0.012*** (0.002)	0.005*** (0.002)
Long CET course			0.024*** (0.002)	0.013*** (0.002)
Wage of previous year	0.883*** (0.002)	0.767*** (0.003)	0.884*** (0.002)	0.767*** (0.003)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.773	0.787	0.773	0.787

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.17:** Baseline regressions – Exclude high participation in CET

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>
Participation in CET (only in one survey wave)	0.005*** (0.001)	0.004*** (0.001)
Year dummies	Yes	Yes
Control variables	No	Yes
N of observations	114,849	114,849
R <sup>2</sup>	0.000	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020. For this robustness test, I exclude workers who were highly active in CET at t-1, i.e., workers who participated in CET in two survey waves.

#### D.4 Results of Robustness Tests for Heterogeneity Analyses

**Table D.18:** Sample splits ‘tertiary education’

<b>Annual wage growth</b>	<b>Below tertiary education</b>				<b>Tertiary education</b>			
	<b>(1a)</b>	<b>(2a)</b>	<b>(3a)</b>	<b>(4a)</b>	<b>(1b)</b>	<b>(2b)</b>	<b>(3b)</b>	<b>(4b)</b>
Participation in CET	0.006*** (0.002)	0.006*** (0.002)			0.001 (0.001)	0.001 (0.001)		
Length of CET course								
No CET course			Ref.	Ref.			Ref.	Ref.
Short CET course			0.003 (0.002)	0.004 (0.002)			-0.005** (0.002)	-0.005** (0.002)
Long CET course			0.008*** (0.003)	0.006** (0.003)			0.004* (0.002)	0.002 (0.002)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
N of observations	63,187	63,187	63,187	63,187	50,231	50,231	50,231	50,231
R <sup>2</sup>	0.000	0.004	0.000	0.004	0.000	0.010	0.001	0.010

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.19:** Sample splits ‘high-skilled occupation’

Annual wage growth	Lower-skilled occupation				High-skilled occupation			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Participation in CET	0.008*** (0.002)	0.007*** (0.002)			0.002 (0.001)	0.002 (0.002)		
Length of CET course								
No CET course			Ref.	Ref.			Ref.	Ref.
Short CET course			0.002 (0.003)	0.002 (0.003)			-0.000 (0.002)	0.000 (0.002)
Long CET course			0.009** (0.003)	0.005 (0.003)			0.005** (0.002)	0.004* (0.002)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
N of observations	53,579	53,579	53,579	53,579	61,329	61,329	61,329	61,329
R <sup>2</sup>	0.000	0.004	0.000	0.004	0.000	0.010	0.001	0.010

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.20:** Factor analysis for skill proxies

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	1.509	1.019	0.755	0.755
Factor2	0.491	.	0.245	1.000

*Notes:* Table displays results of principal-component factor analysis of the familiarity variables. N=114,751.

**Table D.21:** Rotated factor loadings and unique variances after PCF analysis

Factor	Factor 1	Uniqueness
Tertiary education	0.869	0.245
High-skilled occupation	0.869	0.245

*Notes:* Table displays results of principal-component factor analysis of the familiarity variables after rotation. N=114,751.

**Table D.22:** Heterogeneity by skill level – higher-skilled worker (new variable after factor analysis)

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Participation in CET	0.007*** (0.002)	0.006** (0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.002 (0.004)	0.002 (0.004)
Long CET course			0.008** (0.004)	0.004 (0.004)
Higher-skilled worker	0.006*** (0.001)	0.004 (0.002)	0.005*** (0.001)	0.003 (0.002)
Participation in CET # Higher-skilled worker	-0.004 (0.003)	-0.003 (0.003)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course # Higher-skilled worker			-0.002 (0.004)	-0.001 (0.004)
Long CET course # Higher-skilled worker			-0.003 (0.004)	0.001 (0.004)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
N of observations	114,908	114,908	114,908	114,908
R <sup>2</sup>	0.001	0.006	0.000	0.006

*Notes:* Results of linear regressions with robust standard errors in parentheses. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020. The binary variable ‘high-skilled worker’ results after the principal component factor analysis (see Table D.20 and Table D.21), summarising the two skill proxies in one variable.

**Table D.23:** Including the reason for CET as a covariate

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Length of CET course				
No CET course	Ref.	Ref.	Ref.	Ref.
Short CET course	-0.019 (0.018)	-0.019 (0.018)	-0.001 (0.004)	-0.001 (0.004)
Long CET course	-0.011 (0.018)	-0.011 (0.018)	-0.002 (0.004)	-0.002 (0.004)
CET for work-related reason (variable from 2010-2015)		0.003 (0.004)		
CET for work-related reason (variable from 2016 onwards)				-0.002 (0.005)
Year dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
N of observations	14,685	14,685	15,572	15,572
R2	0.002	0.011	0.000	0.013

*Notes:* Results of linear regressions with robust standard errors in parentheses. Models (1) and (2) include the variable ‘CET for work-related reasons’, which was used in the survey waves 2010-2015. Models (3) and (4) include the variable, which was used from 2016 onwards. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

**Table D.24:** Selection into work – Heckman two-step selection model

<b>Annual wage growth</b>	<b>(1)</b>	<b>(2)</b>
Participation in CET	0.004** (0.001)	
Length of CET course		
No CET course		Ref.
Short CET course		0.001 (0.002)
Long CET course		0.004* (0.002)
All control variables	Yes	Yes
<i>Selection eq. with dependent variable: 'Employment'</i>		
Instrument:		
Children under 15 years in household	0.577*** (0.016)	0.577*** (0.016)
Gender: female	-0.255*** (0.008)	-0.255*** (0.016)
Children under 15 # Female	-0.885*** (0.018)	-0.886*** (0.018)
/mills		
lambda	0.01 (0.007)	0.01 (0.007)
N of observations	220,616	220,546
N of selected observations	117,288	117,218
N of non-selected observations	103,328	103,328

*Notes:* Results of heckman twostep estimations with robust standard errors in parentheses. The selection equation includes year dummies, the variables tertiary education, gender, age, Swiss nationality, civil status and household size. The outcome equation includes the same control variables as the baseline regressions. \*=10%, \*\*=5%, \*\*\*=1% significance. Source: Swiss Labour Force Survey 2010-2020.

# Curriculum Vitae

## Personal Information

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Birth date and place	December 18, 1992 in Switzerland
Nationality	Swiss
Citizenship	Citizen of Wald ZH

## Education

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2019 – 2023	<b>Doctor of Science (Dr. Sc. ETH)</b> ETH Zürich, Department of Management, Technology and Economics
2015 – 2017	<b>Master of Science in Economic Geography (M.Sc. UZH)</b> University of Zurich, Faculty of Science
2011 – 2014	<b>Bachelor of Arts in Sociology, Environmental Sciences and Philosophy (B.A. UZH)</b> University of Zurich, Faculty of Arts and Social Sciences
2005 – 2011	<b>Academic Baccalaureate (Matura)</b> Kantonsschule Zürcher Oberland, Wetzikon ZH

## Research Positions

---

May 2018 – April 2019	<b>Research intern ETH Zürich</b> KOF Swiss Economic Institute, Research Division Education Systems
September 2014 – December 2014	<b>Research intern EAWAG Dübendorf</b> Research Division ‘Environmental Social Sciences’

## Research Interests

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Labour market sociology and economics, economics and sociology of education, inequality, migration



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