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## The labour market returns to vocational education over the life course

Korber Maillys

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*The labour market returns to vocational education over the life course*

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**« The labour market returns to vocational education over the life course »**

Jean-Philippe LERESCHE  
Doyen

Lausanne, le 14 décembre 2018

## **Résumé**

La formation professionnelle est reconnue pour faciliter l'entrée sur le marché du travail, en fournissant des compétences spécifiques facilement applicables dans un métier donné. Toutefois, si ce type d'éducation peut permettre aux jeunes de trouver une bonne adéquation au début de leur carrière, il peut rendre les travailleurs plus âgés vulnérables aux changements technologiques et à l'évolution de la structure professionnelle. De leur côté, les titulaires d'une formation générale peuvent avoir plus de difficultés à entrer sur le marché du travail en raison d'un manque de compétences professionnelles, mais ils pourraient avoir plus de facilité à s'adapter au changement en raison de la plus grande flexibilité des compétences générales.

Nous abordons cette question à travers quatre chapitres empiriques. Nous utilisons différentes bases de données pour étudier l'emploi et les salaires tout au long de la vie des titulaires d'une formation professionnelle, et nous les comparons à ceux des titulaires d'une formation générale – principalement – mais aussi d'une formation initiale. Nos analyses se concentrent sur la Suisse, mais comprennent également une comparaison avec le Royaume-Uni. Les résultats montrent que les perspectives d'emploi restent aussi bonnes pour l'enseignement professionnel que pour l'enseignement général au cours de la seconde moitié de la carrière. Toutefois, la formation professionnelle est associée à des revenus inférieurs une fois que les travailleurs atteignent la trentaine, et ce désavantage est plus important chez les femmes que chez les hommes. Ces résultats concernent le niveau secondaire supérieur ; au niveau tertiaire, les perspectives d'emploi et de salaire semblent aussi bonnes pour les titulaires d'un diplôme d'une formation professionnelle que pour les titulaires d'un diplôme d'une formation générale.

## **Abstract**

Vocational education and training (VET) is known to ease the entry into the labour market by providing specific skills that are readily applicable in a given occupation. This type of education may enable young individuals to find a good match at the beginning of their career, but it may also leave older workers vulnerable to technological change and shifts in the occupational structure. On the other hand, holders of general education may face more difficulties when entering the labour market due to a lack of work-related skills but may be better rewarded after several years of experience due to the larger flexibility of general skills.

We address this question in four empirical chapters. We investigate employment and wages over the life course for holders of vocational education, and compare them with holders of general education – mainly – but also of lower education. We use different datasets and focus our analyses on Switzerland, though we also include a comparison with the United Kingdom. The results show that employment prospects remain as good for vocational as for general education over the second half of individual's careers. However, vocational education is associated with substantially lower earnings once workers enter their thirties, and this disadvantage is larger for women than it is for men. Those results hold for the upper-secondary level; at the tertiary level, vocational education and general education seems to be associated with similar prospects in terms of employment and wages.



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<sup>1</sup> Excuse my use of the French word, but the English translations seem to not have the exact same meaning.

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## **1. Introduction**

Vocational education and training (VET) is considered both by the political discourse and academic research as an effective pathway between school and work. It provides a direct link with the labour market and, as a consequence, decreases the risk of unemployment spell(s) after the end of education (OECD 2010). Several countries with a strong work-based vocational training system indeed have low youth unemployment rates, such as Austria, Germany or Switzerland. As a consequence, government delegations from around the world visit these countries to study – and possibly imitate – their educational systems, especially since the 2008-2009 financial crises, which led to a strong increase of youth unemployment in most OECD countries.

The link between low youth unemployment and vocational education is well established by research at both the individual and country levels (Shavit and Müller 1998, Ryan 2001, Gangl et al. 2003, Breen 2005). The success of VET seems to be explained, notably, by the specificity of skills learned during education and, as a consequence, a high productivity directly after education (Ryan 2001, Gangl et al. 2003). Of course, the strong employability of VET graduates depends on the institutional design of vocational training (Bol and van de Werfhorst 2013).

The well-known advantages of VET concern mainly the entry into the labour market and the first years of work. It is, however, less clear whether VET prepares workers well for a life-long working trajectory. The specific skills learned during education may become obsolete after 20 or 30 years and hence not prepare workers well to adapt to new technologies and switch to different occupations. In a context of rapid technological change and digitalisation, it is crucial to know whether VET is adapted to the labour market needs not only in the short run, but also in the longer term. Several recent articles show a decreasing advantage of VET

relative to general education during the second part of workers' careers (Cörvers et al. 2011, Forster et al. 2016, Hampf and Woessmann 2017, Hanushek et al. 2017). According to Hanushek et al. (2017), one reason is that general skills are more adaptive and flexible, and thus have less risk to become obsolete than specific skills.

This thesis tries to contribute to the debate about labour market returns to vocational education over the life course. Several methodological concerns challenge the analysis of how initial vocational education affects later labour market outcomes – as for the topic of returns to education in general (Card 1999). In four empirical articles, we analyse the link between vocational education and working trajectories by using multiple datasets and different research designs in order to address different aspects of the question. We adopt a life course perspective and use repeated cross-sections, household panels and a longitudinal cohort study to show how the situation in the labour market evolves during the career for (pseudo-)cohorts of holders of vocational education as compared to other educational groups. Additionally, we do not focus only on the labour supply of workers, but also investigate the labour demand and thus the point of view of potential employers. We focus on Switzerland, a country with a large vocational educational system that is mainly work-based or dual, meaning that VET is organised in apprenticeships where learning takes place both in real workplaces and vocational schools. Furthermore, VET programmes in Switzerland are not only co-designed by the state, employers and unions, but also nationally standardised, thereby producing degrees with strong signalling power for employers (OECD 2009, Meyer 2009, Mueller and Schweri 2015).

This introduction is structured as follows: we first present a few key concepts linked to vocational education and give a brief overview of the empirical literature on the subject. We then present our contribution, discuss the existing research gap and highlight the methodological challenges raised by our topic. We describe the data used for the analyses as

well as the research designs and conclude with a summary of the four articles presented in this dissertation.

### **1.1 Vocational education and working trajectories**

According to the human capital theory (Becker 1962), both education and experience contribute to increasing workers' human capital. Vocational education presents the particularity to focus on specific skills learned notably by practice, whereas general education – also called academic – puts greater emphasis on theory and general skills, such as mathematics, language or sciences. The advantage of specific skills is their direct applicability in the labour market – and results in a high productivity of young workers (Arum and Shavit 1995, Breen 2005, Van de Werfhorst 2011). This helps young graduates from vocational education find a job as easily as an experienced worker (Shavit and Müller 2000, p. 36, Wolter and Ryan 2011). On the contrary, it is more difficult for holders of a general degree to find a job in which they can apply the general skills they learned. As a consequence, the risk of experiencing unemployment after the end of education is larger. At the same time, the outcomes linked with VET strongly depend on the country and VET system, in particular its degree of specificity and standardisation (Shavit and Müller 2000, Bol and Van de Werfhorst 2013).

However, the advantages experienced at the beginning of a career may become problematic later on in working trajectories, as argued by Hanushek et al. (2017). In an influential article, these authors point to the risk that specific skills may become obsolete during one's career, arguing that newly trained workers may be preferred over older workers with vocational education because the skills learned during the vocational training of the younger workers are up to date, contrary to those of workers who had learned their occupation 20 or 30 years earlier. In a context of rapid technological change, older VET graduates may thus face

difficulties in the labour market (Krueger and Kumar 2004, Hanushek et al. 2017). The situation is the opposite for holders of general education, who may face more difficulties in the short run to enter the labour market, but then be able to apply their skills to a wider range of jobs and occupations. It has thus been argued that they are better prepared to adapt to new technologies and innovation (Goldin 2001).

What further matters for the type of education are the different signals that they may send to potential employers (Spence 1973). Educational achievement may indeed not only be of interest for employers in terms of content, but also act as a signal that an individual is able to learn and understand a set of skills. Vocational education differs from general education in the signal sent to employers in terms of employability, because young graduates are already used to accomplish practical tasks (Breen 2005). Furthermore, the signal sent by holders of an apprenticeship is not only linked to specific skills but also having learned how to work with costumers, colleagues and supervisors. In comparison with holders of general education, this signal may be seen as a real advantage by employers at the entry into the labour market. On the other hand, according to Shavit and Müller (2000), holders of general education may be seen as more intelligent and better learners of new skills. Following the human capital theory (Becker 1962), the signal of an educational degree may be less important later in the career, when individuals have acquired many years of work experience. The idea is then that holders of vocational and general education have acquired similar skills through their work experience.

But how do holders of vocational education and those of general education progress over the life course? With a low risk of experiencing an unemployment episode in early careers, holders of vocational education may use the good start in their working trajectory to make further steps early on in their career and thus gradually access better positions, in a process of cumulative advantages. On the contrary, as the risk of youth unemployment is higher for

holders of general education, due to a weaker link between education and the labour market, experiencing unemployment during one's early career may negatively affect further careers and thus have negative long-term consequences resulting in a so-called scaring effect (Gangl 2003, DiPrete and Eirich 2006).

What does the empirical evidence tell us about the *long-run* returns to vocational education? So far, only a few studies are available on the topic. Cörvers et al. (2011) analyse life-cycle-earnings of holders of vocational and general education at the upper-secondary level. They find higher earnings at the beginning of the working trajectories for holders of vocational education in the three countries analysed, Germany, the Netherlands and the United Kingdom. Holders of general education, however, experience faster wage growth, and their earnings overtake those of holders of vocational education after around six years of work experience. The differences in earnings are statistically significant for Germany and the United Kingdom, but not for the Netherlands – even if the trend is the same in the three countries. The authors underline that their analyses do not account for selection, and warn that their results may in consequence overestimate the benefits of general education.

Hanushek et al. (2017)<sup>2</sup> compare employment rates of holders of vocational and general degrees at different educational levels with the International Adult Literacy Survey (IALS). They find an advantage for holders of vocational education over those with general education in terms of employment rate, and a disadvantage later in the career, especially in countries with a strong apprenticeship system. The reversal of fortunes takes place around the age of 50 for employment and slightly after 30 for income. However, labour market outcomes after VET seem to vary across countries.

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<sup>2</sup> A previous and widely cited version of the article was published in 2011 as a working paper, which is the reason for having this article “early” in the chronological list.

Unlike the two former studies, Brunello and Rocco (2015) do not use cross-sectional, but longitudinal data. They examine two UK cohorts and find an early employment advantage of vocational education in comparison with academic education, which declines during the career but does not disappear. However, holders of vocational education have a disadvantage in comparison with holders of academic education in terms of wages, with weaker earnings growth over the career. The authors note that the results for wages vary by cohort and educational level.

Forster et al. (2016) use newer cross-sectional data from the Programme of International Assessment of Adult Competencies (PIAAC). They find similar results as Hanushek et al. (2017): an employment advantage of holders of vocational education at the beginning of their working trajectories, turning into a disadvantage later on in their careers. However, contrary to Hanushek et al. (2017), they do not find that the disadvantage is systematically stronger in countries with highly developed dual VET systems, such as Germany and Austria.

Hampf and Woessmann (2017) use the model introduced by Hanushek et al. (2017) with the PIAAC data and present similar conclusions as them, based on a bigger dataset. While the countries covered by the data are not exactly the same, the authors also find a bigger disadvantage for holders of vocational education in comparison with holders of general education during the second half of the career in so-called apprenticeship countries (Austria, Denmark and Germany).

Finally, Forster and Bol (2018) investigate the question of returns to vocational and general education on employment over the life course using a measure of the strength of the linkage between education and the occupation. Using the Dutch labour force survey, they find a large advantage for holders of vocational education during the first part of the career; this advantage diminishes throughout it and turns into a small disadvantage after the age of 60.

## **1.2 Methodological challenges about returns to vocational education**

Two main strategies are used in the literature to analyse the labour market situation over the working trajectories for different educational groups. Several authors use cross-sectional data and investigate the situation of groups with different ages at a given moment in time (Forster et al. 2016, Hanushek et al. 2017, Hampf and Woessmann 2017), while others follow one or several specific cohorts (Brunello and Rocco 2015). We share Brunello's and Rocco's doubts about the assumption that employment and wage trajectories are stable across cohorts (Brunello and Rocco 2015, p.2), and that entering the labour market with a given degree in the 1970s has the same implications as entering the labour market with the same degree thirty years later. We thus use a cohort approach and either directly follow a cohort over time or – in order to cover a longer period of time – resort to a pseudo-cohort approach. Following a group of individuals who were born in the same period presents the advantage of limiting the possible confusion between age effect and cohort effect. However, this approach requests data following a specific cohort, or the aggregation of several waves of transversal datasets. We implement this cohort approach with two types of data: in the first part of the dissertation, we present working trajectories of holders of vocational education based on pseudo-cohorts constructed with 24 repeated cross-sectional rounds of the Swiss Labour Force Survey. In the second part, we present analyses based on a specific cohort study for young people in Switzerland, called Transition from Education to Employment (TREE, see Gomensoro and Meyer 2017).

The selection issue is the central methodological challenge in the analysis of returns to education: how can we distinguish the effect of education on an outcome when individuals obtaining different educational degrees have different characteristics, which, in turn, have an influence on labour market outcomes? Some aspects such as cognitive skills, intelligence or the capability to learn quickly are examples of characteristics helping to perform at school,

but also in the labour market. Being clever may help to find a well-paid job not only by getting a high degree but also by being performant at work, no matter the diploma. As a consequence, it is a challenge to isolate the effect of education from other aspects; not only intellectual competencies but also socio-demographic aspects are concerned. As pointed out by Bourdieu (1964) in the sixties and shown in an important empirical literature (e.g. Erikson and Jonsson 1996, Bernardi and Ballarino 2016), parental education and parental occupation – two aspects of social origin – are some of these characteristics. Social origin does not only influence the chance of following an academic track, but also the chance of finding a job, *independently of the type or level of education* (Breen and Jonsson 2005, Bukodi et al. 2014). Notably in Switzerland, not only the parental circumstance, but also the regional (and thus cultural) context plays a role that may impact both the educational track and labour market returns (Meyer 2009, Imdorf et al., 2014, Glauser and Becker 2016). Furthermore, the impact of elements such as social origin and context is especially important in transitions such as the one from lower to upper-secondary education (Buchmann et al. 2016).

A situation where students were randomly selected into educational tracks would be the best empirical solution to address this issue, but such a situation seems extremely difficult to find. To address this point, certain aspects that drive selection are taken into account in some empirical articles, notably measures of competencies (Forster et al. 2016, Hanushek et al. 2017). However, these indicators are measured at the adult age and hence after the (self-) selection into one or the other educational track. As a consequence, the selection issue is not completely solved. We do not have a clear-cut solution either, but try to address the selection issue with two different methods. First, we use cohort data that informs about school performance, competencies, social origin and geographical context of students in their last year of compulsory schooling and thus before the (self-) selection into the educational track. Second, we use a vignette study – also called factorial survey analysis – that presents

employers with résumés (fictive CVs) of workers where only the type of education varies, everything else remaining the same.

### **1.3 Learning from comparisons**

We analyse labour market returns in terms of employment and wages for Switzerland, a country with a large share of workers with a VET diploma, as well as a highly standardised VET system at the national level with strong vocational specificity (Bol and van de Werfhorst 2013). In this country, the link between the labour market and the vocational students' skills is tight, since the competences taught during the VET curriculum are defined jointly by the state, employers and trade unions (OECD 2009, Mueller and Schweri 2015). In order to get a better understanding of the link between the VET system and labour market outcomes, we compare Switzerland with the United Kingdom, a country with a long tradition of VET but a low level of standardisation as well as low vocational specificity (Jenkins et al. 2007, Bol and van de Werfhorst 2013).

What is the counterfactual situation of obtaining a vocational education? In the literature, vocational education is often compared to general education at a similar level (Brunello and Rocco 2015, Forster et al. 2016, Hanushek et al. 2017). On one hand, we follow this strategy and compare holders of vocational upper-secondary education with holders of general upper-secondary education and present the employment and wages trajectories of these two groups in the first article. However, we also use additional comparisons. We follow the “safety-net” concept (Arum and Shavit 1995, Shavit and Müller 2000) and the idea that vocational education is a solution to provide upper-secondary education to those students who are less motivated by academic study and who would be at the risk of dropping out after the end of compulsory school (Wolter and Ryan 2011). We thus also compare holders of VET with holders of lower education, meaning no more than one year of education after compulsory

education. The theoretical argument is that the realistic counterfactual scenario for students with a VET degree may be not a general degree at the same level, but rather the absence of this degree. This comparison is less common in the literature and possibly adds a useful piece of the puzzle. This counterfactual group seems to especially make sense in educational systems where the general track at the upper-secondary level is reserved for the better students. In such situations, it seems unrealistic to think that the alternative option to the vocational track would have been the general one for most of the individuals observed.

Furthermore, one reason for the smooth entry in the labour market for holders of a vocational degree is the possibility for them to directly apply skills learned during their education (Arum and Shavit 1995, Breen 2005). Consequently, if someone finds a job immediately after compulsory school “instead” of doing an apprenticeship, he or she may learn similar skills after several years of work. However, the signal sent by having achieved an apprenticeship versus having no more education than compulsory school may be quite different. This question is presented in details in the second article.

It is important to keep in mind that vocational education is not a homogenous category, but an agglomeration of several programmes leading to different occupations. They vary notably in terms of learning place (school only versus work-base and school) (OECD 2015), length, firm size, sectors, intellectual requirements (Stalder 2011), as well as type of occupations accessible through and strength of the linkage between education and the occupation (Forster and Bol 2018). If we aim at addressing reflexion and empirical works to reply to questions about vocational education globally, we have to keep in mind those differences. While this point is not the centre of our approach, some of those aspects are presented in the appendix of the first article.

Unlike studies in labour economics that tend to solely focus on outcomes for men (such as, for example, Hanushek et al. 2017), we systematically present results for both men and women. Given that the importance of paid work still differs between men's and women's typical trajectories in Switzerland, notably after the birth of the first child (see for example Levy et al. 2006, Le Goff and Girardin 2016), it seems crucial to investigate whether the link between education and labour market outcomes is the same for men and women. Moreover, given the still sizeable extent of labour market segregation in Switzerland as elsewhere in Europe (Kriesi et al. 2010, Murphy and Oesch 2016), and in occupations accessed through vocational programmes especially (Meyer 2009, Buchmann and Kriesi 2012, Eberhard et al. 2015), we develop and test the hypothesis that vocational education brings larger returns relative to general education for men than women.

Different returns to specific versus general skills can indeed be expected for men and women due to different career perspectives for each of them. While, on average, women are more likely to stop working or reduce their employment rate to take care of their family, employers also tend to invest less in women's firm-specific skills (Estévez-Abe 2005). As a consequence, differences on the labour market between male and female holders of a vocational degree, based on occupation-skills as well as firm-specific skills, may be even larger than for holders of general education.

#### **1.4 Data and designs**

This dissertation relies on several datasets and research designs to examine the labour market trajectories related to vocational education. First, we aggregate 24 annual rounds of the Swiss Labour Force Survey (SLFS 1991-2014) in order to follow a pseudo-cohort from the age of 25 to 60. We replicate our analysis with the Swiss Household Panel, using the additional piece of information of the social origin. Second, we compare the results from the Swiss

Labour Force Survey with the 22 annual rounds of the UK Labour Force Survey (UKLFS 1993-2014). These analyses are primarily descriptive configurations and show population associations. For a given (pseudo-)cohort, we observe the employment and wage trajectories of holders of vocational education and compare them with other educational groups with a large number of observations.

Third, we use the Transition from Education to Employment (TREE) study and follow a cohort of school leavers from the age of 15-16 until the age of 30. This dataset allows us to face the selection issue more clearly. We use information about school abilities, social origin and geographical context in order to match students at the age of 15 – before they are (self-) selected into a vocational or general track. With those data, we analyse how wages evolve during early careers for the type of upper-secondary education.

Fourth, we change the focus and study employers' preferences with a vignette study called JOBVUL that was carried out at the University of Lausanne. This dataset is composed of almost 4,500 vignettes, rated by 714 members of the Swiss human resources professional association – in other words, people who are used to evaluate real CVs. With this experimentation, we have the opportunity to observe the chance of being invited to a job interview for fictitious candidates differing only in the variable of interest (the type of education), without any bias from unobserved characteristics. In this study, profiles are those of experimented workers, which inform us on the employers' preferences about workers being 35 and over. Those data inform us whether for a similar level of education, employers prefer holders of vocational or general education, as well as the effect of gender and age on this effect of the type of education.

## **1.5 Outline and main results of the dissertation**

We address the topic of labour market returns to vocational education over the life course in four empirical articles. Each of them highlights a specific aspect of the question, and we present the main results of those four studies in the general conclusion.

In the first article, we focus on the long-term returns of vocational education with an analysis of careers in Switzerland. After the great recession, international organisations have actively promoted vocational training as a measure to fight youth unemployment. However, while vocational degrees give workers a head start in the labour market, they may become obsolete sooner and leave older workers vulnerable to technological change. We compare the employment and earnings over the life course for holders of vocational and general education at the upper-secondary level with a proxy-cohort design with the Swiss Labour Force Survey and Swiss Household Panel. The results show that employment prospects remain as good for vocational as for general education over the second half of people's careers. However, vocational education is associated with substantially lower earnings once workers enter their thirties, and this disadvantage is larger among women than men. While vocational degrees protect against unemployment, they come at the cost of flat earnings curves over the life course.

In the second article, we address the question of whether vocational education gives a life-long advantage over lower education. While research suggests that vocational education and training (VET) tends to reduce youth unemployment by providing specific skills, and thus smoothing the transition from education to work, we still know relatively little about whether vocational education provides higher employment rate and wages over the entire working trajectory than holders of lower education. On the one hand, holders of lower education may obtain, after several years of experience, similar skills to holders of VET, and thus similar

labour market outcomes. On the other hand, we can expect a strong signal of a VET diploma during the entire career, as well as cumulative advantage and disadvantage mechanisms, playing in favour of a stable or increasing advantage of VET during the career. Using regression models, we compare individuals in the UK and in Switzerland by calculating the employment rate and the hourly wage of our two groups of interest: vocational versus no more than compulsory education. We find that VET graduates fare better in terms of both employment and wages over the whole career. This advantage is on average larger for women than men and, contrary to our hypothesis, larger in the UK than in Switzerland – but only with respect to the employment rate. We find contrasting trends for men in those two countries: while the advantage of VET in the UK decreases after the age of 35 for both outcomes, the opposite holds true for their counterparts in Switzerland. This article highlights the advantages on the labour market for holders of vocational education over the entire career, but also shows some differences depending on the context and gender.

In the third article, we address the question of a possible larger experience payoff for holders of general education than holders of vocational education during early careers. Previous research has shown that at the entry into the labour market, holders of vocational education receive a relatively good salary due to a tight link between their education and the labour market needs. On the contrary, holders of general education receive lower wages. However, the situation may already change during early careers. After several years of experience, holders of vocational education may stay in similar jobs and level of salary due to the very specific skills they learnt. On the contrary, holders of general education may quickly reach better positions or salary levels because they learn a lot during the first years of their careers, and may easily adapt to new tasks. This paper analyses whether holders of vocational education have a decreasing wage advantage on holders of general education in their twenties using the Transition from Education to Employment (TREE) data. We follow a cohort of

youth from the end of their apprenticeship or baccalaureate degree up to the age of 30 and use a matching method to account for school abilities and social origin of students before they choose vocational or general education. Our results suggest that holders of vocational education and those with a general one have similar hourly wages at the entry into the labour market once we take selection into account. The second main finding is the significantly higher hourly wages, after six years of work experience, of women with a general upper-secondary degree in comparison with those with a vocational one.

In the last article, we investigate whether employers have preferences towards holders of vocational or general education for jobs where both tracks are common. While vocational education is based on specific skills, we expect that employers will prefer vocational education over general when given the choice, since vocational education is likely to signal an ability to immediately step into a job, while general education may signal that more job-specific training is required. We furthermore explore employers' preferences for the interaction of the type of education with gender on the one hand and age on the other. Using a vignette study where recruiters responded to an online survey, we analyse the rates given to fictional CVs on the probability that they would invite the candidate to a job interview. The CVs represented candidates for three possible jobs to be carried out by workers with either vocational or general education. We find an overall preference for vocational over general education at the tertiary level, but not at the upper-secondary level. Furthermore, results suggest that this effect is stronger for females than for males at the tertiary level. Finally, employers' preferences for holders of vocational education over general education do not vary significantly by the age of the candidates.

We present in the last chapter the main contributions when taking the four chapters into account and discuss them. We also present the main limitations of the dissertation and discuss the implication of the results for public policy.



## 2. Vocational versus general education: employment and earnings over the life course in Switzerland<sup>1</sup>

### 2.1 Introduction

In the wake of the Great Recession, vocational education has become a widely advocated policy solution to staggering rates of youth unemployment. A tighter link between the skills provided by vocational training and the skills demanded by employers should ease the transition from school to work. The OECD (2013) propagated Germany and Switzerland's apprenticeship systems in particular, which combine learning in the workplace with lessons at vocational schools. Consequently, government delegations flock to Berlin and Bern in order to study – and possibly emulate – these systems of vocational education and training (VET).<sup>2</sup>

In the short run, vocational education and particularly apprenticeships have several attractive features. As employers contribute to the development of degrees and teaching curricula, the vocational skills obtained are immediately instrumental in the labour market. This helps young people to transit into the world of work and leads to lower youth unemployment (Shavit and Müller 1998). However, while VET may enable young people to find a good match at the beginning of their career, it may leave older workers vulnerable to technological change and shifts in the occupational structure. Over the life course, job-specific skills learnt in vocational training may become obsolete at a faster rate than general skills learnt in academic curricula. Accordingly, the advantages of VET in smoothing the entry into the labour market may have to be weighed against potential disadvantages later on in the career.

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<sup>1</sup> Article written with Daniel Oesch and conditionally accepted by *Advances in Life Course Research*.

<sup>2</sup> See for instance: *Wall Street Journal* “Germany’s new export: jobs training”, 14. 6. 2012. *Guardian* “Apprenticeships: why we would do well to value them more highly”, 27. 8. 2012. *The Economist* “Ein neuer Deal? Germany’s vaunted dual-education system is its latest export hit”, 1. 6. 2013.

However, there may be no reversal of fortunes over the life course between holders of vocational and holders of general education – because what really counts may be getting off to a good start. The idea is that initial experiences in the labour market crucially shape later working life. As VET facilitates youth integration into the workplace, it may lay the foundation for a successful career. On the contrary, prolonged youth unemployment may have a scarring effect on subsequent work experiences (Gangl 2006) – and securing a stable job may be more difficult for young people with general schooling than apprenticeships.

Several influential studies have recently taken up this issue, notably Forster et al. (2016) and Hanushek et al. (2017). They examine the age-employment curve associated with different types of education and find a higher employment probability for VET than general education at the start of workers' career, but a reversing pattern in later life. However, both studies use a cross-sectional survey on adult competencies and thus rely on a single measurement in time. This forces the authors to interpret the employment situation of a given age group in the year of the survey as an early or late career outcome that is valid for all age groups, regardless of the birth cohort. This assumption is valid if the social and economic context in which different cohorts made their educational choices and entered the labour market remained constant between the 1950s and 2000s. Given the extent of educational expansion, technological progress and occupational upgrading over the period under study, this seems a strong assumption.

Consequently, we try to contribute to this debate by adopting a life course perspective and focussing on a single birth cohort. We use data that cover almost three decades and allow us to compare how the employment prospects and earnings vary by age for a cohort of

individuals born between the mid-1950 and mid-1960s who either obtained an upper-secondary *vocational* or *general* degree as their highest education.<sup>3</sup>

Our analysis focuses on Switzerland, the OECD country with the highest share of youth who attend a work-based (dual) VET course after the end of compulsory school: 60 per cent in 2011. If VET pays off anywhere, then it should be in Switzerland's apprenticeship system, which trains for both blue-collar and white-collar occupations, leads to nationally standardized skill certificates and enjoys broad support from employers (Hoffman and Schwartz 2015).

We use the Swiss Labour Force Survey, years 1991 to 2014, to construct a pseudo cohort of individuals observed in successive years. For greater robustness, we follow the practice of "identical analysis of parallel data" (Firebaugh 2008) and replicate our analysis with longitudinal data from the Swiss Household Panel (1999-2015).

In the next section, we contrast three expectations on the long-term returns to vocational education. We then present Switzerland's educational system and discuss our data, measures and model. The results section compares the age-earnings and age-employment curves for workers with upper-secondary vocational and general education. We conclude by discussing the policy implications of our findings.

## **2.2 Vocational training and the life course**

When evaluating the merits of vocational education, pundits commonly resort to the youth unemployment rate as the key indicator. In the same vein, a large body of research compares different educational tracks by focusing on labour market entry (e.g. Shavit and Müller 1998,

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<sup>3</sup> Our comparison thus focuses on individuals who hold a full upper-secondary vocational certificate or a full upper-secondary general maturity certificate (ISCED 3a for general and ISCED 3b for vocational or categories 2c\_voc and 2c\_gen according to the CASMIN classification). In our cohort of interest, this is the highest level of education of 54 per cent.

Müller and Gangl 2003). Yet information on the first few years of workers' trajectory leaves us with only a partial picture of their career. VET may provide useful skills for an occupational field at the time of training and thereby ease entry into the labour market. Yet it is an open question as to whether these same skills are still valuable when workers are in their mid-forties and older. On this question, we distinguish three competing expectations: (i) cumulative advantage in favour of vocational education, (ii) reversal of fortunes in favour of general education, (iii) identical outcomes for general and vocational education once heterogeneity is taken into account.

### *2.2.1 Cumulative advantage over the life course*

Work-based VET has the key advantage of integrating practice into the learning process and thus ensuring close correspondence between the acquired skills and the actual requirements of firms. Thereby, it smooths the school-to-work transition (Wolter and Ryan 2011: 523). These advantages should be particularly marked in countries where VET is occupationally specific, offering specialized training for hundreds of detailed occupations and taking place in a dual system that combines school- and work-based learning. If, in addition, the vocational education system is standardized and delivers national qualifications that are recognized by employers, a vocational degree likely gives young workers a head start in the labour market (Bol and van de Werfhorst 2011, Grønning et al. 2018).

Countries with VET systems that meet these criteria such as Austria, Germany or Switzerland have particularly low youth unemployment rates (OECD 2010: 12, 170). Furthermore, it is not only on the country level, but also within these countries that VET stands out as easing the transition to work. Based on the German Socio-Economic Panel (SOEP) 1984-1990, Winkelmann (1996: 666) finds that the unemployment rate right after the end of education is 23 percentage points lower for apprenticeship graduates than for university graduates. Apprentices obtain early on workplace experience that facilitates the transition to a job. More

importantly, for many of them the search issue does not arise in the first place. One year after graduation, 36 per cent of Swiss apprentices and over 50 per cent of German apprentices still work for their training firm (Dionisius et al. 2009: 16; Protsch and Solga 2015: 522).

Avoiding a prolonged period of youth unemployment may be crucial for the subsequent career as an early failure in the labour market possibly triggers a mechanism of cumulative disadvantage. Unemployment early on in the career may leave scars on workers because it reduces their human capital, confidence and psychological readiness for work, and may thus make them less attractive to prospective employers (DiPrete and Eirich 2006: 287). Life history data from the Netherlands (Luijkx and Wolbers 2009) and European data from SHARELIFE (Hank and Brandt 2014: 739) suggest that non-employment early in working life indeed has a scarring effect on the subsequent career. These arguments lead to a first expectation:

*Upper-secondary vocational education should ease the entry into the labour market and thus facilitate the advancement of a career, leading to higher employment participation and earnings over the life course than upper-secondary general education.*

### 2.2.2 *Reversal of fortunes over the life course*

A second expectation derives from the argument that vocational training provides specific skills, whereas academic schooling produces general skills (Becker 1964). In this view, vocational training programmes that provide students with a narrow and highly specific set of skills should lead to a better initial match in the labour market and to higher starting wages. This is the reason why VET enjoys broad public support in German-speaking countries: a practical education from which young people graduate knowing a specific trade. However, it is also the reason why the U.S. has largely eliminated vocational education as a separate track

in secondary schools: specific skills linked to a trade become outdated too rapidly (Hanushek et al. 2017).

While the specificity of vocational skills should not be overestimated – they are clearly transferable beyond single firms (Winkelmann 1996: 668, Müller and Schweri 2015) – vocational degrees are closely linked to single occupations. The Swiss VET system offers school-leavers apprenticeships in 230 occupations, the German VET system in 328 occupations. Specializing in a given occupation may be valuable at a given moment in time, but carries the risk that the skills specific to this occupation are obsolete one or two decades later. Newspaper typesetters and switchboard operators are two occupations that have disappeared, travel agents and postal clerks two occupations that may follow them in a near future (Oesch 2013).

VET's strong focus on practical skills may come at the cost of neglecting general skills. In Germany and Switzerland, apprentices typically spend one to two days per week at vocational schools and three to four days in the workplace where they engage in on-the-job training. One to two days of schooling per week do not allow much instruction time for general skills such as literacy, numeracy and foreign languages – all the less so because half of instruction time goes to subjects related to apprentices' vocational skills (OECD 2013: 82).

By contrast, general skills may not prepare youth well for entry into the labour market. Yet they are probably more adaptive and transferable, thereby providing a stronger basis for further learning. Workers with general skills may thus be better equipped to respond to technological change and to switch occupations more easily. In comparison, a vocational degree may have a shorter half-life over the career. The initial labour market advantage of vocational over general education may therefore decrease, and possibly reverse, with age.

Based on data from the International Adult Literacy Survey (IALS), Hanushek et al. (2017) find that people with vocational qualifications aged 40 and less benefit from an employment advantage, whereas people older than 40 are at a disadvantage relative to individuals with general education. The trade-off between initial employment gains from vocational education and employment losses later on seems particularly marked in Denmark, Germany and Switzerland, three typical apprenticeship countries. Forster et al. (2016) use the more recent PIAAC data and, controlling for numeracy skills, find that in terms of employment probabilities graduates from general education programmes catch up, and surpass, vocational graduates at the age of 45 for men and 36 for women – with no significant differences across countries.

The finding that vocationally-trained workers suffer a faster depreciation of their skills than those with a general education is also reported by Weber (2014) for the Swiss Labour Force Survey 1998-2009 and Dearden et al. (2002) as well as Brunello and Rocco (2017) for Britain's National Child Development Study. These arguments lead to a second expectation:

*The initial employment and earnings advantage of workers with upper-secondary vocational education turns into a disadvantage over the life course, as upper-secondary general education leads to better employment and earnings prospects over the second half of workers' careers.*

### 2.2.3 Identical outcomes

A third expectation does not anticipate different labour market outcomes for holders of different *types* of education, as opposed to different *levels*. According to this view, both the advantages and disadvantages of holding a vocational degree are overdone. To begin with, occupational mobility is large and vocational education does not lock workers into a single occupation. In Germany, between 30 and 50 per cent of vocationally-trained workers are

employed in a different occupation than the one for which they were initially trained (Winkelmann 2006: 93-4).

At the same time, if VET provides skills that are widely portable, this also leads to the question ‘whether it makes sense to train as many mechanics, bakers or carpenters, if probabilities are high that they will leave their trade or never take it up in the first place’ (Meyer 2009: 36). Moreover, the initial labour market advantage of apprenticeship graduates should not be overestimated. Based on the SOEP 1984-1990, Winkelmann (1996: 671) finds that once the transition to work was made, graduates from general education were employed in jobs that were as stable as those of apprenticeship graduates. While the matching process takes longer for holders of general education, they catch up quickly over the first few years of work.

Different labour market outcomes for vocational and general education may primarily result from two sources of heterogeneity: heterogeneity of vocational degrees and population heterogeneity, that is, the selection of different people into different educational tracks. The first source relates to the widely varying quality of apprenticeships and depends on at least three dimensions: (i) firm size: larger firms provide more demanding workplace learning than small businesses. (ii) sector: the public sector tend to offer more structured VET programmes than the private sector; (iii) level of intellectual requirement: requirements vary widely across occupation and, in the case of Switzerland, are much higher in some apprenticeships such as electronics technicians and draughtsman than in others such as butchers and flooring installers (Stalder 2011). The differences in employment prospects and earnings may thus be larger across vocational degrees than they are between vocational and general education.

The second source of heterogeneity relates to selection effects. Young people (and their parents) choose a given educational track based on their ability, social origin and interest.

Since entry into general schools is often conditional on examinations, individuals with higher ability and a more privileged background may prefer a general education to VET. Even in countries where vocational degrees enjoy broad recognition such as in Switzerland, pupils who eventually take up an apprenticeship perform worse, on average, in the PISA test than pupils who continue in a baccalaureate school (Wolter et al. 2014: 119).

If there is strong heterogeneity among people who take up vocational and general education, it is possible that VET pays off for some individuals but not for others. Based on the British National Child Development Study, Dearden et al. (2002: 269) find that the wage premium from vocational qualifications is twice as high for individuals having low ability in reading and mathematics than for those having high ability. The vocational route may thus be of critical importance for less academically able and more practically oriented students. By reducing the drop-out rate from high schools and increasing the share of students taking on a post-compulsory education, VET may generate important benefits (Wolter and Ryan 2011: 551). A comparison between holders of general and vocational degrees at the upper secondary level may not adequately capture these benefits.

What does the empirical evidence tell us? Malamud and Pop-Eleches (2010) control for selection by using an educational reform in Romania in 1973 that prolonged general education for everybody and reduced the duration of VET. Despite this general increase in formal schooling, they find no difference in earnings between the pre- and post-reform cohorts. Similarly, an analysis of the National Education Longitudinal Survey for the US shows no systematic advantage of general education over vocational tracks once selection effects are controlled for (Meer 2007). These arguments give rise to a third expectation:

*If one accounts for the heterogeneity of vocational degrees and the selection into different tracks, there is no difference in employment and earnings over the life course between holders of upper-secondary vocational and general education.*

## **2.3 Institutional context, data and methods**

### *2.3.1 Institutional context*

Our empirical analysis focusses on Switzerland, an ideal country to analyse the pay-off that general and vocational degrees have over the life course. After nine years of compulsory education (six years of primary and three years of secondary schooling), the Swiss educational system offers the choice between two main options: VET or baccalaureate school.

Two thirds of a given age cohort embark on vocational education: 60 per cent in a company-based ‘dual’ apprenticeship and an additional 6 per cent in a school-based form of VET (Wolter et al. 2014: 107). Apprenticeships are called dual because they combine two learning places, the training firm and the vocational school (and, additionally, include intercompany courses).

Close to a third of an age cohort remains in general education: 20 per cent enter a baccalaureate school that gives direct access to universities and close to 10 per cent go to another upper-secondary specialised school (Federal Office for Statistics 2013). Women are more likely than men to enrol in the upper-secondary general track, whereas men outnumber women in the vocational track. Unlike in Germany, it is unusual in Switzerland for youth to embark on an apprenticeship after obtaining a baccalaureate.

It takes a similar number of years to obtain a vocational degree or a baccalaureate. For most occupations, the nationally recognized VET diplomas (EFZ in German, CFC in French) require three years of training – a series of more complex occupations require four years. It

thus takes, altogether, between 12 and 13 years to earn a vocational diploma as compared to 12 to 13 years needed to obtain the baccalaureate (not counting the two years of pre-school or kindergarten). Among the latter group, a sizeable proportion may obtain a few years of university education without graduating. Accordingly, we possibly underestimate their effective years of education by measuring it with the highest degree that they acquired.

Both tracks continue at the tertiary level. While a general baccalaureate degree gives access to universities, the vocational baccalaureates – introduced in the 1990s – entitle youth to study at the universities of applied science. The initial transition rates to universities or universities of applied science are much higher for graduates with general degrees (95 per cent) than vocational degrees (23 per cent) (Babel 2018: 6). However, another third of holders of vocational degrees eventually enrol in advanced professional education and training – and thus obtain a degree at the tertiary level. Although the proportion of Switzerland’s population having a degree from a university or university of applied science has risen rapidly over the last two decades, it is still low in international comparison (29 per cent of men and 27 of women aged 25 to 64 in 2014) (Federal Office of Statistics database).

### 2.3.2 *Data*

Our analysis is based on 24 annual surveys of the Swiss Labour Force Survey (SLFS), covering the years 1991 to 2014.<sup>4</sup> We increase the robustness of our results by following the practice of “identical analysis of parallel data” (Firebaugh 2008) and estimate the same model on an additional dataset, the Swiss Household Panel (SHP), 1999-2015 (Tillmann et al. 2016). The replication across datasets allows us to gauge the uncertainty in the results that may be due to errors commonly found in surveys linked to coverage, sampling, non-response or measurement. In addition, although the SLFS provides us with larger samples and covers a

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<sup>4</sup> We do not use the SLFS’s rotating panel, but only include, for each respondent, the first observation.

longer period, the SHP has the advantage of containing information on respondents' social origin (education and occupation of both parents).

We impose two restrictions on the analytical sample of the SLFS. First, we limit our analysis to a pseudo-cohort of respondents born between 1954 and 1966. This specific cohort has obtained upper-secondary education and entered the Swiss labour market in the 1970s and 1980s in a period of very low unemployment and an ongoing transition from a still sizeable manufacturing sector to a dominant service economy. Moreover, this cohort is large enough to provide us with a sufficient number of observations for every single year of age between 25 and 60. In the smaller sample of the SHP, we need to construct a larger birth cohort – 1950 to 1979 – in order to get valid estimates for each single year of age.

Second, we exclude individuals who are still in education and limit our analyses to individuals who have no more – and no less – than upper secondary education, either general or vocational. This allows us to compare individuals where only the *type*, but not the level or duration of education varies. In both datasets, we reduce the number of individuals who will eventually obtain a tertiary degree by limiting the observation window to ages 25 to 60.<sup>5</sup> In the SHP, we exclude all individuals from our analysis who obtain, in later waves, a tertiary degree. This leads us to omit 150 individuals with general education and 273 with vocational education from our analytical sample.

Note that for a majority of labour force participants in Switzerland, the highest education is at the upper-secondary level. For our birth cohort 1954-1966, this is the case for 55 per cent – 46 per cent with upper-secondary *vocational* education and 9 per cent with upper-secondary *general* education. Individuals with tertiary education account for 28 per cent and 16 per cent

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<sup>5</sup> Individuals continue to obtain tertiary education after their early twenties. However, Table A8.1 in the appendix shows that this applies to a similar extent to holders of upper-secondary vocational as to holder of upper-secondary general education after the age of 25. Selectivity into tertiary education seems therefore to be comparable for the two groups over ages 25 to 60.

have not completed any upper-secondary education. Table A8.2 in the appendix provides descriptive statistics.

When applying these restrictions, we obtain 55,391 observations for the 1954-1966 cohort of people aged between 25 to 60 with no more and no less than upper-secondary education. This provides us with an average of 701 observations for men and 837 for women per year of age. In the Swiss Household Panel, our analytical sample is smaller with 5,566 individuals observed over an average of 6.2 years, which means a total of 34,640 observations. Per year of age, this corresponds to an average of 375 observations for men and 587 observations for women.

### 2.3.3 Variables

Our analysis focuses on individuals' labour market outcome measured with two dependent variables: employment and work income. Employment is coded as 1 if respondents are working for a minimum of 8 hours per week and 0 if working less than 8 hours per week or not at all. We replicate our results with an alternative specification of 20 hours per week. Earnings are measured with gross hourly work income in constant 2011 Swiss francs (CHF), which we calculate by dividing monthly work income by the number of hours worked.<sup>6</sup> We include the self-employed, but exclude respondents who are in marginal employment (working less than 8 hours per week). While we impute earnings where missing,<sup>7</sup> we remove wages lower than 12 CHF and higher than 300 CHF per hour (after imputation).

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<sup>6</sup> The number of hours is based on the exact full-/part-time status given by the respondents and, where this information is missing, on the actual number of hours worked per week.

<sup>7</sup> In the SLFS, we impute missing earnings data using multiple imputations (package "mice" in R, using five imputations) based on a regression model including age, age<sup>2</sup>, age<sup>3</sup>, age<sup>4</sup>, type of education, 26 cantons, type of municipality, residential permit as well as nationality. More complex models that additionally include sector, ISCO and job responsibility lead to the same results. Likewise, when comparing the results based on imputed earnings with results obtained with listwise deletion of missing data, we find very similar outcomes (results are available from the authors).

Our key independent variables are education and age. In most analyses, we simply distinguish two types of education. Upper-secondary vocational education includes dual and school-based VET obtained in curricula of three to four years (including the minority of apprentices obtaining a vocational baccalaureate). Upper-secondary general education includes baccalaureate schools and, more marginally, other general schools with usually at least three years of post-mandatory schooling. For the descriptive analysis, we also show results for individuals with no upper secondary education (compulsory education or short upper-secondary level programs of no more than two years) and for individuals with tertiary education (university, university of applied science and tertiary vocational degrees).

We check for the varying quality of vocational degrees by distinguishing six types of VET, based on respondents' studied occupation that is available in the SLFS: (1) agricultural and construction occupations; (2) technical and industrial production occupations; (3) technical office and computer science occupations; (4) commercial and clerical occupations; (5) occupations in private consumer services; (6) occupations in health and social services. While firm size, sector and the intellectual requirement of an apprenticeship would give us a better measure of quality, there is no information on these features in our two datasets.

Measures for respondent's social origin are only available in the SHP. We use five categories to distinguish fathers' education, mothers' education, fathers' social class and mothers' social class.<sup>8</sup> Additionally, we control for resident permit and, in the SLFS, for nationality (in 20 categories), for Switzerland's 26 cantons and for nine types of residential community (from small village to large urban centre).

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<sup>8</sup> For education, we use: (1) no more than compulsory education; (2) upper-secondary vocational education; (3) upper-secondary general education; (4) tertiary education, (5) missing. For social class, we use: (1) low-skilled working class including machine operators and elementary occupations in production, sales and services; (2) skilled working class including craft workers, clerks and skilled sales and service workers; (3) lower-middle class of associate managers, semi-professionals and technicians; (4) upper-middle class of managers and professionals; (5) Missing. Occupations were coded on the basis of the International Standard Classification of Occupations (ISCO) 1988 at the 4-digit levels. The Stata codes are available from the authors.

#### 2.3.4 Selection

The allocation of young people into different educational tracks is not random, but riddled with selection effects. We do not have a silver bullet to deal with selection, but use a multi-pronged strategy to reduce its impact.

We focus on a given cohort and thus do not compare the labour market outcomes of individuals who were educated and entered the labour market in different historical periods. We further narrow down our analytical sample to individuals whose highest educational attainment is at the upper-secondary level and who thus typically spent 12 to 13 years in full-time education. Thereby, we exclude both the least motivated students who did not obtain a degree at the upper-secondary level and the most able students who went on to either post-secondary vocational or university education.<sup>9</sup>

More generally, male students from a lower class origin, the German-speaking and rural cantons are more likely to go to the vocational track, whereas female students from a higher class origin, the French-speaking cantons and cities are more prone to choose the general track (Wolter et al. 2014: 107). We thus control for canton, type of municipality, nationality (which, in our birth cohort, correlates with class origin) and, in the SHP, for both parents' education and social class. Moreover, we run all our analysis separately for men and women.<sup>10</sup>

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<sup>9</sup> We did an additional analysis of the PISA reading competencies with TREE-data (TREE 2016), a cohort study of young adults in Switzerland. These data suggest that individuals who stopped after upper-secondary general education had better reading skills at the age of 16 than those who ended their educational careers with a vocational degree (median scores of 502 and 544 respectively). At the same time, both educational groups had *higher* reading scores at the age of 16 than individuals without upper-secondary education (445) and *lower* scores than individuals who eventually achieved a university degree (575).

<sup>10</sup> We tested – and discarded – two instrumental variables widely used in the literature: institutional school differences and mothers' education (Card 1999: 1822). We used the baccalaureate rate in a given canton in a given year for girls and boys. This rate is set by each canton independently and varies over time and across cantons: if it is low, average students are less likely to go to a baccalaureate school and more likely to choose VET. Unfortunately, the baccalaureate rate turned out to be a weak instrument that leads to biased estimates. Likewise, the correlation between mothers' education and children's education is low and the instrument weak.

While we are confident that these measures – and notably the comparison between holders of upper-secondary vocational and general education in a given cohort – go some way to reducing selection, we do not have an explicit causal design, but present population associations.

### 2.3.5 Estimation method

We test the arguments about the evolution of employment and earnings over the life course in a simple regression setup. The equation of our linear regression is given as:

$$y_i = \beta_1 + \beta_2 educ_i + \beta_3 age_i + \beta_4 age_i^2 + \beta_5 age_i^3 + \beta_6 age_i^4 + \beta_7 educ_i * age_i + \beta_8 educ_i * age_i^2 + \beta_9 educ_i * age_i^3 + \beta_{10} educ_i * age_i^4 + \beta_{11} W_i + \epsilon_i$$

Our dependent variable  $y_i$  is, in a first equation, a binary measure of employment (0/1) and in a second equation the logarithm of hourly wages for an individual  $i$  at time  $t$ .  $W_i$  is a vector of controls and  $\epsilon_i$  is the error term. Our two main predictors are a dichotomous measure for the type of upper-secondary education,  $educ_i$ , which measures the initial labour market prospects of vocational relative to general education, and the interaction between education and age  $educ_i * age_i$  which accounts for a differential age-evolution of the two educational groups.<sup>11</sup>

As the descriptive results will show, employment and earnings do not follow a linear trend, but evolve in a polynomial pattern over the life-course. Therefore, we estimate a model with age squared, cubed and to the power of four ( $age_i^2, age_i^3, age_i^4$ ) with the respective interactions terms between education and age:  $educ_i * age_i^2$ ,  $educ_i * age_i^3$  and  $educ_i * age_i^4$ . We help readers to interpret our results by graphically plotting them. Note that we use individual cross-sectional survey weights for the descriptive results, but not for the regression models in order to avoid accounting twice for the same socio-demographic control variables.

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<sup>11</sup> Hanushek et al. (2017: 57-8) argue, somewhat optimistically, that this model emulates a difference-in-differences approach where the coefficient of  $educ_i$  includes any selectivity into types of education that are not captured by  $W_i$ , whereas the interaction  $educ_i * age_i$  identifies the causal effect of different types of education over the life course.

## 2.4 Empirical results

### 2.4.1 *Employment over the life course*

We begin our analysis by describing the evolution of employment for the cohort born between 1954 and 1966. Figure 2.1 shows how the employment rate varies by age for men and women with different types and levels of education. Over most of the life course, individuals with tertiary education have the highest and individuals without post-mandatory schooling the lowest employment rate among both men and women.

If we focus on the bulk of the cohort who has upper-secondary education, we find men with VET to have a substantial employment advantage over men with general education up to the age of around 40. While the difference becomes smaller thereafter, vocationally-trained men are not overtaken, in terms of the employment rate, by men with upper-secondary general education in the second half of their careers.

For women, we do not observe an employment advantage of VET over general education at the start of the careers. On the contrary, up to the age of 35, -trained women have lower employment rates than women with general education. After that age, they catch up and the two groups with vocational and general upper secondary education evolve in parallel until their retirement.

If we choose a more restrictive definition of employment – at least 20 hours of work per week – we observe a similar pattern for men, but the employment advantage of the vocationally-trained becomes larger. For women, the exclusion of small part-timers leads to a drop in the employment rate of 10 percentage points and the early employment advantage of general education over VET becomes smaller (see Figure A8.1 in the appendix).

Figure 2.1: Employment rate for types of education by age

Figure 2.1a: Men

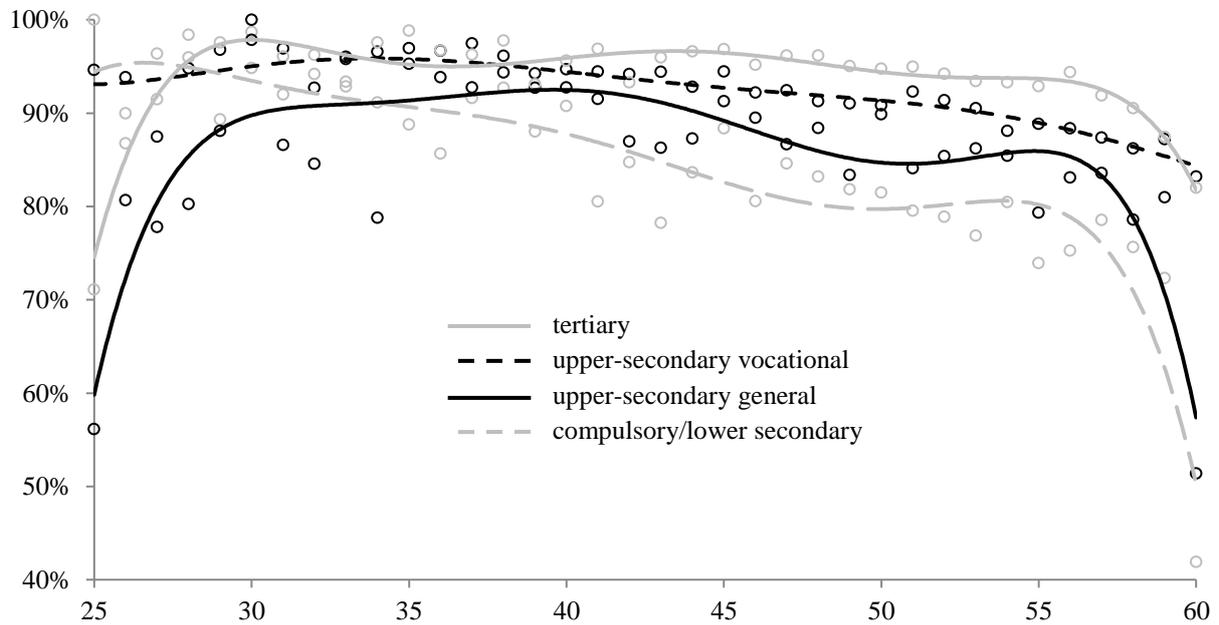
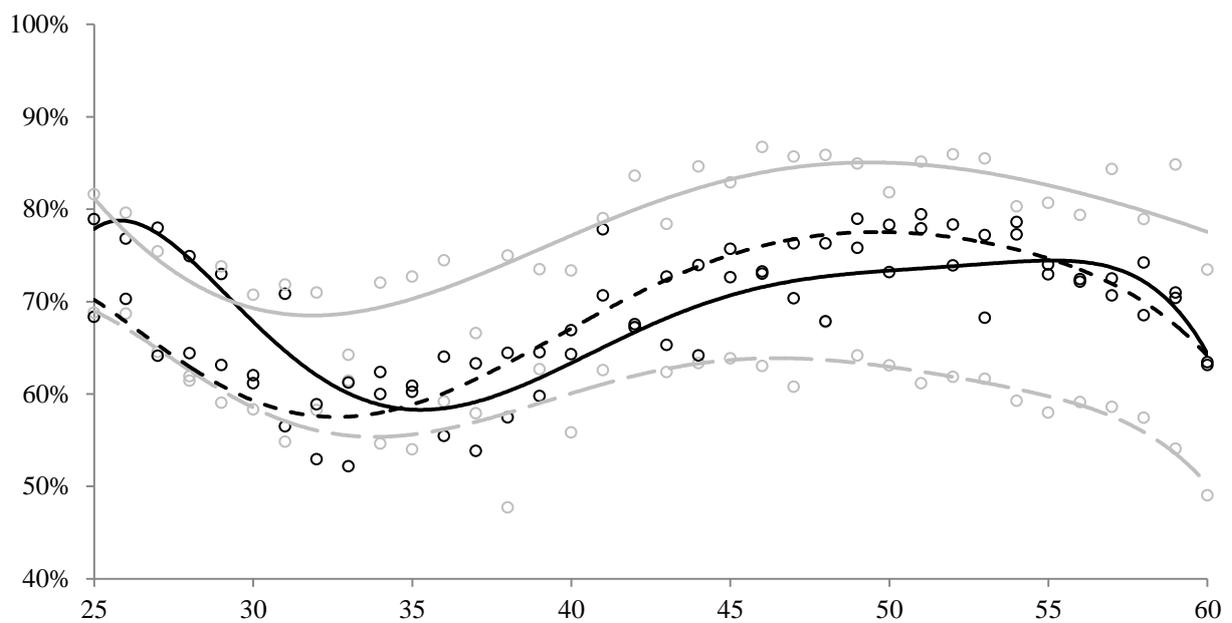


Figure 2.1b: Women



Data: SLFS1991-2014 (for cohort born 1954-66)

Note: employment of a minimum of 8h per week. Dots represent the mean employment rate at each age for the four educational groups. Lines show the polynomial trend lines.

In a second step, we estimate a multivariate linear probability model on the employment prospects for men and women with upper-secondary vocational and general education. Since age is entered as a polynomial term with several interactions, we make sense of the results by plotting in Figure 2.2 the difference between vocational and general education (that is, we show the average marginal effects). Both datasets suggest that there is a large initial employment advantage of vocationally-trained men over men with general education. While this advantage becomes smaller over time and virtually disappears in the early thirties, it never turns into a disadvantage. Holders of vocational qualifications therefore do not have a harder time securing employment over the second half of their career than individuals with general education – if anything, their employment prospects seem slightly better. For women, the differences are smaller and suggest that the employment rates of the two educational groups do not vary in a systematic matter. While women with general education may have somewhat higher employment rates in their early thirties than vocationally-trained women, the key finding is that the employment prospects of women with either vocational or general education are very similar over the life course.

Do these results also hold if we examine unemployment instead of employment, and thus exclude people from our analysis who are inactive for other reasons (notably linked to family or health)? We introduce all our control variable into a linear probability model on unemployment (Moffitt 1999) and plot the difference predictive margins between holders of vocational and general education. The result shows that the two educational groups do not vary in their unemployment risks over the life course (see Figure A8.2 in the appendix). The difference oscillates between +3 and -2 percentage points and does not reach statistical significance for any year of age for either men or women. In Switzerland's context of low ambient unemployment, labour market prospects seem to be better captured by employment rates than unemployment rates.

Figure 2.2: Difference in employment by age for upper-secondary vocational relative to general education (average marginal effects)

Figure 2.2a: Men – SLFS, cohort 1954-66

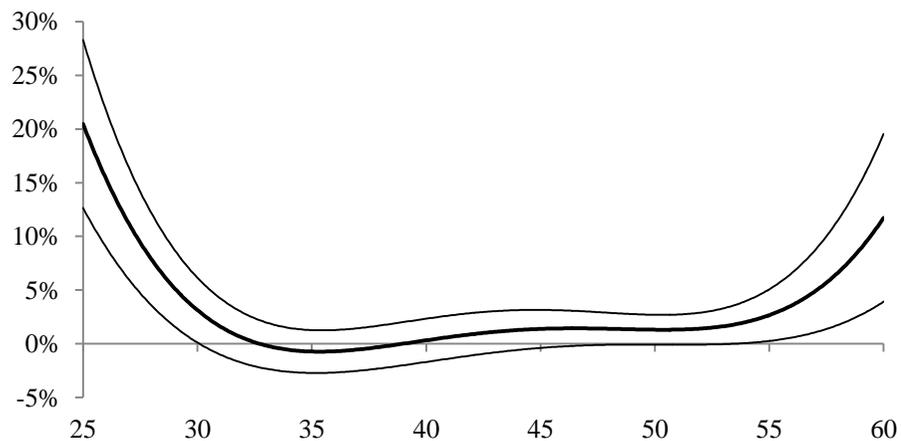


Figure 2.2b: Women – SLFS, cohort 1954-66

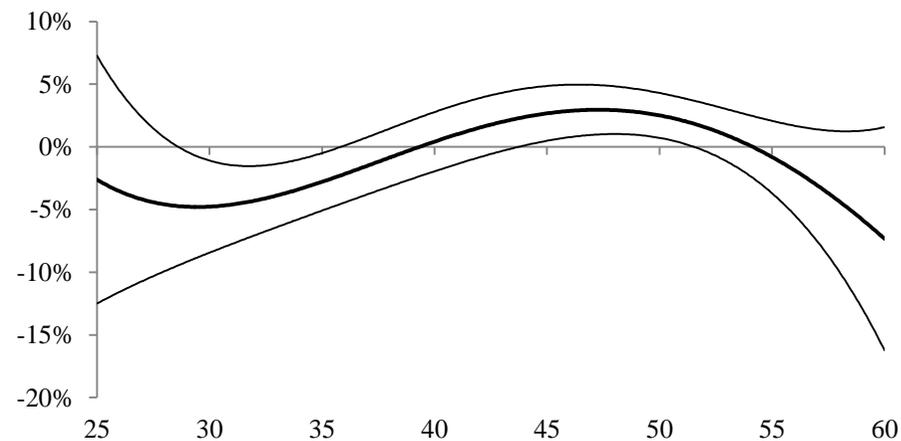


Figure 2.2c: Men – SHP, cohort 1950-79

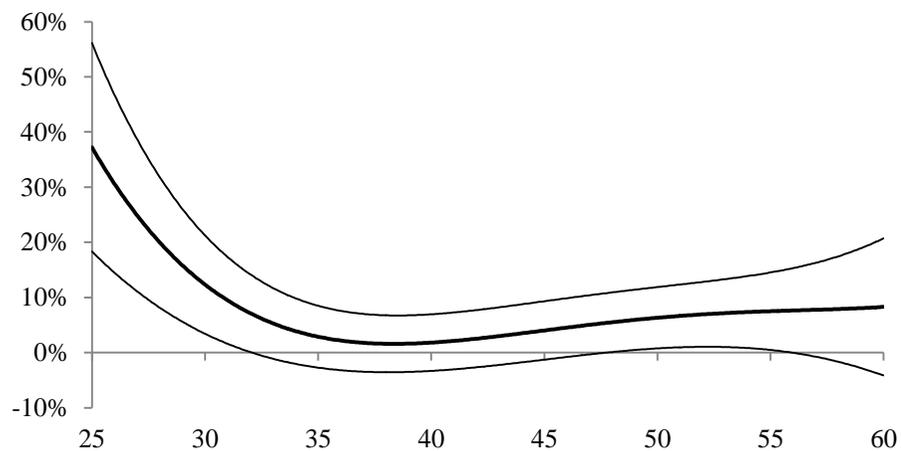
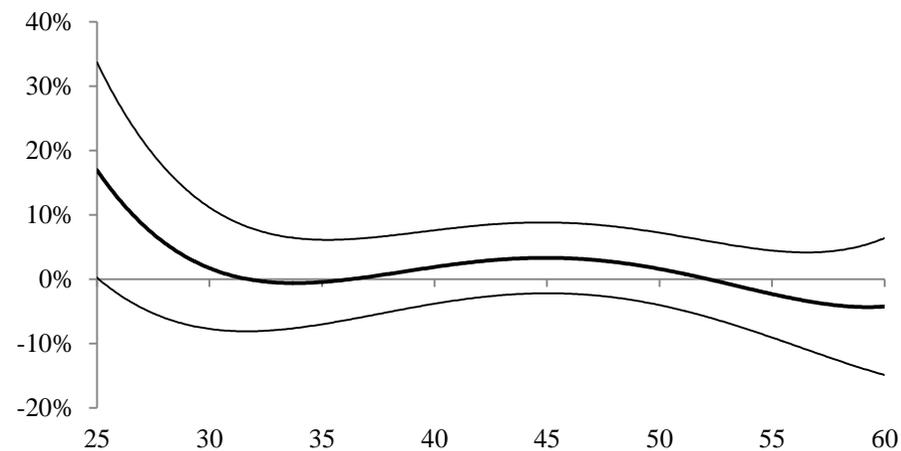


Figure 2.2d: Women – SHP, cohort 1950-79



Note: average marginal effects based on a linear regression (coefficients shown in Table A8.3 in the appendix). Thinner lines represent the 95% confidence intervals. The analyses were replicated with a binomial logistic regression and show to the same age-earnings curves, leading to identical conclusions (results available from the authors).  
Data: SLFS1991-2014, SHP 1999-2015

We return to the outcome variable of employment and estimate the same model as in Figure 2.2 for an older (1941-53) and younger birth cohort (1967-79). The results do not change with respect to those found for our target cohort 1954-66. For the older birth cohort – which we observe over the ages 40 to 60 –, we detect no differences in employment rates between holders of vocational and general education. For the younger cohort – which we observe over the ages 25 to 45 –, we find a higher employment rate of holders of vocational education until the age of 26 for women and until the age of 33 for men (see Figure A8.4 in the appendix). It is noteworthy that, in terms of employability, vocational education seems to have remained as instrumental for younger as older cohorts.

#### *2.4.2 Earnings over the life course*

Figure 2.3 shows how hourly work income varies by age for different levels and types of education. Contrary to our findings for employment, general education offers a clear advantage in terms of earnings. Already at the age of 30, men and women with no more than upper-secondary general education receive higher hourly work income than those with upper-secondary vocational training (although note that both educational groups remain well beneath the earnings of workers with tertiary education). After the age of 30, the earnings of workers with upper-secondary general education continue to increase, whereas the earnings curve of vocationally-trained workers is almost as flat as that of individuals without post-mandatory schooling. As a result, the gap in hourly earnings widens over the life course in favour of workers with general education.

Figure 2.3: Median hourly work income over the life course by education (in 2011 Swiss francs)

Figure 2.3a: Men

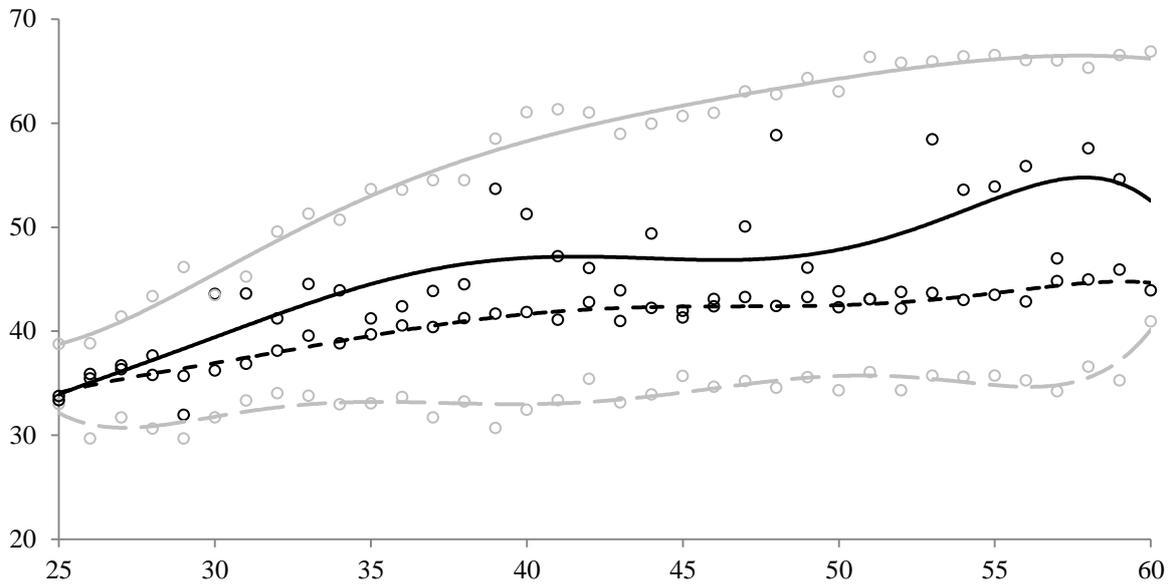
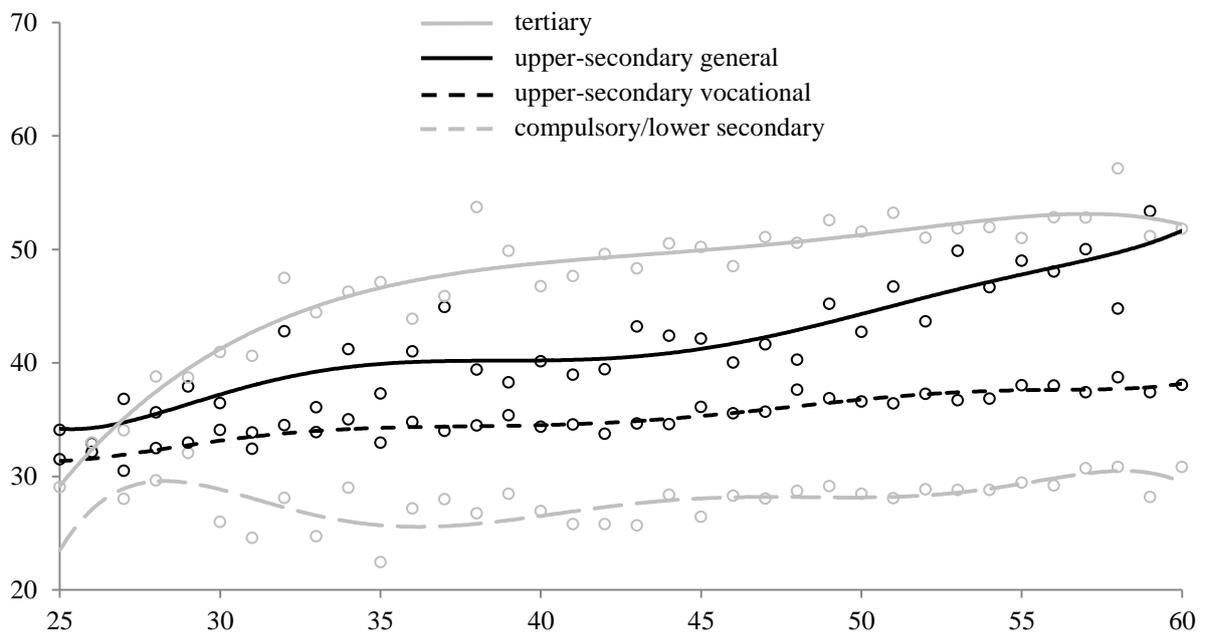


Figure 2.3b: Women



Data: SLFS1991-2014 (for cohort born 1954-66)

Note: Dots represent the mean earnings at each age for the four educational groups. Lines show the polynomial trend lines.

Our multivariate models confirm these findings. In Figure 2.4, we plot again the difference of work income over ages 25 to 60 between holders of upper-secondary vocational education and holders of upper-secondary general education (see Table A8.4 in the appendix for the coefficients). At the age of 25, hourly work income is comparable for the two educational groups for men, with a slight but non-significant advantage for holders of VET. Yet, thereafter, earnings increase more for general than vocational education until the growth curve levels off and the difference stabilizes when workers reach their forties. Women with general education have higher hourly wages already at the age of 25 than women with vocational education. The SLFS suggests that at the age of 40, workers with general education earn 12 (men) to 13 per cent (women) more per hour than their vocationally-trained colleagues. While the analysis for the SHP is based on a smaller sample and repeated observations, thus producing larger confidence intervals, it leads to the same basic finding that the life-cycle earnings-curve is significantly steeper for general than vocational education. The result is an earnings advantage of general over vocational training that is large for women, but more contained for men.

If we estimate the same model for an older (1941-53) and younger birth cohort (1967-79), we obtain similar findings as for our target cohort 1954-1966. For the older birth cohort (observed over the ages 40 to 60), hourly wage are higher after the age of 40 for both men and women having general education as compared to vocational education. For the younger cohort 1967-79 (observed over the ages 25 to 45), we find for men a similar hourly wage at the age 25 for the two educational groups, but the earnings curve is again steeper for the holders of general education (see Figure A8.4 in the appendix). For women, we observe an earnings advantage for general education already at the age of 25.

Figure 2.4: Difference in hourly wages (in %) by age for upper-secondary vocational relative to general education (average marginal effects)

Figure 2.4a: Men – SLFS, cohort 1954-66

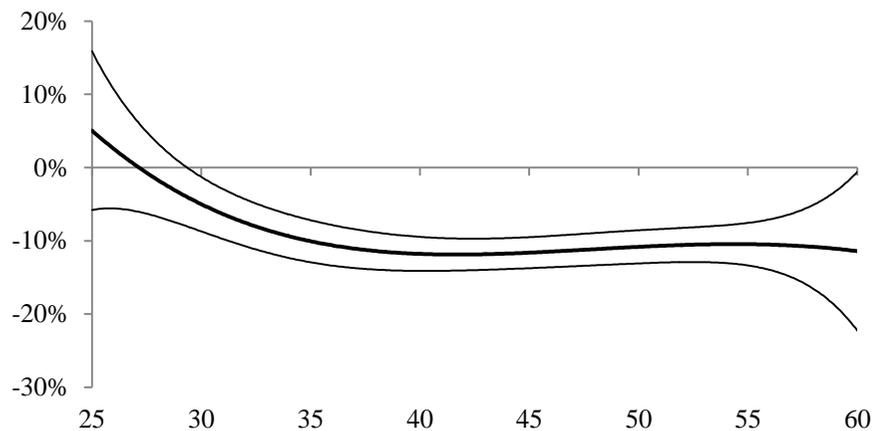


Figure 2.4b: Women – SLFS, cohort 1954-66

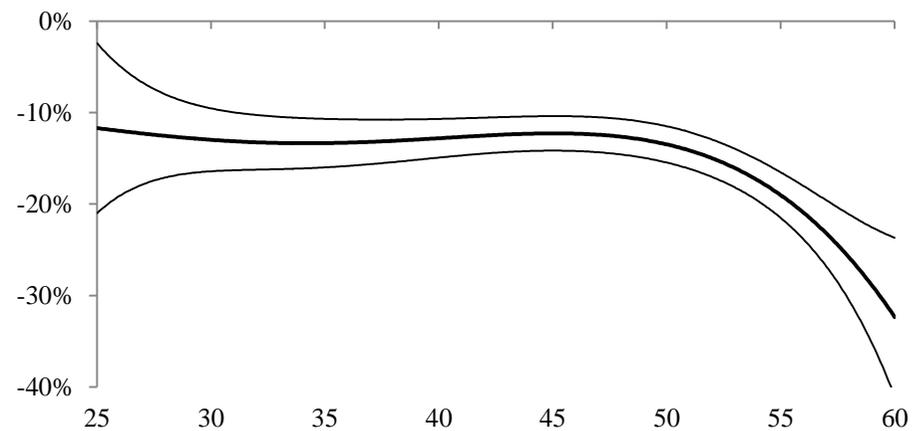


Figure 2.4c: Men – SHP, cohort 1950-79

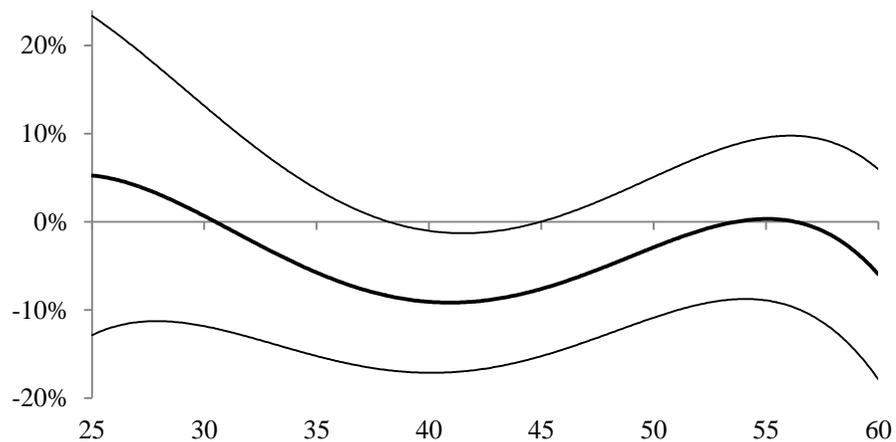
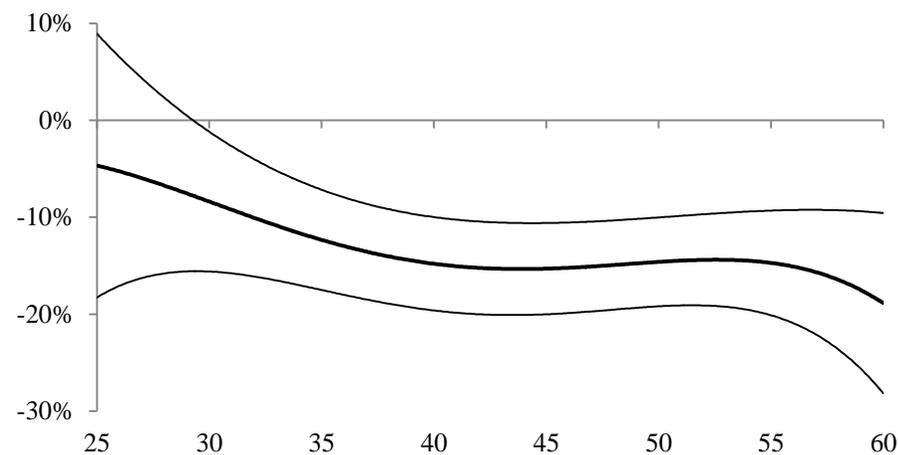


Figure 2.4d: Women – SHP, cohort 1950-79



Note: average marginal effects based on a linear regression (coefficients shown in Table A8.4 in the appendix). Thinner lines represent the 95% confidence intervals.  
 Data: SLFS1991-2014, SHP 1999-2015

### 2.4.3 Robustness tests

Up to now, we have treated VET as a homogeneous type of education. However, the labour market value of a vocational degree may depend on the occupation in which it was obtained. We therefore calculate hourly earnings for each of the six fields of vocational training discussed above (see Figure A8.5 in the appendix). While there are substantial differences in earnings across vocational fields, the conclusions remain unchanged: General education is associated with higher hourly earnings than every single one of the six fields of VET that we distinguish. The first runner-up are vocational degrees in technical and industrial production occupations followed by vocational degrees in commercial and clerical occupations. By contrast, the lowest hourly earnings are paid for vocational degrees in private consumer services, including occupations such as vendors, waiters or hairdressers.

Finally, the question arises as to whether individuals with vocational training succeed in working longer hours and thereby compensate for their lower hourly earnings. We address this question by calculating the *annual* earnings of people working at least 8 hours per week (see Figure A8.6 in the appendix).<sup>12</sup> While the earnings gaps between workers in the two educational groups are similar when we use annual instead of hourly work income, annual work incomes show a clearer advantage of VET for men and a smaller advantage of general education for women at the beginning of careers. Men with vocational degrees obtain higher annual earnings than their colleagues with general education up to the age of 27, whereas vocationally-trained women have a similar annual work income than women with general education until the age of 28. Thereafter, we observe again a reversal of fortunes as annual earnings increase more for holders of general than vocational education.

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<sup>12</sup> SLFS provides information on the effective annual work income, regardless of working hours. For this analysis, we discarded the work income of people who are not in the labour market or employed in marginal jobs (working less than 8 hours per week), left away outliers (the top and bottom percent of the distribution) and imputed missing values (see footnote 6).

## 2.5 Discussion and conclusion

Our paper has examined three arguments about the long-term prospects of vocationally-trained workers. A first argument expects them to keep and extend their initial labour market advantage over the life course. A second argument presumes that vocational skills become more quickly obsolete than skills obtained in general education, leading vocationally-trained workers to fall behind those with general education. A third argument expects very similar labour market outcomes by types of education once heterogeneity of vocational degrees and selection into tracks are accounted for.

Our analysis does not designate a clear winner among these three arguments. With respect to employment, our findings support the first thesis. In Switzerland, vocational training is associated with a substantial employment advantage at the beginning of the career for men, but not for women. Contrary to the idea that vocationally-trained workers are outpaced by structural change, we find that their employment rates remain high over the entire career and do not fall beneath those of workers with general education – contrary to what Hanushek et al. (2017) find for their small cross-sectional samples. Moreover, our analysis shows no systematic differences across birth cohorts and suggests that the labour market prospect of vocational relative to general education has not deteriorated over time. While these findings may be specific to Switzerland and its context of low unemployment, Forster et al. (2016) show that the age-employment curves of vocationally-trained workers vary little across OECD countries.

Results are different for earnings, where our findings support the second argument. Men, but not women, with upper-secondary general education struggle with a slower start in the labour market. However, once they launch their career, their wage curves are steeper than for vocationally-trained workers. As a result, there is a reversal of fortunes between the two

educational groups as workers with general education earn higher work income from their thirties onwards, regardless whether one looks at hourly or annual earnings.

A final result worth noting relates to gender differences: the nexus between education and labour market outcomes looks different for men than women. It is standard practice in labour economics to limit analyses to men and then extrapolate these results to the entire population (e.g. Hanushek et al. 2017: 52, Malamud and Pop-Eleches 2010: 44). This is misleading with respect to the labour market outcomes associated with vocational education. While vocationally-trained men have a significant employment advantage in early careers over men with general education, this is not the case for vocationally-trained women. This result is consistent with the finding by Forster et al. (2016) that the early-career advantage of vocational education reverses faster into a disadvantage for women than men.

Why would vocational education be more instrumental for men than women? Vocational education was originally devised to train craftsmen and is thus still more relevant to, and possibly of higher quality in, traditionally male- than female-dominated occupations (OECD 2012: 53). In addition, skills learnt in firm-based vocational training are more specific and thus less well portable from one firm to another. This smaller portability of specific skills may make vocational education less attractive to women who plan to interrupt their career in order to raise a family. Likewise, if employers anticipate that more women than men quit their job for family reasons, they will be less inclined to invest into the job-specific skills of their female than their male employees (Esteve-Abe 2005: 190).

The finding that vocational education provide better employment prospects to men – and general education to women – echoes the evolution of Switzerland's baccalaureate rate over the last 25 years. In 1990, women equalled men's baccalaureate rate for the first time (at 13.5 percent). Since then, women's baccalaureate rate continuously climbed (to 24.5 per cent in

2015), whereas men's rate has more or less stagnated at 17 percent. It looks as if youth and their parents examine labour market signals closely before making educational choices.

In policy terms, these findings caution against the overly enthusiastic endorsement of vocational education. While vocational degrees facilitate the transition from school to work and hence protect against youth unemployment, they may also seem to limit workers' long-term productivity and thus come at the cost of flat earning curves over the life course. In other words, vocational training reduces the risk of unemployment and downwards social mobility, but may also limit the likelihood of entry into the upper-middle class and upwards social mobility (Breen and Goldthorpe 1997: 283).

These findings also point to the crucial importance of further education for career advancement. While continued adult education is skewed – in Switzerland as elsewhere in the OECD – towards individuals with university degrees, Switzerland's professional education and training (PET) system offers many progression opportunities for graduates of upper secondary vocational education. No less than 20 percent of Switzerland's labour force held a PET degree in 2009 and had thus joined – at the mean age of 30 – the growing ranks of workers with a tertiary education (OECD 2013: 13). An initial degree at the tertiary level – be it a bachelor or a PET degree – may thus increasingly become the standard entry-level education on the labour market as individuals with tertiary degrees become the largest educational group, in Switzerland as elsewhere in Western Europe.

Finally, we wish to caution against the over-generalization of our findings. They refer to a specific cohort, country and historical period – and coincide with the transition from an industrial to a service-based economy in the context of low unemployment. With on-going digitalization, globalization and educational expansion, young adults who obtain an upper-secondary vocational degree today may well face different employment prospects in the

second half of their careers than did the Swiss cohort that left the educational system in the 1970s and 1980s.



### **3. Does vocational education give a labour market advantage over the whole career? A comparison of the United Kingdom and Switzerland**

#### **3.1 Introduction**

Vocational education and training (VET) has several advantages, both at the individual and country level. By providing vocational skills immediately useful in a company, entry to the labour market is eased and thus helps to reduce youth unemployment (OECD 2010). Furthermore, practice as an important part of the learning process helps to increase motivation, which makes VET an interesting solution to provide education until the upper-secondary level to youth having less interest or ability for academic education (Wolter and Ryan 2011). VET is thus seen as a solution against both educational dropout and youth unemployment.

However, two aspects remain unclear about the situation on the labour market of holders of VET: how this advantage evolves over the career, and how this advantage varies depending on the VET system and the institutional differences among countries. In a recent and influential study, Hanushek and colleagues (2017) have shown a decreasing advantage of holders of vocational education over the career, stronger in countries with a strong apprenticeship system. If the first part has been confirmed by Forster et al (2016), they do not find a stronger disadvantage for older workers with a VET degree in countries.

We address those two aspects, with a different research design. First, rather than using international cross-sectional datasets, we focus on two countries with pooling data from the labour force surveys to follow a specific cohort. If the number of countries investigated is smaller, the design is stronger in terms of age and time control: we do not need to follow the assumption that the situation of older people is a good proxy for the situation of younger

people's future. Second, we do not focus on the difference between vocational and general education (such as Hanushek et al. 2017, Forster et al. 2016 but also the majority of articles about long-term returns to vocational education), but investigate whether individuals with VET have a competitive advantage in the labour market during their entire career compared to people with a lower level of education. It seems indeed possible that once people with lower education have acquired work experience, they catch up with the VET group.

We are interested in the possibility that the VET payoff may vary depending on the context. Indeed, labour market prospects may depend on the country and especially the level of standardisation of the VET system. A more standardised VET system may increase the transferability of competences between employers and thus the capability for holders of a VET certificate to reach better positions (Bol and Von de Werfhorst 2013). On the contrary, a less standardised VET system may provide VET graduates with a set of skills that is similar to work experience in a firm, resulting in smaller differences between holders of a VET degree and people with a lower level of education. To address those questions, we compare the situation in a country with a large and nationally standardised VET system – Switzerland – with a country with a less widespread and less standardised vocational system – the United Kingdom. Based on the UK Labour Force Survey 1993-2014 and the Swiss Labour Force Survey 1991-2014, we compare employment and earnings for holders of a VET certificate over their career with the prospects of workers with no more than compulsory education. We use a pseudo-cohort design and focus on people born between 1954 and 1968 in the two countries.

## **3.2 Theoretical framework and hypotheses**

### *3.2.1 Vocational education versus lower education*

In order to address the question of whether vocational education and training (VET) provides positive labour market outcomes over the entire career, we need to determine the comparison group, or counterfactual. In the existing literature, VET is often compared to general education at a similar level (Cörvers et al. 2011, Brunello and Rocco 2015, Forster et al. 2016, Hanushek et al. 2017). However, holders of VET tend to perform worse, on average, at compulsory school than holders of general diplomas, even in countries such as Switzerland where VET is well recognised (Wolter et al. 2014, p. 119). This explains why VET is often considered as a good solution to provide upper-secondary education to youth less motivated or less able to follow an academic track after compulsory school (Wolter and Ryan 2011). VET then serves as a “safety-net” against school drop-out (Arum and Shavit 1995, Shavit and Müller 2000). As a consequence, individuals with no more than one year of education after compulsory education (described thereafter as “lower education”) may provide a relevant counterfactual for a VET diploma. This comparison group also presents the advantage of being highly comparable among countries.

### *3.2.2 Vocational education versus work experience*

Several studies have shown that vocational education facilitates entry into the labour market (e.g. Shavit and Müller 1998; Müller and Gangl 2003; Breen 2005). One reason for the successful transition from education to work is that the content of the training is designed in close cooperation with employers. VET programmes tend to teach skills that are directly applicable, and thus correspond well to labour market demand. After the end of their training, workers are seen as immediately productive and, for this reason, can expect to find a job (almost) as easily as more experienced workers (Shavit and Müller 2000, p. 36). VET aims to bring practical skills to students by providing them an occupation or trade. It has the

advantage of giving youth the opportunity to acquire skills useful for the labour market in real situations. This is especially the case in dual (work-based) programmes, also called apprenticeships, where young workers not only learn technical skills, such as cutting someone's hair or installing a heating system, but also how to interact with customers, colleagues and supervisors.

However, education is not the only way of acquiring skills. As argued in the literature about workplace learning, workers extend their capabilities through their work (Boud and Garrick 1999). Work experience should indeed provide employees with opportunities to learn new aspects of the job and to master them better over time. This idea is in line with human capital theory (Becker 1962), which presents work experience as an integral part of human capital. Since both VET and experience provide work-related skills, it is an open question whether after several years of work experience vocational education still provides an advantage over workers without post-obligatory education in terms of labour market outcomes such as employment and wages. While VET tends to ease labour market entry and reduce the risk of unemployment at the beginning of the career (e.g., Ryan 2001, Breen 2005), the advantage of obtaining a better-paid position after several years of experience is not evident. Shavit and Müller (2000b, p. 437) thus argue that [vocational education at the upper-secondary level] “teaches skills that can easily be acquired on the job rather than through schooling”.

### *3.2.3 Transferability of skills and signalling*

If an employee stays in the company where he or she has been trained, in a VET programme or through work experience, the chances of remaining employed as well as the wage obtained may be similar for holders of a VET degree and for those having work experience only. However, the situation is different when an employee wants or has to move from one firm to another. In such a situation, the new employer has to estimate his or her productivity in order to determine whether he or she hires the employee, and for which wage. The level of skills

required for the position has to be evaluated on the basis of education and work experience. In this case, VET may be seen differently from work experience, since VET includes learning not only firm-specific skills, but also occupation-specific ones (Müller and Schweri 2015). When learning an occupation – and not only gaining experience in a specific position –, students following the VET track have the opportunity to acquire skills that are more easily transferable to similar positions in other firms than skills gained during years of work experience.

If employers have good reason to think a worker is able to immediately apply his or her occupational skills to a new environment, without a long period of adaptation, they are likely to hire them and to pay a higher wage. Therefore, the certificate delivered at the end of VET may open the door to better-paid positions. This last point is explained by the job market signalling theory developed by Spence (1973), who argues that a certificate is a way one party (employers) can access information about another (employees).

Furthermore, according to the “positive view of tracking” (Gamoran and Mare, 1989, p. 1148), higher diplomas should be obtained by more talented students. Based on this argument, workers with a VET certificate should be favoured in recruitment over those with a lower level of qualification not only because the former learned certain skills during their training, but also because the certificate signals their ability to learn. Workers without an upper-secondary level certificate may thus be seen not only as persons having studied for a short period, but also as persons being unable to study for longer. Moreover, the difference may not only be perceived in terms of technical or cognitive skills, but also with respect to behavioural skills, such as being disciplined (Shavit and Müller, 2000, p. 31) or punctual. Along the same lines, Weiss (1995, p. 135) argues that firms interpret education choices as information about unobserved attributes.

### 3.2.4 Differences over the life-course

If dual vocational education is seen as the “gold standard” to enter the labour market and reduce youth unemployment (Hoffman and Schwartz 2015), the long-term benefit of this type of education is less clear. Thanks to the work-specific skills learned, vocationally-trained workers are likely to access qualified jobs at a young age, with higher salaries than in non-qualified jobs. However, the potential wage growth of holders of a VET degree may be limited, with small margins for improvement. If at the end of the VET, the young workers master the occupation they have learned, the potential of future improvement within the occupation may be modest. This argument is in line with the results of Hanushek and colleagues (2017) who show that after the age of 30, workers with vocational education earn less than workers with general education.

Workers with a lower level of education, on their side, may have more difficulty entering the labour market because of a (initial) lack of (recognised) skills. However, if they succeed in securing a position and have the opportunity to learn on the job, they may possibly reach a similar skill level as workers with a vocational education certificate. If their productivity is comparable, they are as likely to get hired and to receive a comparable wage.

This leads us to formulate a first hypothesis:

*H1a: Workers with a VET certificate have an advantage in terms of employment and wages over workers with a lower level of education at the entry to the labour market, which decreases over the career as work experience increases.*

On the contrary, it is also possible that workers with a VET certificate hold an advantage throughout their entire career. Indeed, research on the life-course has shown that careers often follow a trend of accumulation of advantages and disadvantages (DiPrete and Eirich 2006), which would lead us to expect more successful careers after a good start than after a more

difficult one. Being more likely to find a good position, workers with a vocational education certificate may succeed in keeping their position or moving to another one, because their good start sends a positive signal to employers. Conversely, workers without an upper-secondary degree are more likely to experience spells of unemployment at the beginning of their career, which may lead to a higher risk of unemployment during their entire career – leaving a scarring effect (Gangl 2006). Furthermore, the signal of having achieved an upper-secondary degree may be rewarded by employers not only at the beginning of the career, but also later.

This argument leads us to the opposite hypothesis:

*H1b: Workers with a VET certificate benefit from a better start in their career and have a steadily increasing advantage in terms of employment and wages over workers with a lower level of education during their career.*

### *3.2.5 Institutional differences of VET: specificity and standardisation*

Up to now, our discussion of education and the labour market was presented as if VET systems were homogeneous across national contexts. This is not the case. Several aspects have been highlighted in the literature to describe the institutional differences of the VET systems, notably the level of specificity or institutional linkage, the standardisation of the content and final exams as well as the degree of stratification or differentiation (Wolbers 2003, Breen 2005, Bol and Van de Werfhorst 2013, Levels et al. 2014, Grønning et al. 2018). We focus in this article on two dimensions: specificity and standardisation.

Schematically, vocational education can be organised in two different ways: in the firm-based dual system (apprenticeship) and in vocational schools. The dual system, where students share their time between the workplace and school, is well-established in a group of countries including Austria, Denmark, Germany, the Netherland, and Switzerland (Wolter and Ryan 2011) and is based on the principle of occupation-specific skills (Müller and Schweri 2015).

Working in a firm as part of the training gives a specific orientation to young workers, while vocational programmes spent at school tend to focus on a wider range of occupational skills (Bol and Van de Werfhorst 2013, p.5). In a firm, apprentices solve “real tasks”, providing them not only with specific but also work-relevant skills (Breen 2005). Vocational specificity of the educational system of a given country has thus been measured by the prevalence of the dual system in that country (Bol and Van de Werfhorst 2013, p.13).

Another important difference between the dual system and school-based vocational programmes concerns the role, in the former, of an employer who hires the apprentice and follows his or her progress during the apprenticeship. Due to a first experience with an employer, the signalling of an apprenticeship is positive in terms of an employee’s skills (OECD 2010, p.105). It provides other employers with a better signal about workers’ skill levels and potential productivity (Breen 2005, p. 126). As a consequence, the signal of a VET degree may be strongest in a country with a highly specific VET system.

The role of employers is not restricted to hiring and supervising apprentices, but also involves defining the content of the apprenticeship and the competences required to obtain a given certificate. Employers’ involvement is crucial in connecting apprenticeships, and vocational education more generally, to the needs of the labour market (OECD 2010, p. 139). Defining skills that have to be learned by every apprentice to earn a VET diploma is the process of standardisation defined as “the degree to which the quality of education meets the same standards nationwide” (Allmendinger 1989, p. 233).

A standardised system not only benefits workers, who are able to leave the firm where they undertook the apprenticeship without expecting a strong reduction of their productivity and thus their wage, but is also advantageous to firms at the moment of hiring (Allmendinger 1989, p. 239). Thanks to a standardised system, employers can hire young workers knowing

they have a basic level of occupational skills in their field, as well as a certain professionalism and capacity to learn.

In a system where every firm has to teach a set of abilities useful not only to the firm itself but to all the firms of the sector, workers are ready to move to a different firm at the end of their training (OECD 2010, p. 22). To increase the signalling of a given skill set, a national diploma or certificate is given at the end of the vocational education to workers able to demonstrate all the required skills. A nationally standardised vocational degree recognised by employers helps in particular for labour market entry (Müller and Gangl 2003). Consequently, the more firms recognise the diploma or certificate, the more useful the diploma is for workers.

### *3.2.6 Comparison of two national contexts*

We analyse the evolution of wages and employment over the life-course for two countries with different VET systems: the United Kingdom and Switzerland. These two countries share a tradition of vocational education, and of apprenticeships more precisely (Cörvers et al. 2011), and a sizeable part of their population holds such a diploma: in the United Kingdom, 21 per cent of adults between 25 and 64 had vocational education at the upper-secondary level as their highest level of education compared to 39 per cent in Switzerland in 2014 (OECD 2015 p. 45). While the share of holders of a VET degree is larger in Switzerland, this aspect is not the only difference between the two countries. We focus on two aspects: the prevalence of the dual programmes and the standardisation of the VET programmes.

After the end of compulsory school, students in both countries can follow different options within the vocational track. In Switzerland, a large majority of the vocational programmes are taught in the dual form (90 per cent for the year 2005, own calculation from OECD 2007 p. 277). Those programmes combine school- and work-based education, and are also called

apprenticeships. While the current rate of youth enrolled in an apprenticeship is small today in the United Kingdom (Cörvers et al. 2011, Bol and Van de Werfhorst 2013, Brunello and Rocco 2015), it was larger in the seventies and eighties, the period of observation for this article, with around half of holders of a vocational upper-secondary level being an apprenticeship (own calculation. See *Data* for more details).

Furthermore, according to Rauner (quoted in Brockmann et al. 2008, pp. 549-550), the Swiss dual system focuses on education for an occupation, whereas the VET system in the United Kingdom is based on the certification of competences. While the Swiss system may be more efficient in preparing young workers to enter the labour market, due to a strong link between training and existing occupations, the UK system may prepare them better to face a “changing labour market” (Brockmann et al. 2008, p. 550). For this reason, Rauner calls the UK model “employability”.

A second important institutional difference between the two countries lies in the level of standardisation, or unification, of the VET system. On the one hand, Switzerland benefits from a nationally harmonised system, with national certificates that give official recognition to VET skills acquired at the upper-secondary level for over 250 occupations (OECD 2009). Standardised final exams need to be passed in order to obtain the Federal VET Diplomas. In contrast, there is no unified structure of VET in the United Kingdom (Cörvers et. al 2011) and the system is described as “opaque” even by experts (Ryan 2011). For the period observed in our analysis, the main VET programmes are trade apprenticeships, National Vocational Qualification at level 3 (NVQ3), Business and Technology Education Council (BTEC) and City and Guilds advanced craft (Jenkin et al. 2007).

We expect employability and wages to be higher if the signal of a diploma is stronger (standardisation), as well as if the connection between the vocational programmes and the

labour market needs is tighter (specificity). As a consequence, given the institutional differences between the United Kingdom and Switzerland, we formulate a second hypothesis:

*H2: The employment and earnings advantage of workers with vocational education over workers with a lower level of education is larger in Switzerland than in the United Kingdom, thanks to the higher specificity and standardisation of Switzerland's VET system.*

### 3.2.7 Available empirical evidence

The question of returns to education has been widely studied from many different perspectives. In a reference review, David Card (1999) focuses on the returns to an additional year of education without distinguishing between the type of education. Furthermore, this approach does not consider the differences across the career but only looks at the average returns. The question of whether returns to education are similar in different institutional contexts has also been analysed by several authors (Müller and Shavit, 1998, Breen 2005), but the issue of how returns vary over an entire career is not frequently addressed.

Recently, these three aspects – distinction between vocational and general education, differences over careers, and distinction of institutional contexts – have been taken into account by two important articles. Hanushek and colleagues (2017, but circulating already in 2011 in an influential working paper) examined the labour market advantage of vocational versus general education in 11 countries. Based on the cross-sectional International Adult Literacy Survey, they suggest that the initial advantage of vocational education decreases with age, especially in countries with a large apprenticeship system. Forster and colleagues (2016) present similar results considering the early advantage and late disadvantage of vocational education on general education, while controlling for competency and parental education.

However, they do not find that the effect is larger in countries with a strong vocational system.

While these two articles have the advantage of covering a range of countries, they use cross-sectional data and do not take into account the distinction between age and cohort effects: the career pattern is obtained by adding the situation of each respondent by age. However, it is not certain that the labour market situation in a given year of someone at age 60 reflects the situation that a person of 30 in the survey will experience 30 years later. Articles following a cohort, or a pseudo-cohort, solve this problem by following an age group over time. In these situations, the observed effect is clearly an age effect, because the cohort is the same for all the observations.

As mentioned earlier, the comparison group of VET is often general education. This is the case in earlier articles on the returns of the career of VET in the UK and Switzerland. Dearden and colleagues (2000, 2002) show that academic qualifications have higher wage returns than vocational education in Britain. However, the authors also find that when the time needed to acquire qualifications is taken into consideration, this effect is smaller, since vocational education takes less time to complete. Brunello and Rocco (2015) examine two UK cohorts and find an early employment advantage of vocational education in comparison with academic education, which declines during the career but does not disappear. On the contrary, holders of vocational education have a disadvantage in comparison with holders of academic education in terms of wages, with lower earnings growth over the career. Similar results are presented by Weber (2011) and Korber and Oesch (2016) for Switzerland.

However, these results do not address the question of whether holders of vocational education have an advantage over individuals who have no more than compulsory education. As far as we know, two papers address this question for the United Kingdom and Switzerland. Jenkins

and colleagues (2007) find mixed returns for England for vocational education at a lower level (level 2), but positive returns for vocational education at an intermediate level (level 3). In Switzerland, Weber (2011) finds that the wage growth of workers with a lower level of education than an apprenticeship is larger than for workers with an apprenticeship.

### **3.3 Data and Method**

#### *3.3.1 Data*

Our analyses are based on the UK Labour Force Survey (UKLFS) 1993-2014 and the Swiss Labour Force Survey (SLFS) 1991-2014, pooling the available rounds. This allows us to work on large datasets taking into account a period of more than twenty years. To restrict our analysis to a more homogeneous group, we focus on one cohort. To be able to observe workers from 25 to 60, we follow the cohort 1954-1968 over the 22 (UKLFS) and 24 (SLFS) rounds. Because the same individual is not observed several times (we do not take the mini-panel structure of the SLFS into account) we use a pseudo-cohort design. According to Deaton (1985), pseudo-panels – and pseudo-cohorts – have some advantages over “real” panels: a lower attrition rate, better representativeness (due to a larger number of observed individuals for a given number of observations) and a lower impact of measurement errors. After selecting the two educational groups of interest for this article (upper-secondary vocational education and compulsory education and lower born between 1954 and 1968), the sample sizes are 214,826 for the United Kingdom and 72,945 for Switzerland.

The structure of the population in terms of educational level is not exactly the same in Switzerland and in the United Kingdom, as presented in Table 3.1. The main difference between the United Kingdom and Switzerland is the importance of the upper and intermediate secondary education categories (upper-secondary: 20 per cent UK vs 49 per cent CH; intermediate secondary 22 per cent UK vs 4 per cent CH). If we do not distinguish between

upper and intermediate secondary, the rate of secondary education is not too different in the two countries (42 per cent in the United Kingdom and 53 in Switzerland), but the share of vocational education is more than two times lower in the UK (44 per cent against 17). However, the general structure is similar, with around 30 per cent of the population highly educated (tertiary level of education) and around 15 to 20 per cent with lower education (compulsory or lower).

Table 3.1: Distribution of the population aged 25–60 across education in the United Kingdom and in Switzerland, cohort born 1954-1968

	United Kingdom	Switzerland
Tertiary	27%	31%
Upper-secondary	20%	49%
<i>general</i>	7%	7%
<i>vocational</i>	13%	42%
Intermediate secondary	22%	4%
<i>general</i>	19%	2%
<i>vocational</i>	4%	2%
Compulsory or lower	22%	15%
Other/missing	8%	1%
<i>Total</i>	<i>100%</i>	<i>100%</i>

UK Labour Force Survey 1993–2014 (N=614,293) and Swiss Labour Force Survey 1991–2014 (N=126,859), own calculation.

Unweighted results. After verification, the proportion of each group is similar to the weighted ones.

Details of each category in Table A8.5 in the appendix

This paper focuses on vocational education at the upper-secondary level, the main category for vocational education in the two countries. In the United Kingdom, the category “vocational education at the upper-secondary level” is split into several programmes: trade apprenticeships representing slightly more than half the category (55 per cent), the National Vocational Qualification at level 3 (NVQ3) represents 15 per cent, the Business and Technology Education Council (BTEC) and similar 14 per cent, and the City and Guilds advanced craft 14 per cent. In Switzerland, the firm-based apprenticeship is dominant with 86 per cent of the category. The remaining 14 per cent have attended a full-time school

vocational programme, which leads to the same certificate as the apprenticeship (Federal VET Diplomas).

The group of comparison for this article is holders of compulsory school level or lower education (called *lower*). It includes persons with compulsory school as the highest level of education, those who have not completed school, and those who have followed short programs giving no access to the intermediate secondary level of education. In the United Kingdom, 87 per cent of this group have attended compulsory school or less, and 13 per cent have completed a short training which is lower than secondary education such as city and guilds part 1. In Switzerland, the share of persons having attended only compulsory school or lower is 94 per cent, and only 6 per cent have completed a short training with a lower level of education.

### 3.3.2 *Dependent, independent and control variables*

The two dependent variables are employment and wages. Employment is calculated with a binary variable taking the value of 1 if the person works at least 8 hours per week, and 0 if the person works less than 8 hours per week or not at all (this last category includes housework, education, retirement, illness, etc.)<sup>1</sup>. Income is measured as the hourly wage, calculated by dividing the gross annual work income by the number of hours worked (number per week multiplied by 52)<sup>2</sup>. The gross annual work income corresponds to the wages of employees, without self-employed workers and employers who are not available in the UK Labour Force Survey and excluded in the Swiss Labour Force Survey. It is corrected for inflation with December 2010 as the reference. We exclude the top and lower 1 per cent of the wage distribution as well as wages of workers working less than 8 hours per week from our models.

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<sup>1</sup> Additional results considering workers working at least 20 hours per week are shown in the appendix.

<sup>2</sup> Additional results for annual work income are shown in the appendix.

The number of observations is lower for wages than for employment: firstly, the questions about wages are not asked in each wave of the UK Labour Force Survey and secondly, the wage variables contain a higher rate of missing data, due to the sensitivity of the questions. For this reason, annual wages are available for 34,044 individuals in the UK Labour Force Survey and 49,293 in the Swiss Labour Force Survey<sup>3</sup>.

The two key independent variables are education (vocational education versus lower education) and age (from 25 to 60). As control variables, we use the region (split into 20 regions for the United Kingdom and into the 26 cantons for Switzerland<sup>4</sup>) and nationality. We do not control for any other aspects taking place after the educational achievement since our aim is to capture the “net” effect of education. Since the choice of an occupation or a sector of activity is not independent from education (but affected by it), introducing these variables into our model would expose us to an over-control bias. The same argument applies to the family situation: if the decision to have children (when and how many) depends on labour market prospects and labour market prospects depend on education, controlling for children would only serve to “explain away” the true effect of education on wages and employment.

All results are presented separately for men and women, since labour market trajectories differ between the two groups.

### 3.3.3 *Regression model and multivariate results*

We calculate linear regression models to predict employment and wages by education for men and women. The equation is the same for the two dependent variables and is given as:

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<sup>3</sup> Due to the availability of this information in the SLFS, we have imputed part of the missing wage data with a regression model containing age, year, canton, type of municipality, residential permit and nationality, occupation studied, hours worked, sector of activity, current occupation, and employment status. This allows us to reduce the number of missing earnings from 12,661 (12.9% of the workers) to 670 (less than 0.1%).

<sup>4</sup> Regional disparities in the employment structure and job opportunities may impact differently holders of vocational and of lower education.

$$y_i = \beta_1 + \beta_2 educ_i + \beta_3 age_i + \beta_4 age_i^2 + \beta_5 age_i^3 + \beta_6 age_i^4 + \beta_7 educ_i * age_i + \beta_8 educ_i * age_i^2 + \beta_9 educ_i * age_i^3 + \beta_{10} educ_i * age_i^4 + \beta_{11} W_i + \epsilon_i$$

Where  $y_i$  is first a binary variable (0/1) measuring if the person works or not and secondly the natural logarithm of hourly wage for an individual at a given moment,  $W_i$  is a vector of controls composed of the region and nationality and  $\epsilon_i$  is the error term. The two key independent variables are *educ* and *age*. The binary variable *educ* indicates whether the person has an upper-secondary vocational level of education, or a lower level of education. The variable *age* indicates the age of the respondent and is developed into four forms: *age*, *age squared*, *age cubed* and *age to the power of four*. These variables enable us to account for the non-linear effect of age on the life-cycle curves in employment and wages, in particular for women. Each of the forms is then interacted with *educ*, since we expect a different age curve of the dependent variables depending on the education. We present our results graphically due to the large number of interaction terms.

### 3.3.4 Causality and selection

The level of education of an individual – upper-secondary vocational education or mandatory education – is not randomly assigned but rather the result of a selection process, driven by individual choices, personal abilities, social origin and regional circumstances. Individuals are indeed selected and select themselves into educational tracks, which tend to lead them to different situations on the labour market. For this reason, this article does not claim to identify a causal link between education and the labour market situation, but shows the difference between two groups (upper-secondary vocational education and lower education) on the labour market in two different countries over the life-course. This design presents a population association and allows us to observe the differences across the life-course and the national contexts. The strategy of selecting a specific cohort (1954–1968) enables us to focus on two groups that faced the same educational and labour market context at a given age.

### 3.4 Employment trajectories in the United Kingdom and in Switzerland

The four graphs of Figure 3.1 present descriptive evidence for the employment rate over the life-course in the United Kingdom (left) and in Switzerland (right) for the two groups of interest: holders of an upper-secondary vocational level of education (vocational) and holders of a compulsory school level or lower (lower), for men and women.

We observe three important aspects: (i) In Switzerland and the UK, for both men and women, the employment rate of holders of vocational education is higher than the employment rate of holders of lower education; (ii) this difference is greater in the United Kingdom than in Switzerland; (iii) this difference seems stable during the career in the UK, but tends to increase across the career for Swiss men, and women after the age of 35.

In the United Kingdom, the employment rate of holders of vocational education remains high during the entire career, at around 90 per cent until the age of 50 for men, and between 65 and 85 per cent for women. In comparison, the employment rate of holders of lower education follows a similar trend but lies 17 (men) to 27 (women) percentage points lower.

In Switzerland, the employment rate is comparable for the two groups of men until the age of 35 (with 95 per cent on average between 25 and 35 for holders of vocational education and 93 per cent for holders of lower education). After this period, the employment rate of holders of lower education gradually decreases to 70 per cent at the age of 60<sup>5</sup>, while that of holders of vocational education remains almost constant until the age of 60.

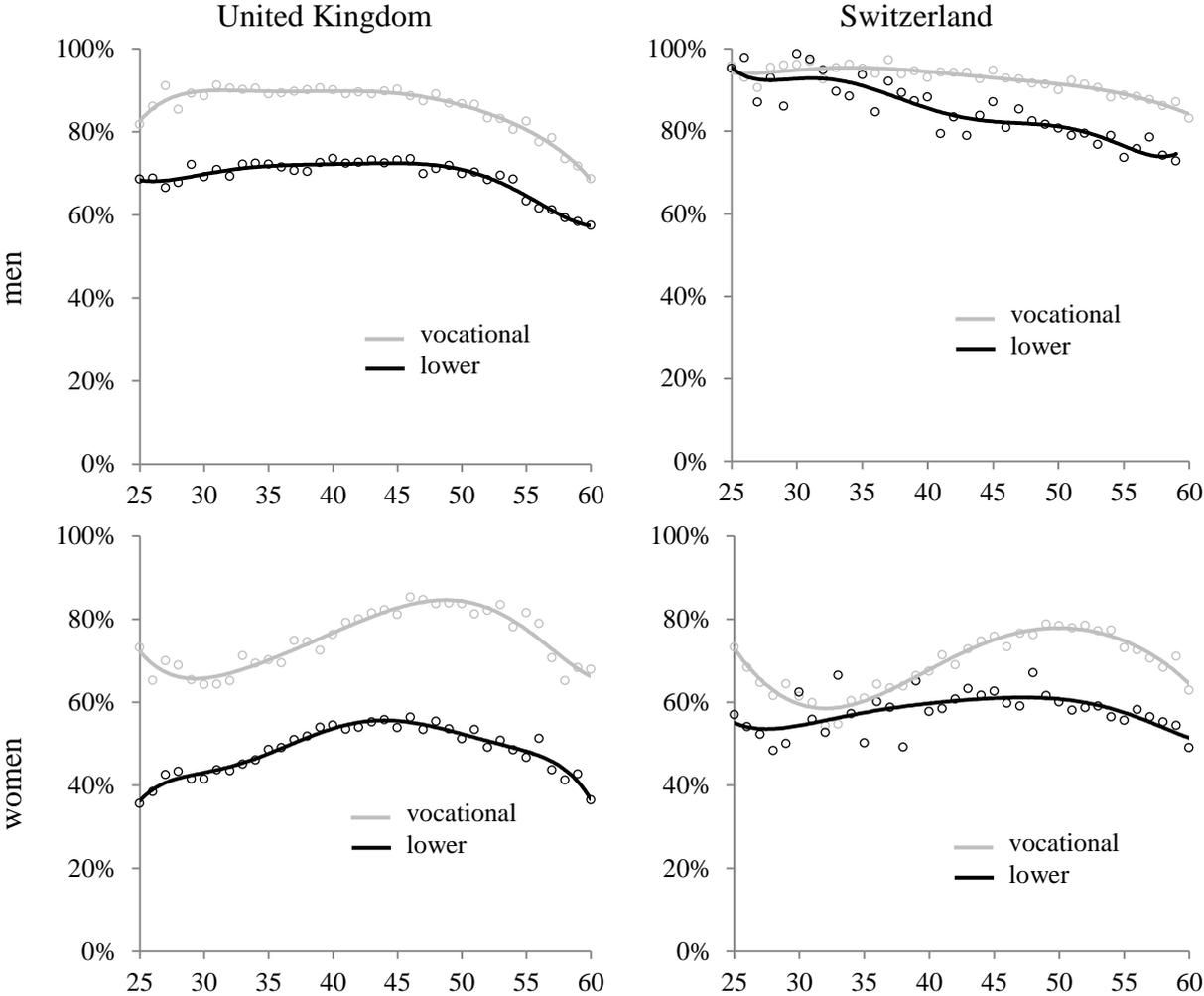
Women in Switzerland with vocational education have a similar employment rate as women with lower education during the first part of their career (around 60 per cent between 30 and

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<sup>5</sup> This decrease seems primarily to be due to an increasing rate of withdrawal from the labour market (6 per cent between 40 and 49 and 12 per cent between 50 and 60), while unemployment does not increase (7 per cent between 40 and 49 and 5 per cent between 50 and 60). However, these situations are self-reported and the number of observations per age for each category is limited.

40 years old). After this period, the employment rate of women with vocational education increases (to almost 80 per cent around the age of 50), while that of women with lower education remains basically flat at 60 per cent<sup>6</sup>.

Figure 3.1: Employment rate (minimum 8 hours per week) for men and women by level of education and age: upper-secondary vocational education (*vocational*) and compulsory school or lower (*lower*)



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968  
 Black and grey lines represent the polynomial trend line for the respective groups.

<sup>6</sup> The curve of the “lower” groups – both for men and women – is less stable, especially during the first part of the career. This is partly due to a smaller number of observations in the “lower” group than in the “vocational” one (men: 7,726 vs 25,227; women: 11,533 vs 27,981).

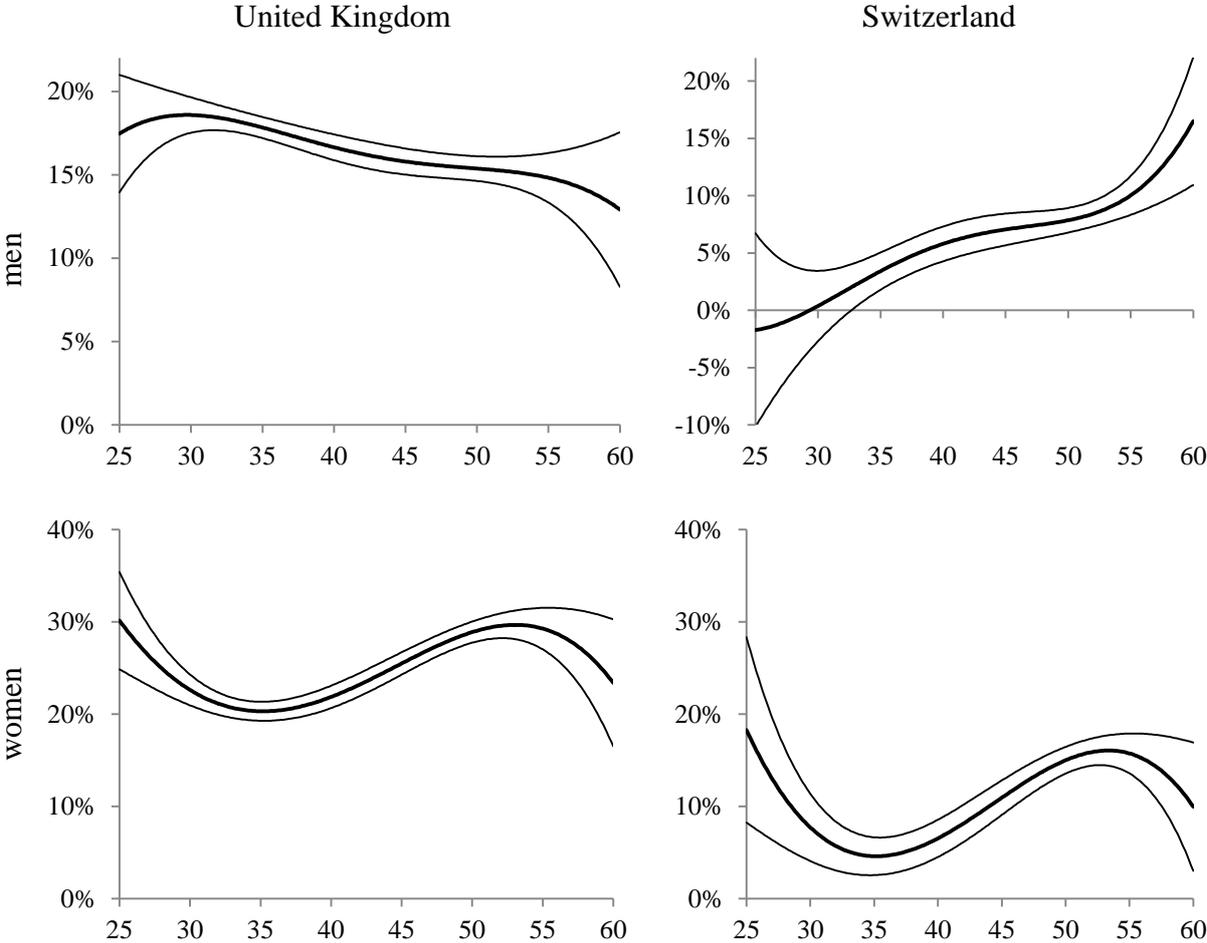
The results presented here consider as workers all the persons working at least 8 hours per week. As a robustness check, we examine the employment rate for workers employed at least 20 hours per week (see Figure A8.7 in the appendix). The only notable change concerns the employment rate of women which is lower with this second threshold. However, the differences between holders of vocational education and holders of lower education remain unchanged.

In the two countries, the category *upper-secondary vocational education* is composed of several different diplomas (UK: apprenticeship, city and guilds advanced, BTEC and NVQ3 and CH: apprenticeship and vocational school). Figure A8.8 in the appendix present the employment rate split by type of vocational track. These results are presented for the entire available population (and not only the cohort 1954-1968) to obtain a sufficient number of observations. Despite some heterogeneity among vocational education, the employment rate of the different vocational tracks is systematically higher than the employment rate of the holders of lower education over the entire career for men and women in the two countries, which validates the decision to keep the different VET tracks together. However, we observe for the UK that holders of apprenticeships have a lower employment rate than holders of other vocational education tracks, especially among women. This is not the case in Switzerland, where graduates of vocational schools and holders of an apprenticeship have similar employment rates.

We provide a more stringent test of our hypotheses by resorting to a multivariate design. We estimate the employment rate and hourly wage of each group at each age, based on linear regression models. We present the coefficients in the appendix (Table A8.6 and Table A8.7). Figure 3.2 shows the advantage of vocational education, in comparison with lower education, based on these regressions (average marginal effect). Overall, the employment advantage of vocational education is larger in the United Kingdom than in Switzerland, and larger for

women than for men in the two countries. More specifically, for men, we can observe an opposite trend in the two countries. The advantage of holders of vocational education is high at the beginning of the career in the UK (17 percentage points) and decreases slightly during the career to 13 points. In Switzerland, there is no significant advantage of vocational education on employment at the beginning of the career for men. However, the advantage of VET increases during the career and men with vocational education have, on average, an employment rate that is 17 percentage points higher at the age of 60.

Figure 3.2: Difference in employment by age for upper-secondary vocational relative to lower education (average marginal effects)



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968  
 Main line: average marginal effect. Thinner lines: 95% confidence intervals.

For women, the trend over the career is similar in the two countries with the employment rate difference between the two educational groups taking the shape of a horizontal “S”: the advantage is particularly high at the age of 25, lower at 35, high again at 55, and decreases again during the last 5 years observed. However, the level of the vocational advantage for women is higher in the UK – where it fluctuates between 20 and 30 per cent – than in Switzerland – where the evolution is between 5 and 20 per cent.

### **3.5 Wage trajectories in the United Kingdom and in Switzerland**

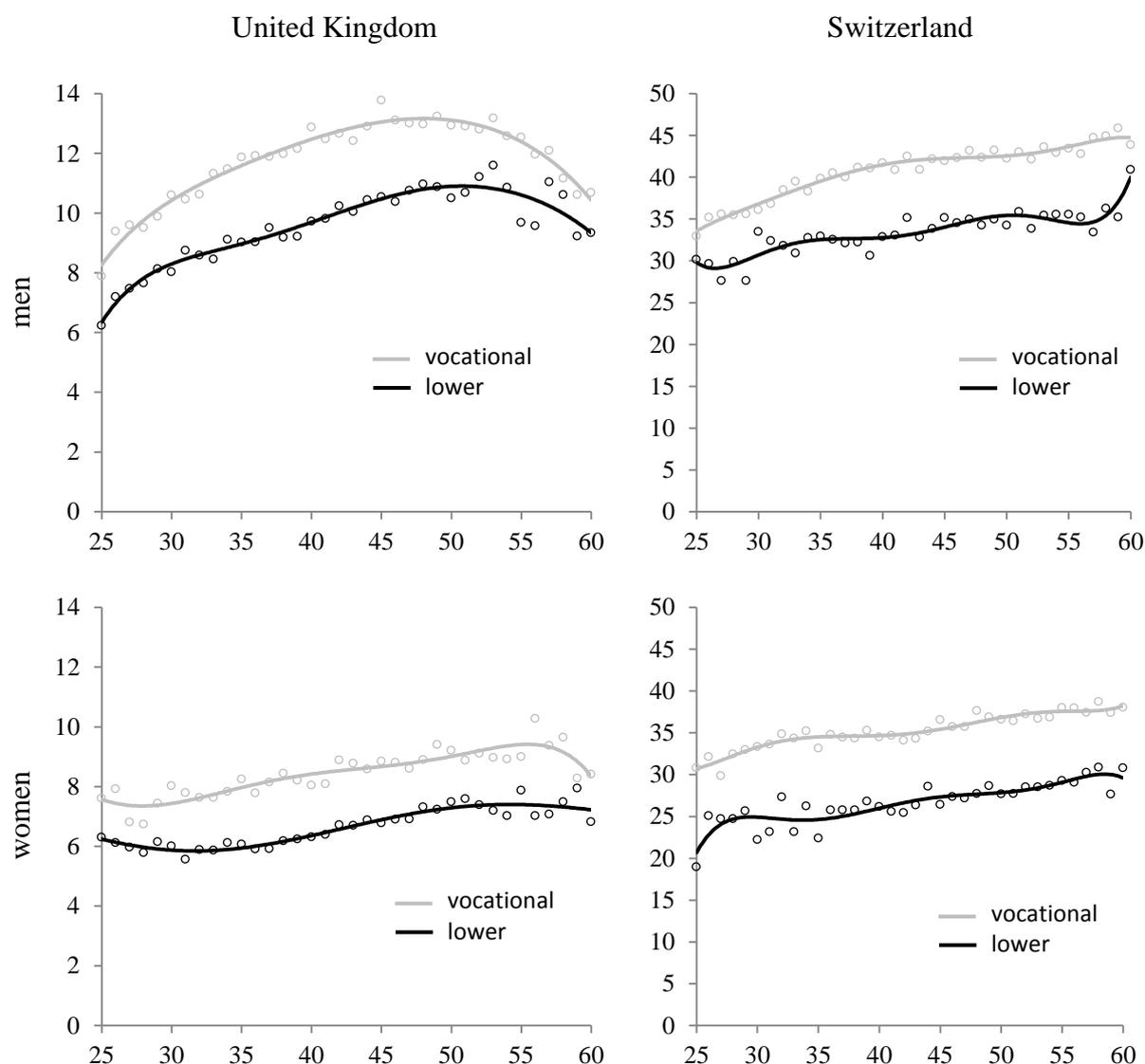
Figure 3.3 presents descriptive results for the hourly wage over the life-course for holders of an upper-secondary vocational level of education and holders of a compulsory school level or lower. Each point represents the median hourly wage for a specific age and the line shows the general trend.

As with the employment rate, the hourly wages of holders of vocational education are higher than those of holders of lower education among men and women, in the United Kingdom and in Switzerland. In the UK, the mean difference in the hourly wage between holders of lower education and those with upper-secondary vocational education is around 20 per cent for both men and women. In Switzerland, this difference is slightly smaller for men than in the UK (18 per cent) but larger for women (25 per cent). Regarding the evolution of the difference over the career, the difference between holders of vocational education and holders of lower education remains rather stable for men in the UK, but tends to be smaller at the end of the career. The hourly wage increases more during the career for men than for women in both countries<sup>7</sup>.

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<sup>7</sup> The decrease of the hourly wage observed for men in the UK after the age of 50 may be the result of decreasing productivity due to a difficulty to adapt to new technologies for example, but may also be due to a measurement effect. There is indeed a “mechanic” tendency of wages to decrease for older workers when observing more than

Figure 3.3: Median hourly wage (£/hour for UK, CHF/hour for Switzerland) for men and women by level of education: upper-secondary vocational education (*vocational*) and compulsory school level or lower (*lower*).



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968

Black and grey lines represent the polynomial trend line for the respective groups.

Median hourly wage for the cohort 1954–1968: UK £13, CH CHF48

We replicate this analysis with annual median wages (see Figure A8.9 in the appendix). This second measure does not take the number of working hours into account. It is then less suitable to measure the “hourly price” (and therefore productivity), but informs us about the

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one birth year cohort (here: fifteen). Because of wage growth across time, the salary at a given age of a person born several years later is on average higher than that of a person born earlier (for more details on this effect, see Baudelot 1982).

money wages available to the respondents. If these two indicators present very similar trends for men, the situation is slightly different for women.

To take the heterogeneity of the vocational track into account, the annual work income is also presented for the different VET tracks – for the entire available population and not only the 1954–1968 cohort, due to small numbers of observations (Figure A8.10). As with employment, annual wages of holders of vocational education are systematically higher than wages of holders of lower education regardless of the type of vocational degree.

We turn again to our multivariate model and show in Figure 3.4 the predicted advantage of vocational education in hourly wages on lower levels of education, based on linear regression models. On average over the entire career, the wage advantage of vocational education is similar in the two countries: 18 per cent for men and women in the UK as well as for women in Switzerland, and 15 per cent for Swiss men. However, the evolution during the career differs between the two countries.

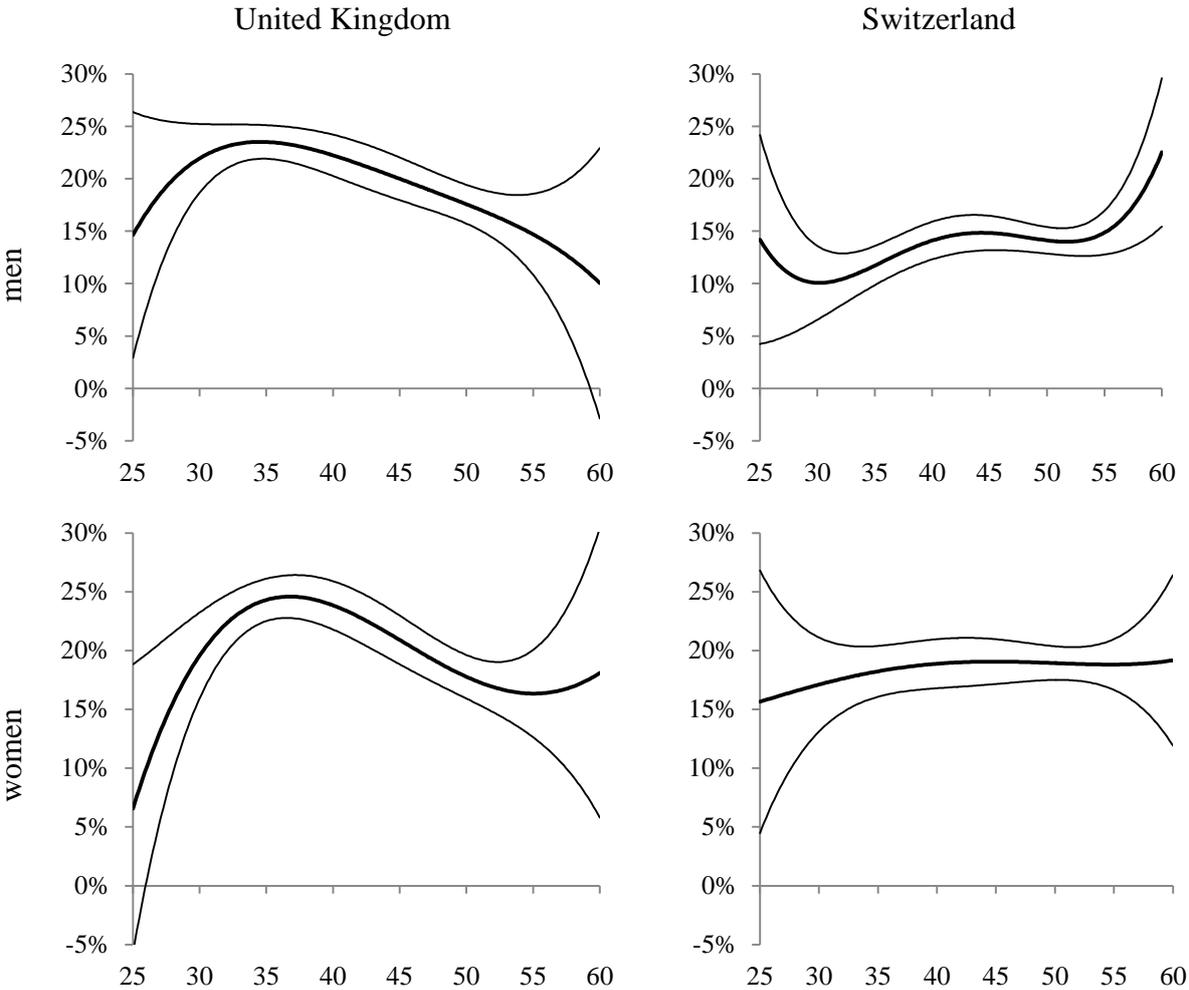
In the United Kingdom, the advantage of VET increases between 25 and 35, and decreases afterwards. The initial increase is more pronounced for women than for men (respectively from 7 per cent to 24 per cent and from 15 per cent to 24 per cent). Afterwards, the advantage decreases for men and women to about 15 per cent at the age of 55.

In Switzerland, the wage advantage of vocational education is more stable during the career. It is almost constant for women, going from 16 per cent at the age of 25 to 19 per cent at 60. This small increase is not statistically significant since the confidence intervals around the value at the age of 25 and the one at the age of 60 overlap. For men, the increase between the ages of 30 (10 per cent) and 60 (23 per cent) is statistically significant.

The advantage of vocational education on annual wage is presented in the appendix (Figure A8.11). While the observation of this measure leads us to similar conclusions than the

observation of the hourly wage, we can observe one interesting difference. Men and women with lower education seem to not only receive a lower hourly wage in both country, but also tend to work less hours per week. Therefore, the advantage of vocationally-trained men becomes larger when we look at hourly than annual wages.

Figure 3.4: Difference in hourly wage by age for upper-secondary vocational relative to lower education (average marginal effects)



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968  
 Main line: average marginal effect. Thinner lines: 95% confidence intervals.

### 3.6 Discussion

The analyses of employment rates and wages over the career in the United Kingdom and Switzerland for holders of vocational education in comparison to holders of lower education show us three main results: (i) a constant advantage of holders of vocational education over those with lower education in the two countries, for both men and women, and during the entire career – with rare exceptions where the difference is not statistically significant; (ii) for employment, a larger advantage of VET in the UK than in Switzerland and for women than for men; (iii) for hourly wage, a similar advantage over the career for men and women in the two countries.

Let us look in greater detail at the results to answer our hypotheses about the evolution during the career. Our first hypothesis concerns the evolution of the advantage for holders of VET over the career. In the United Kingdom, the trend for men is not linear. During the beginning of the career, between 25 and 35, we observe an increase in the wage advantage of vocational education, and a stable advantage in the employment rate. However, the advantage of holders of VET diminishes after the age of 35 up to the age of 60. As argued in human capital theory, the signal of a VET degree may be less important after individuals acquire a certain amount of work experience and the difference between the two educational groups possibly decreases thanks to the more similar skills acquired by experience.

These mechanisms seem to affect the careers of women in the United Kingdom as well, at least in terms of hourly wages. As for men, the advantage of vocational education increases between 25 and 35, and then decreases. However, the situation is different for employment. The advantage of VET on employment rate takes a horizontal “S” shape which may be more linked to family tasks than to demand on the labour market. It is possible that women with vocational education – with higher average hourly wages – have more room for manoeuvres

considering their personal or household income, and modify their situation on the labour market more than those with lower education and lower average hourly wages. This mechanism may explain the decrease of the employment rate around the age of 35 for women with vocational education and, to some extent, the stronger decrease of employment rate between the ages of 55 and 60 for UK women with vocational education compared to those with lower education. It is indeed easier to reduce the employment rate or to stop working after a certain age – to take care of parents or grandchildren for example – if the (previous) salary is higher and entitlement to pensions is more generous. However, it is interesting to note that the employment advantage of VET is, on average, clearly larger in the UK than in Switzerland for both men and women.

In Switzerland, the trend is clear for men, with an increase of the advantage of both employment and hourly wages over the career. In this situation, having obtained a VET diploma seems to lead to a mechanism of cumulative advantage where vocationally-trained men in Switzerland are getting a better and better situation in the labour market in comparison with their peers without an upper-secondary degree.

For women in Switzerland, the trend is different, and the underlying mechanisms may be not the same. Similar to the women in the UK, the employment rate of vocationally-trained women in Switzerland fluctuates more over the life-course and thus seems affected by family commitments. The difference in Switzerland between the employment rate of vocationally-trained women and women with lower education follows the same trend as in the UK.

We do not have a simple answer to our first hypothesis. Results for men and women in the UK tend to confirm hypothesis H1a, which expected a decreasing advantage of vocational education over the career. However, this is only valid after the age of 35. On the contrary, results for Swiss men confirm hypothesis H1b, showing an increase of the vocational

advantage over the career. For women in Switzerland, we find none of the predicted trend, but have a stable effect on wages and a horizontal “S” curve for employment. This shows the importance of accounting for the involvement of a large share of women in household tasks and family life in predicting the evolution of labour market careers.

Contrary to hypothesis H2, which expected a larger advantage of vocational education in Switzerland than in the United Kingdom, we observe the opposite, a larger advantage in the UK, especially in terms of employment. The larger difference in employment rates in the UK may be due to a stronger selection process at the upper-secondary vocational education level in the UK than in Switzerland. The proportion of the population with this level of education is indeed substantially larger in Switzerland than in the UK. However, because the difference in terms of wage is similar in the two countries, we could also interpret this result as showing an overall stronger labour demand in Switzerland for workers, even without qualification. In a context of almost full employment, as is the case in Switzerland, many employers may have no other choice than to appoint unqualified workers. During the observed period (1991-2014), the unemployment rate is indeed higher in the UK (between 5 and 10 per cent) than in Switzerland (between 2 and 5 per cent).

Furthermore, additional analyses showed us that in the UK, holders of apprenticeships have a lower employment rate than holders of other vocational education tracks, especially among women. This is not the case in Switzerland, where graduates of vocational schools and holders of apprenticeships have similar employment rates. This may be due to the fact that apprenticeships cover all fields in Switzerland, while other tracks are followed in the UK to study, for example, business and technology (BTEC).

### **3.7 Conclusion**

This article contributes to the study of returns to vocational education in two respects: investigating how the situation on the labour market of holders of a VET degree evolves during the career, and how it varies depending on the institutional context. Contrary to most existing literature, which compares vocational education with general one, we followed the “safety-net” argument (Arum and Shavit 1995, Shavit and Müller 2000) and considered that achieving no upper-secondary education is as realistic a counterfactual to vocational education as obtaining upper-secondary general education. This gave us the opportunity to highlight the evolution of the VET advantage over the career with an original perspective.

Our contribution is also methodological. Our article follows a group of people born, educated and entering the labour market at the same period over their entire career, with the method of a pseudo-cohort. This enables us, to some extent, to isolate the age effect while avoiding cohort effect. This has been possible by pooling data from 22 (UKLFS) and 24 (SLFS) rounds.

Our results clearly highlight the better position on the labour market for holders of vocational education than holders of lower education, in terms of employment prospects and wages over the entire career. Vocational education appears not only key to enter the labour market, but also to shield against non-employment and very low wages. If women’s careers are more affected by family events than men’s, we nevertheless observe an advantage of vocational education for both men and women.

The effort of strengthening vocational tracks in the educational system appears as clearly relevant, to not only avoid educational drop-outs but also to offer better opportunities in the labour market to youth less interested in, or having more difficulties with, general education. This conclusion can be drawn for both a nationally standardised and very specific system such

as Switzerland, as well as a less standardised and less specific context such as the United Kingdom.

However, it is important to keep in mind the limitations of this article. First of all, our results do not derive from a causal design, which means this article is unable to prove that the difference between the two groups comes from the level of education. It has indeed been shown in the literature that (self) selection in educational tracks not only depends on ability, but also on other factors such as social origin (Erikson and Rudolphi 2009, Erikson and Jonsson 1996). The population association presented in this article does not take this selection bias into account, due to the lack of relevant information in the datasets. Presenting a detailed, and career-long, description of the labour market situation of the two groups appears nevertheless interesting to us.

Finally, it is also important to remember that we present respondents who entered the labour market 30 to 45 years ago. In a context of globalisation and digitalisation, it is difficult to predict how the careers of youth entering the labour market nowadays will evolve. However, the high employment rates of our study's cohort today – who are now in their fifties and early sixties – strongly suggest that the demand for vocationally-trained workers will not only persist, but also continue to exceed that for non-qualified workers. The challenge for governments may then be the constant modernisation of vocational systems in order to face the increasing importance of information technology in most vocational domains.

## **4. How educational track determines wages in early careers. Panel evidence for Switzerland**

### **4.1 Introduction**

One of the aims of education is to prepare youth to enter the labour market. In many OECD countries, two different tracks at the upper-secondary level try to take up this challenge: the general – or academic – track and the vocational one. While the former tends to focus more on general skills such as languages, mathematics and science, the latter focuses more on work-related skills and prepares youth for a specific occupation. Defenders of general education argue that general skills are adaptive and flexible, and prepare youth for a career in different occupations and sectors in a context of rapid technological change (Krueger and Kumar 2004, Hanushek et al. 2017). At the same time, advocates of vocational education and training (VET) reply that vocational education prepares youth better to enter the labour market by providing apprentices with skills that are directly applicable in a given job (Shavit and Müller 1998, Ryan 2001, Gangl et al. 2003, Breen 2005).

There is some evidence supporting both sides. Recent research (Cörvers et al. 2011, Forster et al. 2016, Hanushek et al. 2017) shows that while vocational education successfully prepares youth to enter the labour market, holders of general education have an advantage towards the end of their careers both in terms of employment and wages. These studies present some differences among countries but a similar trend of a later disadvantage in careers for holders of vocational education in most of them. VET seems to present simultaneously the advantage of high productivity directly after the end of education, but higher risk of unemployment later in the career and lower wage growth than general education.

However, this research is based on cross-sectional datasets and as a consequence cannot distinguish between age and cohort effects. It is not a given that youth entering the labour market a certain year will be subjected to the same circumstances later in their careers as the older people observed the same year. We address this issue by following a single cohort of school leavers in their early labour market career. Furthermore, while these contributions bring substantial contributions to the topic, they only partially address the question of selection. Some individual characteristics are indeed known to have an impact both on the type of education followed and the situation on the labour market (notably earnings). Characteristics that could introduce this selection bias include social origin such as parents' education and class (Erikson and Jonsson 1996, Goldthorpe 1996, Erikson and Rudolphi 2009), migration background, and geographical or cultural context (Imdorf et al., 2014, Glauser and Becker 2016). And last but not least, intellectual abilities may not only have a direct influence on the choice of the track (notably if the general track is reserved for the better students), but likely also impact future earnings, independently of the school track followed. It is then difficult to isolate the net effect of education on labour market outcomes. Our study aims to assess the impact of education on labour market outcomes while reducing the selection bias as much as possible.

This article addresses the question of how the type of upper-secondary education, vocational or general, affects wages in early careers. Our contribution is focused on youth in Switzerland, a country where vocational enrolment is high: 68 per cent of the cohort of school leavers started to study in the vocational track at the upper-secondary level in 2016<sup>1</sup>. We use the Swiss cohort panel study TREE (Transitions from Education to Employment) (Gomensoro and Meyer 2017), that follows a cohort of youths from the end of compulsory school (age 16) up to the age of 30. By matching students on the basis of their PISA reading test, social

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<sup>1</sup> Federal Statistical Office website

origin, migratory background and geographic region at the age of 16 – meaning before the beginning of the upper-secondary track – we use a quasi-experimental design to address the selection issue for the aspects presented previously. We also address the question of a different return on general and vocational education for men and women, due to stronger gender segregation in vocational than academic programmes and, possibly, a lower inclination of employers to invest in firm-specific skills of female rather than male employees.

We first present our hypotheses on how different types of education lead to different early careers. We then discuss the problem of selection, before presenting the data and matching method used for our analyses. Results suggest that holders of vocational education and those with a general one have similar hourly wages at the entry into the labour market once we take selection into account. In terms of experience payoff, women with a general upper-secondary degree have significantly higher hourly wages after six years of work experience, in comparison with those with vocational education.

## **4.2 Vocational versus general education**

A seminal literature discusses the advantages of vocational education for entering the labour market and presents empirical evidence of its effectiveness (e. g. Shavit and Müller 1998, Ryan 2001, Gangl et al. 2003, Breen 2005). This literature has been completed more recently by articles analysing the labour market situation of holders of vocational education not only directly after school, but also after ten, twenty or thirty years of work (Cörvers et al. 2011, Forster et al. 2016, Hanushek et al. 2017). By examining early careers with a focus on the evolution of earnings after several years of work experience, our article draws together these two strands of the literature.

#### *4.2.1 Situation at the entry into the labour market*

Empirical research on the school-to-work transition and youth's situation on the labour market tends to show good employment outcomes for (standardised) vocational education. At the individual level, it tends to ease the transition from school to work (Ryan 2001, Müller and Gangl 2003, Wolter and Ryan 2011) and, at the aggregate level, to lead to lower unemployment rate, notably in countries with strong vocational programs, such as Austria, Germany, the Netherlands or Switzerland (Shavit and Müller 2000, Breen 2005, Quantini and Manfredi 2009, OECD 2010, Bol and Van de Werfhorst 2011). The advantage of vocational education seems larger in countries with a strong firm-based system of apprenticeships (Shavit and Müller 2000, Iannelli and Raffe 2007).

Several reasons may explain why VET helps labour market entry. First, the close link between the training system and the labour market helps to prepare apprentices directly for the labour market (Shavit and Müller 2000, Van de Werfhorst 2011). This is clearly the case in terms of technical skills, but may also apply to the acquisition of work autonomy and social skills such as the relationship with colleagues and customers. Second, if vocational education is standardised, it leads to degrees that are easily “readable” for employers who then know precisely what kind of tasks a vocationally-trained person is able to do in a specific occupation. This mechanism is related to the signalling effect of a degree (Spence 1973, Arum and Shavit, 1995). Finally, the possibility to follow a vocational track, focused on practice and concrete tasks, helps youth with lower ability or interest for the academic track to continue their education until the end of the upper-secondary level (Wolter and Ryan 2011), which may give them better employment prospects than with compulsory school degree only.

In countries such as Switzerland, the difference between holders of VET and general education may not only concern job access, but also wages<sup>2</sup>. After the end of their training, holders of VET are immediately ready to work on specific tasks, contrary to holders of general education. If the former do not have formal experience, the fact that their training was composed in a large part of real tasks executed in a company (usually, more than half of their effective training time) plays a similar role (Shavit and Müller 2000). For this reason, they are likely to be productive right away and can expect a wage that does not differ much from their more experienced peers directly after the entry on the labour market.

On the contrary, holders of general education have acquired academic skills in different domains, but these skills are usually not directly linked to a professional context or to the specific demand of a company. For this reason, their first salary after the end of their education could be lower than holders of vocational education, reflecting their (initial) lower productivity. Consistent with this argument, higher initial wages for holders of VET in comparison with their peers with general education are observed in Germany (Hanushek et al. 2017), the Netherland and United Kingdom (Cörvers et al. 2011). This leads us to formulate a first hypothesis:

*Hypothesis 1: workers with VET have a higher salary than those with general education at their entry into the labour market.*

#### *4.2.2 Wage growth over the life-course*

If the type of education has an impact on the chance of finding a job and the starting wage, the first years of work experience are crucial for the evolution of wages. After several years of experience, holders of general education may benefit from both general skills – due to their

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<sup>2</sup> In a context of low unemployment as in Switzerland (less than 5 per cent of the adult population and around 8.5 per cent of 15-24 year olds over the period of 2012-2014, ILO definition, Federal Statistical Office), wages may be a better indicator of differences between the groups than employment.

education – and specific skills – due to their work experience. If this combination is well rewarded on the labour market, it should give them the opportunity to move to better-paid positions. On the contrary, holders of vocational education may not learn significantly different skills during their first years of work than during their apprenticeship, considering that the aim of the apprenticeship is to prepare youth to be ready for a specific occupation. The extent to which their productivity at work – and thus their wages – may increase with experience seems more limited.

While employment over the entire career associated with VET has been examined in several articles (Cörvers et al. 2011, Brunello and Rocco 2015, Forster et al. 2016, Hanushek et al. 2017, Korber and Oesch 2018), only a few studies compare the evolution of wages for holders of vocational versus holders of general education. Cörvers et al. (2011) show that the initial earnings advantage for workers with VET in comparison with those with general education in Germany (where it is largest), the Netherlands (where it is smallest) and the United Kingdom decreases over the career. The two earnings curves intersect after around 6 years of experience.

Hanushek et al. (2017) show for the cross-sectional Micro-census data for Germany a higher wage at the beginning of the career for workers with vocational education, but a larger experience payoff for workers with general education over time. Due to this difference in the evolution, workers with general education overtake those with vocational education at the age of around 30.

Similarly, Korber and Oesch (2019) find for Switzerland a significantly higher hourly wage for general than vocational education for men after the age of 30, and for women after the age of 27. The analysis of annual work incomes shows similar results, but since the group with

general education works fewer hours per week, it catches up with that having vocational education somewhat later in the career: at the age of 34 for men and 29 for women.

This literature confirms the smooth entry in the labour market for holders of VET, in line with the literature on the school-to-work transition. However, the life-course perspective highlights the fact that the advantage given by VET tends to decrease, or even disappear, over the career. It is essential, then, to not only study the situation at entry into the labour market, but also the evolution of wage; an idea from which we formulate a second hypothesis:

*Hypothesis 2: the wage returns to experience are greater for workers with general education than for those with vocational education.*

### **4.3 Men and women**

Despite a general trend towards greater gender equality, occupational gender segregation is still substantial in Western countries (Charles and Grusky 2005, Hout and Di Prete 2006, Pan 2015) including Switzerland, where it has been described as the “most pronounced and persistent form of segregation on the Swiss labour market” (Deutsch et al. 2005, quoted by Imdorf et al. 2014: 14). Gender segregation of job orientation is not a feature of the past; young workers continue to enter the labour market in gender-segregated jobs, both in terms of occupation and sectors (Triventi et al. 2015). With similar ability profiles, girls and boys do not follow the same tracks, but rather gender-typical ones (Jonsson, 1999).

This segregation would not be problematic in terms of earnings if male and female occupations were equally paid. However, occupations dominated by men tend to be better paid than those dominated by women (England et al. 2007, Murphy and Oesch 2016). As a consequence, the segregation in different occupations seems to be responsible for a considerable part of the gender wage gap (Fitzenberger and Kunze, 2005). Our interest lies

not on the gender wage gap itself, but on the wages associated with different types of education – and whether this association differs for men and women. In this context, it is important to note on that gender segregation seems even larger in occupations accessed through vocational than academic programmes (Meyer 2009, Buchmann and Kriesi 2012, Eberhard et al. 2015).

This situation is due to at least four reasons. First, vocational education is more gender orientated than academic education (Imdorf et al. 2015). Secondly, in vocational education the occupation is chosen earlier in the life course: after mandatory school, the students going on to high school have more time to choose an occupation or a training track than students who decide to start an apprenticeship. Youths who orient themselves – or are oriented – to an apprenticeship have to choose an occupation already at the age of 15 in the Swiss system. At this age, the capability of asserting a gender atypical choice may be reduced, partly due to more pronounced identity challenges at younger age (Gottfredson 2002, Buchmann and Kriesi 2012).

A third possible reason is the difference of social origin and the higher propensity to make gender atypical choices among higher educated people's offspring (Imdorf et al. 2015). Children of parents with low education are more likely to undertake an apprenticeship than children of parents with higher education, due partly to social reproduction mechanisms (Erikson and Jonsson 1996). Gender roles may thus weigh more heavily among youth whose parents have lower levels of education, whereas the choice of gender atypical occupations seems more encouraged by parents with a higher education and by their network (Koppetsch 2001 in Imdorf et al. 2015, Kriesi and Buchmann 2014).

A fourth reason relates to the employer side of the equation. Several studies have shown the difficulty for women to be hired as an apprentice in typically male occupations (Fuller et al.

2005, Imdorf 2013, Kergoat 2014). Reasons such as physical strength, “natural” skills or the difficulty of integrating a few women in a mostly male workforce may be used as arguments by employers in order not to hire a young woman in such occupations.

Because VET is closely linked to the labour market, the choice of the apprenticeship is highly correlated with the occupation later in life. For this reason, women having done an apprenticeship more often work in gender-typical occupations than women having done general education (Buchmann and Charles 1995). And since female occupations are less well-paid than male occupations, we expect lower relative wage returns to VET for women than men.

Furthermore, Estévez-Abe (2005) argues in her skill-based approach that specific skills are not rewarded the same way for men and women, due to the belief of employers that women are more likely to quit their job for family reasons. This argument is particularly relevant for early careers, where the likelihood of having a child is high. According to this approach, employers are more interested in investing into the firm-specific skills of their male employees compared to their female employees because the return on investment, linked to the employee’s duration of work in the firm, is expected to be smaller for women than for men. As a consequence, we expect lower wage returns to vocational education relative to general education for women than men during early careers.

Based on the gender differences and on hypothesis 1 (*workers with VET have a higher salary than those with general education at their entry into the labour market*), we formulate a third hypothesis:

*Hypothesis 3: Relative to vocational education, general education provides better wage perspectives in early careers for women than for men.*

#### **4.4 The issue of selection**

The literature investigating the difference between vocational and general education faces the thorny issue of selection. The (self) selection into an educational track is indeed not random, but linked to several factors such as the school abilities, the social background (Erikson and Jonsson 1996, Goldthorpe 1996, Erikson and Rudolphi 2009) and the cultural context (Imdorf et al. 2014, Glauser and Becker 2016). These factors create a bias when they are not taken into account, because they affect both the allocation to a track and labour market outcomes such as wages.

The unequal access of students to different educational tracks based on their social background is an important topic in sociology and educational science. Boudon (1974) theorised the primary and secondary effect of social background on educational attainment. The primary effect relates to the fact that children from advantaged backgrounds tend to benefit from more resources and a better learning environment, helping them to perform better at school than those from disadvantaged backgrounds. The secondary effect, in turn, relates to the fact that children from different social backgrounds make more or less ambitious educational choices.

Another approach to explain the lower rate of children from modest social backgrounds in the general tracks is the rational action theory (see Boudon 1974, Goldthorpe 1996). It argues that individuals make decisions rationally based on costs and benefits, and depending on their own interests. In the context of educational choice, the costs are not only the possible education fees and materials, but also a place to live near the university or the absence of a salary during the years of education, compared to the possibility of working. The benefit is linked to the future position on the labour market, and can include income, severity of working conditions but also social prestige. The expected benefit of a situation may vary depending on the

available information and personal values. Following this theory, students from more modest backgrounds may choose vocational education rather than general education in order to acquire a salary quicker and become independent from their parents earlier. Finally, the probabilities of success are also taken into account; it seems plausible that students from modest backgrounds and their parents estimate the likelihood of failure to be higher in the academic track (due to a lower possibility of receiving parental help in case of school difficulties, for example). Finally, the academic track is also more costly as these additional years of study demand more financial resources, in relative terms, from low-earning than high-earning parents (knowing that apprenticeships do not only cost anything, but rather provide the apprentice with a small wage).

Many studies show that students from disadvantaged background have more difficulties in accessing a high level of education than those from more advantaged ones, *even when controlling for school abilities* (see for example Erikson and Jonsson 1996, Bukodi et al. 2014). As a consequence, children of lower educated parents tend to be overrepresented in the vocational track in comparison with the general one, which is due partly to social reproduction mechanisms (Erikson and Jonsson 1996).

When trying to identify a causal effect of the type of education on wages, one has to take this selection bias into account. Else, results are informative and help to observe the difference between groups, but without telling if the difference is causal or purely correlational. To be able to identify a causal link between the type of education and wage, an experimental design should be used. However, it is difficult to imagine a situation where it would be possible to select randomly students to general or vocational track, and observe their wage afterwards. To get around this problem, we can use a quasi-experimental design, which means simulating a situation where the data are generated by a process approaching a random assignment. In our article, we use a matching method to account for the selection and match the individuals who

will eventually follow a different type of education at the upper-secondary level (vocational VS general) but who are, at the age of 15, as close as possible on other aspects such as reading abilities, school track, social origin, migration background, and geographical context. By comparing the wages of two individuals who were almost identical at the end of compulsory schooling, but who chose or have been selected to a different track of education, we come close to a causal link between the type of education and wage.

## **4.5 Data and Method**

### *4.5.1 Data*

We analyse the entry into the labour market using the panel dataset TREE. It follows a cohort of youth who finished compulsory school in 2000 and allows us to analyse early careers while taking into account school abilities and the social background. Students were first surveyed in TREE after taking the PISA test, during their last year of compulsory school. They were then surveyed again each year between 2000 and 2007 (between the ages of 16 to 23) as well as in 2010 (age of around 26) and again in 2014 (age of around 30). The initial sample size was more than 6,000 students. However, the number of respondents was halved in 2014 due to attrition.

For our analyses, we restrict the sample to the respondents who replied to the question about their situation on the labour market in the waves of interest. Our focus is on the situation after the end of upper-secondary education, which means in 2005 (wave 5, at the age of 21) the earliest. Table 4.1 presents the number of respondents and the composition of the sample for each wave of interest. In 2005, the majority of the students had finished upper-secondary education in either the general (academic) or vocational track. However, a quarter of the weighted sample had not finished upper-secondary education (yet) and is presented in a separated line.

Table 4.1: Sample size and composition, wave 5 to 9

	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9
year	2005	2006	2007	2010	2014
number of observations	3,566	3,332	2,943	2,452	2,280
average age	20.8	21.8	22.8	25.8	29.8
% women	55%	56%	56%	52%	57%
% vocational	48%	55%	60%	64%	61%
% general	26%	29%	30%	27%	28%
% no upper-secondary (yet)	26%	16%	10%	9%	11%

Data: TREE

We use the truncated and calibrated grossing-up factor (population weights) for each wave.

From the age of 23 already, holders of general education represent a bit less than 30 per cent of this age cohort, while vocational education graduates represent around 60 per cent and individuals without an upper-secondary degree 10 per cent.

Men and women are not equally divided among the educational tracks. We observe at age 30 (wave 9) that 53 per cent of women have a vocational upper-secondary degree, 36 a general one, and 11 per cent no upper-secondary degree. The rates for men are 72 per cent for vocational education, 17 per cent for general education, and 11 per cent with no upper-secondary degree. Vocational education is thus largely more common among men than women.

All respondents who provide information on their situation in waves 5 to 9 are taken into account for the descriptive results. In a second step, we focus on waves 8 and 9 to calculate regression models and keep respondents for whom the hourly wage was possible to calculate (wage and hours of work per week available) and for whom information used for the matching was available (the list of variables used for the matching is presented in section 4.5.3). Our sample is unbalanced as some respondents dropped out in later waves. We use the population weights (truncated and calibrated grossing-up factor weights) for each wave for

the descriptive results, and the nonresponse correction weights for the regression models to take the attrition issue into account.

#### 4.5.2 *Dependent and independent variables*

Our dependent variable is the gross hourly wage, transformed with the logarithm to approximate a normal distribution. We only consider the wage of respondents fully in the labour market, which means individuals for which work is their main activity. The median hourly wage in our sample is 32.4 Swiss francs for men and 30.7 for women<sup>3</sup>. This variable is calculated from different answers to the question “How much do you earn?” adapted to fit each situation such as monthly salary, hourly wage, etc. We present the variable without the extreme values (lower than 12 and higher than 70).

Our main independent variable is the type of upper-secondary education that the respondents obtained: general or vocational. The category *general* includes graduates of a federal maturity (*Gymnasium* in German, *gymnase* in French) and other diplomas of general education at the upper-secondary level<sup>4</sup> while the category *vocational* represents holders of an apprenticeship – including those made in a vocational school – or a certificate of elementary vocational education (*Anlehr-Ausweis* in German, *attestation de formation élémentaire* in French)<sup>5</sup>. The vocational maturity is embedded in the vocational track and thus considered as a vocational (rather than a general) degree. While the distinction between vocational and general education

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<sup>3</sup> The inflation between 2010 and 2014, the two measurement points for wages, was 0.01%. Since this value is very close to zero we do not account for inflation.

<sup>4</sup> More precisely, this category includes in German: "Maturitätszeugnis (gymnasiale Maturität)", "Diplom (Diplommittelschule/Fachmittelschule)", "Fachmaturitätszeugnis (nach DMS)", "Diplom (Handelsmittelschule)/Handelsdiplom" and "Lehrerseminar/Lehrpatent" // in French: "Certificat de maturité (maturité gymnasiale)", "Diplôme (école de culture générale, école de degré diplôme)", "Certificat de maturité spécialisée (après une ECG/EDD)", "Diplôme (école supérieure de commerce)/Diplôme de commerce" and "Diplôme (formation d'enseignant)/brevet d'enseignement, formation pédagogique secondaire".

<sup>5</sup> More precisely, this category includes in German: "Eidgen. Fähigkeitszeugnis (EFZ) / Lehrabschluss(zeugnis)", "Berufsmaturitätszeugnis (Berufsmatur)" and "Anlehrabschluss/ eidg. Berufsattest" // in French: "Certificat fédéral de capacité (CFC)/ Apprentissage (certificat)", "Certificat de maturité professionnelle (maturité professionnelle)", "Attestation de formation élémentaire/Attestation".

is done at the upper-secondary level, we also include in our analysis a variable answering if the respondent has achieved a tertiary degree of education, to control for the level of education.

The second independent variable is work experience, measured in months but presented in the regression per year (divided by twelve). It is calculated by adding the different respondents' work episodes. Even when we consider respondents at waves 8 and 9 only (main models), work experience is calculated taking into account all their previous experience, mentioned in each wave. We calculate the variable experience by only taking into account the job episodes in a similar occupation (same ISCO-08 at the two digit level) that respondents had at the time of the interview. This measure focuses on experience that is relevant for the observed wage and avoids possible "noise" created by the work experience in completely different occupations than the one observed (notably in student jobs such as waiters, sales assistants or security guards). This is especially important in early careers, when the relative length of work experience episodes in different occupations may be important in comparison with the experience in occupations similar to the one observed. We remove the few outliers having mentioned more than 7 years of experience at wave 8 and more than 11 years at wave 9. Median work experience is 47 months for men and 49 for women in the sample composed of waves 8 and 9 (used for the regressions).

We do not control for other variables such as the occupation or working conditions. These variables are posterior to the choice of education and directly influenced by it (the choice of a vocational track pre-determines, to a considerable extent, the choice of occupation and working conditions). Including them would mean that we run the risk of over-controlling – or controlling away – the effect of education on wages. We only include the fact of having achieved a degree at the tertiary level of education, because this is part of the educational achievement.

### 4.5.3 *Matching method*

As mentioned previously, we use a matching design. This method aims at comparing – by matching – individuals with the same characteristics (here: school abilities, social origin, etc) but who differ with respect to the element of interest (here: the type of education). The effect of the treatment (here: type of education) is thus calculated not between individuals having nothing in common, but between individuals having similar characteristics.

We use entropy balancing, a specific method of matching using a reweighting scheme (see Hainmueller 2012). We use this distance method and not an exact matching procedure because some of our matching variables are continuous (reading score and maturity rate in the canton) and creating categories to find “exact twin” (comparison of individuals being exactly the same regarding the variables used for the matching) is less precise than keeping the entire information from continuous variables. The entropy balancing presents the advantage of keeping the entire sample for the analyses by attributing a weight to each observation based on the distance with other observations. With this method, we compare the sample of holders of vocational education to a simulated sample of holders of general education. This simulated sample is calculated on the base of the existing sample, weighted with the variables selected for matching. These variables are: school abilities measured first with the reading score in the Programme for International Student Assessment (PISA) test and the track of lower-secondary school<sup>6</sup>; respondents’ social origin based on fathers’ and mothers’ level of education measured with the International Standard Classification of Education (ISCED) recoded to avoid small categories (1-2-3; 4-5; 6); migration background (whether the respondent arrived before the age of 5 or was born in Switzerland as compared to those who arrived later); cultural/geographical context, measured using the canton’s maturity rate –

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<sup>6</sup> At the moment of the first wave (2000), most Swiss cantons used a tracking school system at the lower-secondary level (22 of the 24 cantons surveyed – 6 cantons with two tracks, 14 cantons with three tracks, and 2 cantons with four tracks).

separately for men and women – in 2000, the year when the respondents had to choose their upper-secondary educational track. In the appendix, we present the sample characteristics before and after the matching (Table A8.8).

We do a robustness check using another distance method of matching, the nearest neighbours from propensity score matching (for more details, see Heckman et al. 1997, Dehejia and Wahba 1999). Contrary to the entropy balancing, the entire sample has not been retained with this method; only the treated individuals (holders of a vocational degree) and the non-treated ones (holders of a general degree) who are close enough to the treated ones in terms of the characteristics that we used for matching are retained.

#### 4.5.4 Regression model

Our model analyses the effect of the type of upper-secondary education (general or vocational) and work experience on wage. Since it is possible that the effect of work experience differs for holders of vocational and general education we also include an interaction between these two variables. We measure these effects by estimating the following regression model:

$$y_i = \beta_1 + \beta_2 \text{voc}_i + \beta_3 \text{experience}_i + \beta_4 \text{voc}_i * \text{experience}_i + \epsilon_i$$

We add the variable *tertiary* (the fact of having or not a tertiary level of education) as a control variable, as well as the variable *gender* (*male*) to test our third hypothesis. To catch the full picture, we also introduce the interaction between those variables and the main ones in our model. The assumption of a linear link between experience and wage is based on theory, and the fact that our data cover the early careers only (the effect of experience on wages during the entire career is usually modelled with experience squared). During this moment of the career, we expect wages to grow linearly with experience, without the possibly curvilinear

effect of experience during the last part of the career. We present in the appendix (Figure A8.12) the plots of hourly wage depending on the experience.

Our panel data contain repeated measurements of the same individuals over time. Because we need to apply the weights produced by matching, we use a mixed model – and not only a random effects model. The structure of the dataset does not enable us to follow the individuals' earnings month by month, or even year by year. However, if we observe higher overall wages for more experienced workers, we can deduce that experience pays off. We use the term experience payoff rather than wage growth because we mainly observe the overall effect of experience on wage rather than the evolution of each respondent's personal salary. We subsequently interpret the coefficient of *vocational* as the difference of initial wage between holders of vocational versus general education, and we add the coefficients of *experience* and *vocational\*experience* to obtain the wage returns to experience for holders of VET. The experience payoff of holders of general education is the coefficient *experience*.

#### **4.6 Selection into vocational or general education**

After the end of compulsory school, youth are (self-)selected into the vocational or general track. As previously mentioned, this selection is not random, but linked to factors such as school abilities, social origin, and context. Before taking into account this selection in further analyses, we present in Table 4.2 the link between school track, reading score, socio-demographic characteristics and the type of upper-secondary education achieved.

Table 4.2: Likelihood of holding a vocational upper-secondary degree (in comparison with a general one), linear regression

	coeff	standard error
<b>School abilities</b>		
PISA score (reading)	<b>-0.002</b>	(0.000)
Track: - pre-gymnasial		
- extended academic requirements	<b>0.360</b>	(0.020)
- basic academic requirements	<b>0.364</b>	(0.027)
- no (formal) tracking	<b>0.124</b>	(0.039)
<b>Origin and context</b>		
ISCED of the father: 1-2-3		
4 and 5	-0.005	(0.025)
6	<b>-0.142</b>	(0.025)
ISCED of the mother: 1-2-3		
4 and 5	0.014	(0.024)
6	<b>-0.065</b>	(0.025)
In Switzerland before 5	-0.055	(0.041)
Maturity rate in the canton	<b>-0.012</b>	(0.001)
Constant	<b>1.558</b>	(0.080)
Adjusted R2		0.342
N		2257

TREE, individuals observed in waves 8 and 9, independent variables from wave 1  
 Dependant variable: general education=0, vocational education=1

We observe a significant effect of the reading score: students with higher reading scores are more likely to achieve general education than vocational one. The coefficient is not easy to interpret, with a score running from 253 to 791. We make it easier to interpret with a transformation: a move from centile 25 (score 494) to centile 75 (score 595) increases the likelihood of getting a general degree by 16 percentage points ( $101 \cdot 0.002$ )<sup>7</sup>. School performance is also presented in terms of track at compulsory school, the variable having the larger effect on the (self-)selection into vocational or general education. With the most demanding track (pre-gymnasial) as the category reference, we can observe that the likelihood of obtaining a vocational degree is 36 per cent higher for students who finished compulsory

<sup>7</sup> Since the dependant variable is binary, we can interpret the coefficient from the linear regression as percentages.

school in less demanding tracks (extended academic requirements and basic academic requirements). Even when controlling for reading abilities and school track, both influenced by social origin, we still find a significant difference in the likelihood to follow a vocational track depending on the level of education of the parents. Children from parents with a higher level of education (ISCED 6) are more likely to follow the general track than children of parents with a lower level of education (ISCED 1, 2 or 3). The effect is stronger for the level of education of the father (14 per cent) than the mother (6 per cent). Finally, we see the importance of the context. With similar school abilities and social origin, students from cantons where the maturity rate is higher tend to be more likely to achieve a general degree. While the maturity rate runs from 7.6 to 32.7 per cent depending on the canton and gender, a move from centile 25 (13.4 per cent) to centile 75 (22.1 per cent) increases the likelihood to get a general degree by 10 percentage points.

#### **4.7 Labour market situation after general or vocational education**

Since both apprenticeship and baccalaureate school have a duration of around 3 to 4 years, upper-secondary qualifications are achieved at the age of 21 for most of the respondents, which corresponds to wave 5 of the TREE data. We thus show in

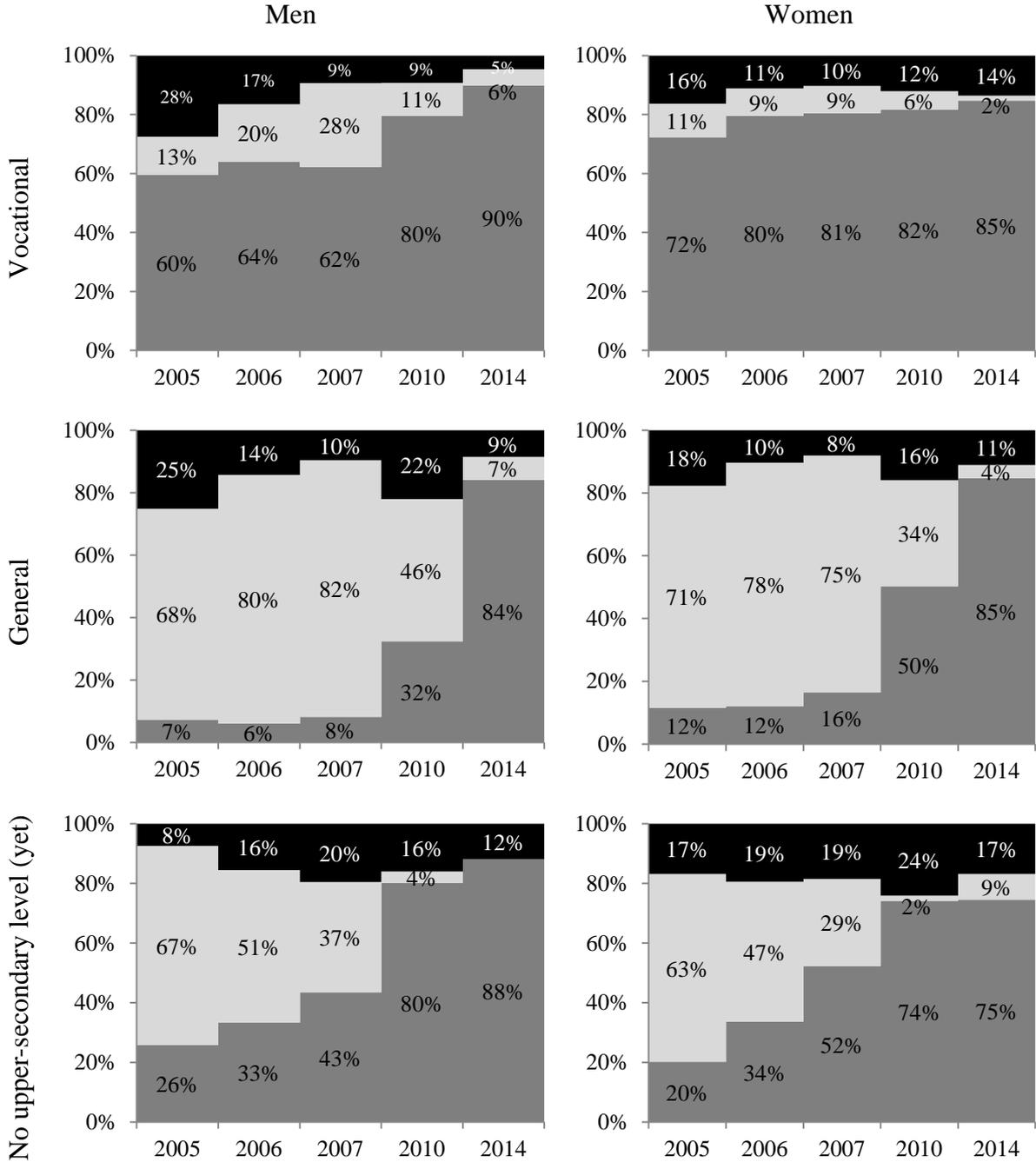
Figure 4.1 the situation on the labour market from wave 5 to wave 9 which roughly correspond to ages 21 to 30. The results are split by the type of upper-secondary education (general versus vocational) and gender.

Four years after the end of compulsory school (in 2005), between 60 per cent (men) and 72 per cent (women) of holders of vocational education are working as the main occupation. This rate increases over time to 90 (men) and 85 (women) per cent in 2014 (age 30). In parallel, the proportion of individuals who are still in education gradually falls from 13 (men) and 11 (women) per cent in 2005 (age 21) to 6 (men) to 2 (women) per cent in 2014.

Figure 4.1: Labour market situation of men and women by type of upper-secondary education.

Wave 5 = 2005, average age: 21  
 Wave 9 = 2014, average age: 30

- Work (minimum of 8 hours per week)
- Education
- Other (internship, travel, unemployment...)



TREE, waves 5 to 9 (2005-2014) with population weights

Around 30 per cent of young men continue their education after the end of their apprenticeship (age 23). This rate is more than two times lower for women (9 per cent). Right after their apprenticeship, men are also overrepresented in the category “other” which signifies that they are neither in education, employment, or training (category called “NEET”) (28 per cent). One explanation is that some of them are doing the compulsory military or civil service (compulsory for men only in Switzerland). In contrast, continuing education after the upper-secondary degree is common after general education. This is the case of around 70 per cent of this group at wave 5 (age 21) and even 80 per cent two years after. At age 30, a large majority (85 per cent) of them has finished their education and are working. If the situation is similar for men without upper-secondary degrees, the employment rate of women without such a degree is lower (75 per cent).

After the end of upper-secondary education, some of the respondents obtain a tertiary degree of education. Figure A8.13 in the appendix shows that it is rare to get one before the age of 23 (wave 7)<sup>8</sup>. However, at the age of 26 (wave 8), 45 per cent of men and 55 per cent of women who had done general upper-secondary education had obtained a tertiary degree. This proportion further rises to 66 (men) and 74 per cent (women) at the age of 30. Note that also among respondents who had initially done upper-secondary vocational education, the share with tertiary education is substantial: 35 (men) and 23 per cent (women) at the age of 30. While the proportion of women who get a tertiary education is higher than that of men after the general track, it is around a third smaller for women than men after the vocational track.

#### **4.8 Hourly wage and work experience**

Only a small – and possibly selective group – of holders of general education declare their main status to be in paid work before wave 8. Consequently, our regression model only

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<sup>8</sup> Note that due to implausible results obtained with population weights, we used the nonresponse correction weights only. This means that those results are representative for the sample, but not for the population.

includes waves 8 and 9. These two waves also correspond to the moment when most of the young adults finished tertiary education, which gives us the opportunity to control for this variable. We present in Table 4.3 the effect of a given type of upper-secondary education, work experience, gender and the fact of having achieved or not a tertiary degree on (log) hourly wages. We present this model without matching, and with two different types of matching: entropy balancing and nearest neighbours propensity score matching.

Table 4.3: The effect of the type of education and experience on wages (linear regression coefficients on log hourly wages)

	Without matching		Matching entropy balancing		Matching Nearest neighbours	
	coeff.	robust std. err.	coeff.	bootstrap std. err.	coeff.	bootstrap std. err.
vocational	<b>-0.036</b>	(0.012)	-0.028	(0.020)	-0.023	(0.378)
experience	0.002	(0.002)	0.002	(0.003)	0.003	(0.003)
male	<b>0.064</b>	(0.010)	<b>0.073</b>	(0.009)	<b>0.069</b>	(0.011)
tertiary	<b>0.154</b>	(0.012)	<b>0.128</b>	(0.018)	<b>0.109</b>	(0.022)
constant	<b>3.351</b>	(0.015)	<b>3.352</b>	(0.028)	<b>3.348</b>	(0.037)
N observations	2257		2257		2150	
N individuals	1679		1679		1593	

TREE, waves 8 and 9 (2010, 2014), nonresponse correction weights

Bootstrapping: 2000 replications; Number of nearest neighbours: 10

Variables used for the matching:

Abilities: track, reading score in PISA test

Origin: arrival in Switzerland after the age of 5 (yes/no), isced of the father and of the mother

Regional context: maturity rate for men/women in the canton in 2000 (continuous)

Note: Bold is statistically significant at  $p < 0.05$ ; standard errors in parentheses.

The main difference between the simple model with and without matching is the larger confidence interval of the coefficient for the type of education in the model with matching, which has as a consequence that the coefficient is not significant anymore. This means that when taking selection into account, the difference between holders of vocational and general upper-secondary education (that is, lower hourly wage for holders of vocational education) disappears. The other effects are rather stable: higher hourly wages for men of about 6 and 7

per cent in comparison with women<sup>9</sup>, and higher hourly wages for holders of a tertiary level of education between 11 and 15 per cent in comparison with holders of upper-secondary education. This table also shows us that the type of matching procedure has little effect on the results.

The link between education, experience and wages is complex, especially during early careers. As a consequence, we need to investigate not only the simple effect of our variables on hourly wage, but also their interactions. Since the effect of experience on wage may differ regarding not only the type of upper-secondary education, but also gender and the fact of having achieved or not achieved a tertiary level of education, all the possible interactions between those variables are important. Such a model is difficult to interpret; as a consequence, we show in the appendix the table presenting all the coefficients (see Table A8.9) and present here the results graphically, to ease the interpretation.

We plot in Figure 4.2 the hourly wages predicted by the full model for holders of vocational and general upper-secondary education by work experience. Consistently with the simple model presented in Table 4.3, we find no significant difference between hourly wages of holders of vocational and general education at their entry into the labour market. Furthermore, the predicted hourly wages after several years of experience are also not significantly different for holders of vocational and general education for men at the two different level of education (upper-secondary and tertiary), and for women with a tertiary level of education. However, we observe significantly higher wages for women with a general upper-secondary level of education in comparison with women with a vocational one after 72 months (six years). Due to large confidence intervals, we see no other significant difference between holders of vocational and general education. To directly observe the difference between vocational and

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<sup>9</sup> To get the percentage correspondence of the log income increase, we take  $\exp(\text{coeff})-1$ .

general education, we present the average marginal effects of vocational education on hourly wages by work experience in the appendix (see Figure A8.14).

Figure 4.2: Predicted hourly wages for holders of vocational and general upper-secondary education by months of work experience and gender

Figure 4.2a: no tertiary degree

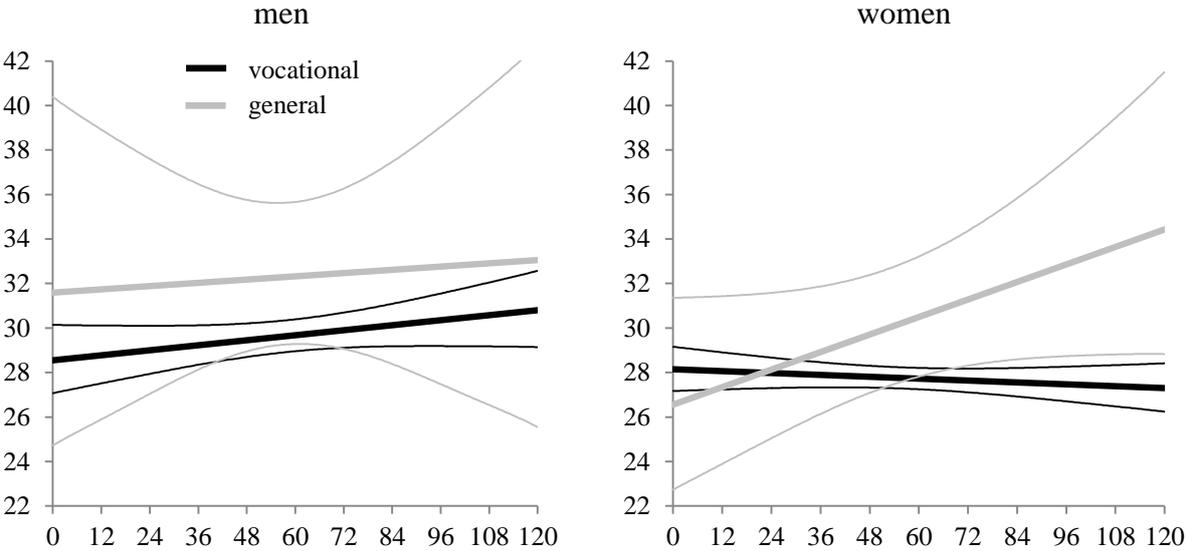
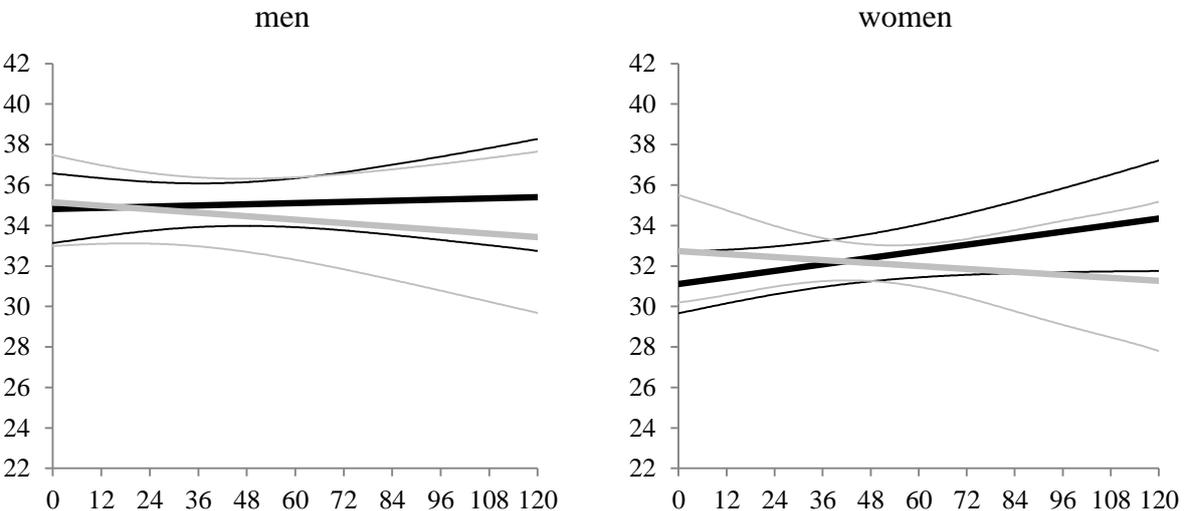


Figure 4.2b: with a tertiary degree



This figure is based on the models shown in Table A8.9 (full model with entropy balancing matching) and shows 95% confidence intervals  
 TREE, waves 8 and 9 (2010, 2014), nonresponse correction weights

## 4.9 Discussion

Our first hypothesis expects that workers with VET have a higher salary than those with general education at their entry into the labour market. Our results do not support this hypothesis: predicted hourly wage for zero experience is not different for holders of vocational and general education, neither at the upper-secondary level nor at the tertiary one.

On the other hand, our results partially support the second hypothesis, arguing that the wage returns to experience are greater for workers with general education than for those with vocational education. This hypothesis is indeed supported for women with an upper-secondary level of education only, but not for the other categories (men at the upper-secondary level or tertiary level and women at the tertiary level). After six years of experience, women with general upper-secondary education have significantly higher hourly wages than women with vocational upper-secondary education. This result is in line with the results from Cörvers et al. (2011), who found higher wages for holders of general education with six years of experience. Note that we observe the opposite tendency for workers with a tertiary level: wages of holders of a general degree tend to become smaller than those with a vocational one while work experience increases, especially for women. While this difference is not statistically significant in our results, this effect would be worth further investigation.

Our third hypothesis is rather complex, arguing that relative to vocational education, general education gives better wage perspectives at the entry into the labour market for women than for men. In other words, we expect that the difference between holders of general education and vocational education is smaller for women than for men. Our hypothesis is not supported by our results, since we found no significant differences between hourly wages of holders of vocational and general education at their entry into the labour market for either men or women. However, we observe larger experience returns on wages for women with general

education than vocational ones, which shows that the effect of the type of education on wages is indeed different for men and women during early careers.

The non-confirmation of hypotheses one and three suggests the possibility that vocational and general education provide similar hourly wages during early careers once we take selection into account. This seems to be the case with our data: in the simple model without interaction (Table 4.3), the significant negative effect of vocational education on hourly wage disappears while using the matching method.

To understand better returns to vocational and general education, we could split tertiary education also into vocational and general education. However, we do not do it, since the distinction between vocational and general education is less clear at the tertiary level than at the upper-secondary one. Universities of applied sciences are a good example of education which mixes some general disciplines with applied ones, preparing students to specific occupation such as nurse or engineer, for example. Architects are also prepared for a specific occupation, while most students from the university are not. Tertiary education is in most cases not strictly vocational or general.

#### **4.10 Conclusion**

This paper addresses the recent debate about the returns to vocational and general education (see notably Forster et al. 2016, Hampf and Woessmann 2017, Hanushek et al. 2017), suggesting that vocational education is associated with higher entry wages, but more modest wage increases. Its main contribution is to directly address selection by using longitudinal data from a homogenous youth cohort and to match individuals in their last year of compulsory schooling (and thus before they choose to continue their education in the vocational or the general track) on the basis of their school potential, social origin and regional context. The TREE data and matching design thus offer the opportunity to go one

step further in studying the returns to vocational education, with hard-to-get information such as school abilities and social origin being measured before the (self-) selection into the vocational or general track takes place.

This paper has compared the evolution of wages during early careers between holders of vocational and general upper-secondary education. Contrary to our expectation, we found no difference between hourly wages of holders of vocational and general upper-secondary degrees at the entry into the labour market. Those results suggest that while taking selection into account, the type of education is not a determinant of wages during the first years of the career. The second main finding is the significantly higher hourly wages, after six years of work experience, of women with a general upper-secondary degree in comparison with those with a vocational one. This result highlights different experience returns on wage depending on the type of education for women. However, it is important to mention that this effect is visible for women with an upper-secondary level of education only. For those with a tertiary degree of education, we find no significant difference in experience returns on wages depending on the type of education.

From those results, we conclude that it is important to take into consideration, in the debate about the advantages and disadvantages of vocational and general education, the issue of selection, the differences between men and women in interactions with the type of education, and the possible different outcomes depending on the type of education at the upper-secondary and tertiary level.

Finally, we want to acknowledge some limitations of this article. While our quasi-experimental design helps us to deal with the issue of selection bias, it does not solve it completely. It is important to remember that while matching can emulate a quasi-experimental design, it does not deal with unobservable characteristics such as, for example, motivation of

the respondents. Furthermore, abilities are measured with the literacy score and lower-secondary school track, which give us an idea of school abilities, but not the full picture.

Our data also come with their limitations. They enable us to observe respondents only until the age of 30, and as a consequence the effect of each type of education on the entire working trajectories cannot be addressed (yet). The large confidence intervals for the two types of education leave the door open to the possibility of statistically non-significant results due to a too low number of observations – or simply that wages do not differ significantly between youth with similar school potential with either vocational and general education.



## **5. Employer preferences for vocational over general education: evidence from an employer survey experiment<sup>1</sup>**

### **5.1 Introduction**

How employers judge vocational education as opposed to general is a question that has not received a great deal of attention in the literature. Employers may have fixed perceptions about the type of education itself: an employer may prefer candidates with vocational education because they are able to begin working with little additional training, due to their technical knowledge about a specific occupation and the likelihood they have had in-firm experience before entering the labour market. General education, on the other hand may be a signal of higher academic attainment, better potential and more flexibility as a worker – possibly a better long-term investment, even if providing less value in the short term.

How these competing logics of hiring play out may differ based on other aspects of candidate profiles. For example, so-called “feminine” skills, such as languages, interpersonal and empathic skills as well as organisational skills are more seen as the domain of general education, while “masculine” technical and business skills are the purview of vocational education (Cejka & Eagly 1999; Gorman 2005; Castilla 2012). Additionally, job- and firm-specific skills may be valued less for women than men, given that these skills are less easily transferable and that career interruptions are more likely to affect women than men. This may lower the return on investment for an employer of a young woman, and result in less well-developed skills in the case of an older woman (Estévez-Abe 2005). These factors may lead to stronger preferences for vocational education for male candidates, and general education for female candidates.

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<sup>1</sup> Article written with Patrick McDonald

Gender is not the only characteristic that may affect perceptions of vocational versus general education. Age may be relevant as well. Older workers with vocational education may be seen differently to younger: whereas workers in the early stages of their career with vocational education may represent a good prospect to an employer because they will be productive from the start, older workers with vocational education may be seen as less-desirable profiles as they may prove less adaptable to changing working conditions and job requirements, their skills possibly being outdated.

Our interest lies in exploring the differences in employer preferences for either vocational or general education. As well as the overall effect of the type of education on recruitment – do employers prefer employees with general or vocational education? – we are interested in the effect of the interactions of education with gender on the one hand and age on the other: is a certain type of education of greater benefit for men or women, older or younger applicants?

Addressing these questions from a labour market demand-side viewpoint is an important empirical contribution of this research. To do so, we analyse a factorial survey experiment (also known as vignette studies), where 714 human resources professionals in Switzerland indicated for fictive CVs the likelihood that they would be invited to a job interview (a measure of employability). Each of the CVs varied, amongst other things, on the type of education held by the applicant.

This method has several advantages: first, by implementing an experimental design where all variables are uncorrelated and all inputs are known to the researchers, it should be possible to identify causal relationships between type of education and employment. Secondly, by choosing three jobs where it is common in the Swiss labour market for candidates to hold either vocational or general education, we nullify the problem of differences being due to occupational segregation rather than educational differences. And finally, by targeting

employers directly, we tap into the demand-side of the labour market and can directly measure employers' intentions, rather than making inferences about their behaviour through labour market surveys.

Our article proceeds as follows. First, we discuss the literature regarding type of education, gender and age, leading us to our hypotheses for analysis. We next describe our data and method, followed by the results of our analysis. We conclude with a discussion of our results, which show a more nuanced picture of the topic than expected.

## **5.2 Theory**

### *5.2.1 Vocational and general education*

In most OECD countries, two types of education are offered at the upper-secondary level and beyond: vocational and general education. The former aims to teach specific skills about a given occupation, usually with practical training forming an important part of the process. This type of education can be undertaken in vocational schools or within firms and organisations, or a mix of both in so-called “dual systems”, with some (usually most) days spent in the firm, and some at school, or organised yearly with extended periods spent in each. After the end of the training, students should be ready to work directly in the occupation they have learned.

General, or academic, education is closer to compulsory school in terms of content, with a focus on general skills such as languages, mathematics, sciences and so on. It does not prepare students for a specific occupation, instead focusing on general knowledge applicable in a range of contexts. The general track at the upper-secondary level is the usual track leading to university – itself considered a form of general education: although organised by domain, it still teaches students more about knowledge than about practice. That said, other

forms of tertiary education tending more towards the vocational, including teaching, engineering, and even medicine, are equally prevalent in universities. In parallel, professional vocational education and training (PET) – vocational education at the tertiary level, is also becoming more common in OECD countries (OECD 2015).

Different advantages are presented by defenders of each type of education. Due to its strong focus on practical skills, vocational education prepares its graduates for labour market entry (Shavit and Müller 1998; Müller and Gangl 2003; Breen 2005). They can take up a job immediately after the end of their formal education without further training, thanks to the fit of their studies with labour market demand and the occupation they will be undertaking. On the contrary, holders of general degrees, especially at the upper-secondary level, seem to face more difficulties entering the labour market, and receive lower salaries for their work (Korber and Oesch 2016). Their profiles may seem less attractive than experienced workers, considering their lack of specific skills. However, they may be better prepared to face the long-term transformations of the labour market which impact most careers. According to Goldin (2001), general skills are more adaptive and flexible, giving those with a general education a better chance to move from one occupation to another one.

Employers may exploit this general-vocational dichotomy as a signal when seeking to recruit new workers. Signalling theory, developed by Spence (1973), argues that when important information and characteristics (about a worker's productivity, for example) cannot be observed directly, they must be inferred by information – signals – that can be. In labour market terms, this means the important unobservable characteristics of a prospective employee – their productivity, aptitude, and knowledge of a given occupation – must be inferred from information that is generally present in CVs, such as work experience and level and type of education. Here, for the reasons outlined above, vocational education is likely to signal an ability to immediately step into a job, while general education may signal that more

job-specific training is required initially. It may also indicate a higher level of adaptability to changing work conditions in the long term.

Education as a signal for employers, including vocational/general differences, has been studied in the European context using both survey experiments (Biesma et al. 2007; Di Stasio 2014; Di Stasio and van de Werfhorst 2016) and standard survey data (Bol and van de Werfhorst 2011). The consensus of these papers is that the institutional context matters greatly to the impact of the type of education: in Italy, vocational education is poorly linked to the labour market and not a powerful signal for employers; therefore, it is not as valuable as general education (Di Stasio 2014). Likewise, in the UK, where a general education at a prestigious university is likely to prevail over a lesser-known tertiary institution that may be more vocationally-oriented, education is seen as a signal of trainability rather than being able to work immediately and thus general education appears to be preferred (Di Stasio and van de Werfhorst 2016). On the other hand, in countries with strong vocational systems (notably the Netherlands and Germany) a vocational degree seems to offer a stronger signal of employability than a general degree (Bol and van de Werfhorst 2011, Di Stasio and van de Werfhorst 2016).

Given the position of Switzerland as a strongly vocational-based system, we would expect the signalling power of vocational education to prevail, especially in jobs where both vocational and general education are normal paths for entry. We therefore propose a first hypothesis:

*H1: For the same level of education, employers prefer applicants with a vocational education over general education for a job where both types of education are acceptable.*

### *5.2.2 Men and women on the labour market*

While we can expect an overall preference for vocational education amongst employers in Switzerland, we should also expect that this preference may vary based on other

characteristics of job applicants. Notably, the gender and age of a job candidate are likely to interact with their type of application in the recruiter's decision-making process. Concerning gender, it is clear that the differing experiences of men and women on the labour market concern also their type of education, with vocational and general education taken up at different rates and in different fields by boys and girls (Jonsson, 1999). Estévez-Abe (2005: 190-191) argues that this is largely a consequence of men's and women's differing life-courses: as vocational education is occupation-, and often firm-specific, it makes sense for an employer to invest in a worker with vocational education only if they expect this worker to remain long-term. This is often not the case with women, who are more prone to spells of employment inactivity in order to engage in child-rearing – especially in conservative family and welfare-state settings such as Switzerland (Charles et al. 2001). As such, a woman with vocational education is likely to be considered higher-risk than a man with a similar profile, or than a woman with general education, and thus less likely to find themselves with a job offer. Time out of the labour market also means less opportunity for further on-the-job training and retraining to remain up-to-date with evolving occupations, thereby compounding the disadvantages for vocationally-educated women as compared to those with general education, who may be expected to adapt more quickly based on the generality and flexibility of their skills. This effect is of importance in our study, which involves employers judging profiles who are not applying for their first job. This means that any firm-related vocational education is not likely to be considered as useful, and any time out of work – real or assumed on the part of the employer – is likely to be of greater detriment to women with vocational education.

Stereotypes held by employers towards workers may also play a part in their differing judgements of male and female job applicants based on their type of education. Stereotypes associated with men are linked to agency, including achievement-orientation, inclination to

take charge, autonomy, and rationality (Heilman 2012), while stereotypes associated with women are linked to communality, including concern for others, affiliative tendencies, deference, and emotional sensitivity. Additionally, “business skills” and “quantitatively oriented” tasks are stereotypically masculine (Gorman 2005), while reading and language-related tasks are stereotypically feminine (Retelsdorf et al. 2015). If these “male” qualities can be associated with vocational education and skills, the “female” qualities are clearly linked to general education. Overall, therefore, it seems plausible that typically masculine stereotypes fit better with vocational education, while feminine ones fit better with general education, and that employers will react to job applications accordingly.

Evidence on gender differences in type of education is mixed. On the one hand, Meer (2007) shows that in the US men benefit more from vocational relative to general education than women, and of the technical track in particular, in terms of income. Using the same data, the National Education Longitudinal Study (NELS), Ainsworth and Roscigno (2005) find a higher risk of unemployment for women after vocational education than for men, controlling for school achievement and educational expectations. On the other hand, Shavit and Müller (2000) find a smaller negative effect of vocational education on the occupational prestige for women than for men. Similarly, Brauns et al. (1997) find a larger positive effect of vocational education for women in Germany, in terms of the relative and absolute social class position attained. In terms of earning, Lewis et al. (1993) present results showing a positive effect of vocational education for women, and for women from disadvantaged socio-economic origins in particular. Finally, Boesel et al. (1994: chap. 6) write in a review of the literature regarding the United States that women with vocational education have both higher income and a higher employment rate than both women with general education and men with vocational education. Gender, then, may be seen as a salient point by recruiters when judging the type of education of applicant profiles. Although the preference for type of education based on gender is likely

to be most strongly expressed between occupations than within them, in the Swiss context, with conservative family norms and welfare state (Charles et al. 2001) we nevertheless expect an effect within occupations. This leads us to a second hypothesis:

*H2: Employers prefer profiles of women with general education and profiles of men with vocational education in comparison with women with vocational education and men with general education.*

### 5.2.3 Age and education

The returns to vocational and general education are likely to differ across the career. For a new graduate, a vocational education may be an advantage due to occupation-specific training facilitating entry into the jobs market. In contrast, a general education may be of less value in the short run because, in the absence of occupation-specific education, further training is likely to be required before a young worker can take on a job fully. However, towards the end of the career, the effect may well reverse: an older jobseeker with occupation-specific education will be limited in their search and may find his or her qualifications and skills out-of-date, thus reducing the chance of finding a job (Hanushek et al. 2017). On the contrary, the flexibility provided by general education may present an advantage in the long run, as older jobseekers have skills that may be adapted to many different circumstances and can possibly choose from a wider range of jobs (Goldin 2001). These effects are likely to be strongest for older workers changing occupations entirely, rather than simply changing jobs. However, given that many occupations themselves also change over time, we can reasonably expect a similar effect for those changing jobs but remaining within the same occupation. This is particularly likely after a spell of unemployment: jobseekers with vocational education are more likely to require more detailed catch-up training to bring themselves in line with current practices than someone with general education who may be more used to adapting their skills based on the context.

Empirical evidence generally supports this argument. As demonstrated by Hanushek et al. (2017, but already in 2011 in a widely cited working paper) and replicated by Foster et al. (2016) with a different dataset, analyses of cross-sectional data show a decreasing advantage of vocational education on employment over the career, turning into a disadvantage. The moment when the advantage reverses in favour of general education varies in the two papers from the age of 30 to 40. While this trend is seen in all countries analysed, Hanushek et al. find a larger effect in countries with a stronger vocational system, such as the Netherlands, than those where a clear majority pursue general education. This last point is however not confirmed by Forster et al. (2016).

In terms of employer preferences, we can imagine that the combined signal of type of education and age will be in line with the results of the supply-side literature on workers. Employer-side studies have not yet, to our knowledge, studied this question explicitly. However, factorial studies on education that focus on new graduates (Di Stasio 2014, Di Stasio and van de Werfhorst 2016) and younger workers who experience spells of unemployment or early-career job insecurity (Imdorf et al. 2017; Shi et al. 2018) show that vocational education is a positive signal in new labour market entrants only if the institutional context places strong importance on vocational education. In addition, a number of factorial studies in the Netherlands have focused on the conditions under which employers are willing to keep on or re-hire workers past retirement age (e.g. Henkens et al. 2009, Mulders et al. 2014). Amongst many other factors they find that flexibility and adaptability of older workers is of importance to employers when considering keeping such profiles on or re-hiring them after retirement age. These are attributes most associated with general education, suggesting that general education may be more valued in older worker profiles than vocational. Based on this we propose a third hypothesis:

*H3: Employers prefer younger workers with vocational rather than general education, but this preference reverses as worker age increases.*

### **5.3 Data and Method**

#### *5.3.1 Institutional context*

In Switzerland, vocational education is highly developed at the upper-secondary level with around two thirds of a given youth cohort following this track after compulsory school (68 per cent in 2016<sup>2</sup>). Most of the students following the vocational track do so by completing a firm-based apprenticeship, a kind of training closely linked to the labour market. A federal diploma of vocational education and training is delivered at the end of the three or four years of the apprenticeship. The other third of a youth cohort follows a general track, mostly in baccalaureate schools. It takes between 3 to 4 years to obtain the *maturity* diploma, the general upper-secondary diploma. These two diplomas are thus at the same level (upper-secondary) but have a different type (vocational versus general). They are both common and well-known in Switzerland.

Vocational and general tracks also co-exist at the tertiary level. Tertiary vocational education (also known as professional education and training, PET) is taught in parallel with paid-work, which most of the time has to be in the same domain as the training. An (advanced) federal diploma of higher education, obtained after vocational tertiary education, opens doors to different occupations than vocational education at the upper-secondary level, or to a higher level of responsibility in similar occupations. General education is taught in universities, universities of applied sciences, and federal institutes of technology and is recognised by bachelor and master degrees. The Swiss upper-secondary and tertiary educational system is summarised in Figure A8.15 in the appendix.

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<sup>2</sup> Federal Statistical Office website

### 5.3.2 Data

We study the question of whether employers prefer vocational or general education with a factorial survey experiment amongst human resources managers in Switzerland. Factorial surveys (also called vignette studies) involve presenting respondents with a series of fictive scenarios (*vignettes*) that vary the *levels* of several different characteristics (*dimensions*), with respondents asked to make a judgement on each vignette (Jasso 2006, Auspurg and Hinz 2015). This type of survey has seen an increase in use for labour market sociology questions, often in the form of worker profiles or CVs which are evaluated in terms of likelihood to be invited for a job interview, potential salary, or fit for a specific job, for example (Liechti et al. 2017, Oesch et al. 2017; Shi et al. 2018). Factorial surveys present a number of specific advantages for the study of labour market sociology (McDonald 2017): first, they can be targeted directly at employers, meaning they plug a knowledge gap of supply (employer) side information. Factorial surveys are also less prone to social desirability bias, as they facilitate a more subtle method of asking questions about sensitive topics, and with several dimensions changing constantly it is difficult for respondents to focus on one sole characteristic or pinpoint a controversial research interest. Second, factorial survey design permits the researcher to control all the information respondents receive. By drawing *D-efficient* samples, where all dimensions are orthogonal, all variables will be uncorrelated (Auspurg and Hinz 2015). Moreover, unobserved confounders are eliminated. These two factors mean that factorial surveys fulfil the requirements of experimental design and therefore it should be easier to estimate causal effects. The drawback of such an experiment design is that they reflect only stated intentions, and not real-world actions or decisions. While this does reduce the external validity of results, there is evidence that behaviour within survey experiments closely mirrors that in real life (Hainmueller et al. 2015).

Our survey took place as a part of the JOBVUL project, itself a part of the Swiss National Science Foundation's NCCR LIVES and On the Move research programmes, where a research team devised a factorial survey to be sent to human resources professionals across the Swiss economy<sup>3</sup>. The web-based survey was sent electronically to the 5,000 members of the Swiss association of human resources management, with responses collected from June to November 2016. 714 responses were recorded, for a response rate of about 16%, which is in line with similar factorial surveys (e.g. Liechti et al. 2017). The respondents were 67% female with an average age of 46. 70% of responses were recorded in German, 30% in French, and respondents generally came from the larger urban areas of Switzerland, with Zurich and Bern particularly overrepresented. Large companies made up over 50% of respondents' places of employment, well above the Swiss average – larger organisations being more likely to run a dedicated HR department. The responses are therefore skewed more towards large, urban organisations with professional human resources departments, a fact which, according to Fuller (2018), may lead to conservative estimates of the actual effects we are measuring, as human resources managers should be trained to avoid judgements based on signals such as gender and age. The gender effect may be further moderated by the large number of female recruiters answering the survey. Despite its skew towards large urban firms, our survey does contain some responses from self-employed managers of small and medium enterprises, and organisations based in rural areas. Importantly, 82% of our respondents reported being actively involved in recruiting in the past 12 months, meaning our survey did indeed target recruitment decision-makers.

The survey was presented to respondents as seeking to analyse differences in hiring practices across Swiss regions. Respondents were presented with a series of vignettes simulating CVs of job applicants for three occupations: accountant, HR assistant, and building caretaker

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<sup>3</sup> The team was led by Professors Giuliano Bonoli and Daniel Oesch, with Daniel Auer, Flavia Fossati, Fabienne Liechti and Patrick McDonald. Further information can be obtained at [lives-nccr.ch](http://lives-nccr.ch) and [nccr-onthemove.ch](http://nccr-onthemove.ch)

(concierge). They were then asked to rate the likelihood that they would invite each profile for a job interview (on a scale from 0 to 10). The survey was framed in terms of job interview invitation rather than likelihood of hiring in order to better simulate the recruitment process – in very few cases will a recruiter make a final decision on filling a vacancy based on the CV only.

The three occupations were chosen because they are common to most companies and many respondents would therefore have had experience in hiring these profiles. They are also gender-neutral jobs: In Switzerland, none are more than 65% male or female (OFS 2016). Critically, in the Swiss labour market context it is normal to see these three jobs carried out by workers with either general or vocational education. The survey has thus far been used to measure the motherhood wage penalty in Switzerland and chances of immigrants to be invited to job interview (see Oesch et al. 2017; Auer et al. 2018). A full summary of the dimensions in the vignettes, as well as example vignettes and a correlation table of the dimensions, are available in the appendix (Figure A8.16, Table A8.10 and Table A8.11).

For the position of accountant, the two education options are at the tertiary level. The vocational option is a federal examination for the Advanced Federal PET Diploma of Accounting, and the general one a university Bachelor of Business Administration. For the position of HR assistant, the two educational options are at the upper-secondary level: a Federal Diploma of Vocational Education as an office clerk (*Kaufmann/frau* in German, *employé-e de commerce* in French) and the general upper-secondary diploma granting entrance to university (*Matura* or *maturité*). We present in the appendix results for the concierge position, as the two education possibilities (compulsory schooling only or a federal diploma of vocational education in commercial building maintenance) are not at the same level, and therefore the profiles with vocational education may be preferred because of the level – and not the type – of education.

The vignettes are made up of 11 dimensions, including gender, type of education, civil status, age, number of children, and work experience. The total vignette universe numbered 5'529'600 vignettes for each occupation, from which we drew a sample, *D*-efficient up to two-way interactions, of 720 per occupation. Not all respondents judged all the vignettes presented to them. However, since the vignette order was assigned randomly to each respondent, all vignettes were evaluated a similar number of times. Once non-responses are removed, and restricting the sample to the 82% active recruiters, we are left with a sample of 537 respondents rating 5674 vignettes (an average of 10.6 vignettes per respondent) on the likelihood to be invited to a job interview. These vignettes form our analytical sample.

### 5.3.3 *Method*

Our dependent variable is the chance to be invited to a job interview on a scale from 0 to 10, while our independent variable is binary and distinguishes the type of education: vocational or general. We include an interaction term between the type of education and gender because we expect a different effect of the type of education depending on the gender, and do likewise for age. Given all the other variables (including nationality, number of children, work experience, etc.) are uncorrelated, no further controls are required. The fact that the different profiles are fully randomised also removes most of the selection bias that often plagues survey-based evidence for educational outcomes. However, we do not present any information about school abilities, which may be assumed by employers to be a key difference between holders of vocational and general education (entering and graduating from general upper-secondary education requires more academic effort in school). We thus cannot exclude that employers do not take this expected selection into account.

Observations are nested by respondents, since each of them rates up to 12 vignettes. Each of them may have a different baseline judgment of CV depending on their own experience as well as the location of the firm and its sector of activity. As a consequence, we focus on the

within-respondent variance and use respondent-level fixed-effects regressions. The regression models are based on the following two equations:

$$y_{ir} = \beta_1 + \beta_2 \text{vocational}_{ir} + \beta_3 \text{female}_i + \beta_4 \text{vocational}_{ir} * \text{female}_i + \epsilon_{ir} \quad (1)$$

$$y_{ir} = \beta_1 + \beta_2 \text{vocational}_{ir} + \beta_3 \text{age}_i + \beta_4 \text{vocational}_{ir} * \text{age}_i + \epsilon_{ir} \quad (2)$$

The coefficient *vocational* informs us on the difference in likelihood to be invited for a job interview between holders of general versus vocational education, the coefficient *female* on the one between men and women, and the coefficient *age* on the difference between the 35-40 and 50-55 age groups. The age dimension contains 5 categories, from 35-55 years. To simplify our analysis, we create two age groups by selecting the vignettes with the youngest (35-40) and oldest (50-55) in the survey, leaving away the intermediary age category. This is not a perfect measurement strategy, particularly given that the two age groups represent neither the very beginning nor the very end of the career for most workers. However, it is nevertheless useful to study the differences between these two points, because it is here that we should see the switch in advantage from vocational and general according to the literature (Korber and Oesch 2016; Hanushek et al. 2017). The interaction between *vocational education* and *gender*, or *age*, respectively, tells us whether the effect of the type of education is the same for men and women, and the two age groups.

## 5.4 Results

### 5.4.1 Descriptive results

We first present the descriptive results from the vignette study. The average rating is 6.9 and differs slightly for each occupation: 7.1 for the accountant, 6.2 for HR assistant, and 7.3 for concierge. Employers' preferences toward the type of education seem to differ depending on the occupation, as presented in Figure 5.1. For the position of accountant, profiles with a

vocational degree have higher chances of being invited for a job interview than those with a general degree (7.2 and 6.9 respectively). For the position of HR assistant, the difference is in favour of profiles with a general degree (6.3 and 6.0). Regarding gender preferences, women are preferred over men for both occupations, but the difference is small for the position of accountant (7.0 and 7.1 respectively) and larger for the position of HR assistant (5.9 and 6.4). Finally, profiles aged 35-40 are more likely to be invited for a job interview than profiles aged 50-55 for both occupations, but the difference is more prominent for the position of HR assistant (6.4 and 6.0) than for the position of accountant (7.1 and 7.0).

Figure 5.1: Mean likelihood of being invited for an interview depending on type of education, gender and age (on a scale from 0 to 10)



Jobvul, descriptive results  
 N (vignettes): 3015

5.4.2 Multivariate results

In a second step, we calculate fixed-effects regressions. Table 5.1 presents the simple models (without interaction) and then the full models with the interaction between the type of education and gender. For the position of accountant, the effect of holding a vocational degree is statistically significant and positive in the simple model (0.415). In the model with interaction, we observe that the effect of vocational education for men, the control group, is positive and statistically significant but smaller (0.235) while for women, it is larger (0.235+0.361=0.597). The effect of gender, however, is not statistically significant in either of

the two models. For the position of HR assistant, the situation is different: we find no effect of the type of education, in either of the two models. On the contrary, we find a statistically significant and positive effect of being a women of 0.449 and 0.495 in the model without and with interaction, respectively. Finally, the interaction between the type of education and gender is not statistically significant.

Table 5.1: Likelihood of being invited for an interview depending on the type of education and gender (on a scale from 0 to 10), with and without interaction effects

	Accountant				HR assistant			
	Coeff	Robust std. err.						
Vocational	<b>0.415</b>	0.094	<b>0.235</b>	0.111	-0.146	0.090	-0.103	0.125
Female	0.032	0.079	-0.156	0.121	<b>0.449</b>	0.078	<b>0.495</b>	0.108
Vocational*Female			<b>0.361</b>	0.159			-0.088	0.163
Constant	<b>6.822</b>	0.063	<b>6.917</b>	0.074	<b>6.034</b>	0.061	<b>6.012</b>	0.073
R <sup>2</sup>	0.023		0.028		0.036		0.036	
N (vignettes)	1487		1487		1528		1528	
N (respondents)	475		475		486		486	

Jobvul, respondent-level fixed-effect regressions

Bold coefficients are significant at the 95 per cent level.

Table 5.2: Likelihood of being invited for an interview depending on the type of education and age (on a scale from 0 to 10), with and without interaction effects

	Accountant				HR assistant			
	Coeff	Robust std. err.	Coeff	Robust std. err.	Coeff	Robust std. err.	Coeff	Robust std. err.
Vocational	<b>0.420</b>	0.094	<b>0.335</b>	0.126	-0.163	0.091	-0.174	0.117
50-55	-0.155	0.086	-0.239	0.124	<b>-0.385</b>	0.081	<b>-0.395</b>	0.110
Vocational*50-55			0.167	0.146			0.021	0.158
Constant	<b>6.913</b>	0.064	<b>6.955</b>	0.080	<b>6.453</b>	0.061	<b>6.459</b>	0.070
R <sup>2</sup>	0.027		0.028		0.028		0.028	
N (vignettes)	1487		1487		1528		1528	
N (respondents)	475		475		486		486	

Jobvul, respondent-level fixed-effect regressions

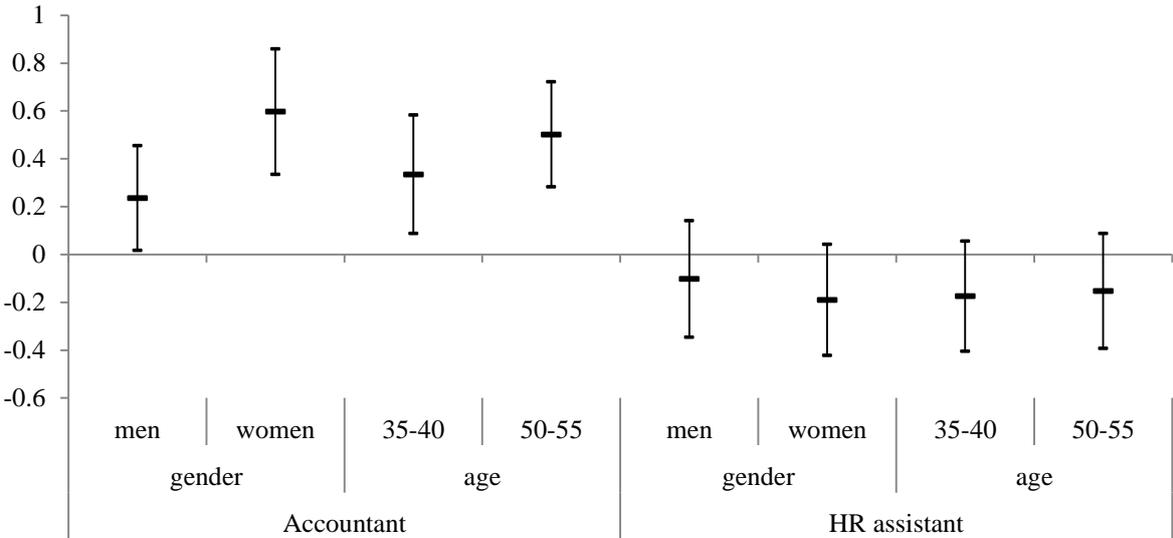
Bold coefficients are significant at the 95 per cent level.

To address our third hypothesis, we present in Table 5.2 the simple models (without interaction) and the full models with the interaction between the type of education and age.

For the position of accountant, the effect of vocational education is again statistically significant and positive in both models (0.420 and 0.335). Both the overall effect of age and its interaction with the type of education are not statistically significant for the position of accountant. On the contrary, we find a difference between profiles 35-40 and 50-55 for the position of HR assistant: the older profiles are less likely to be invited for a job interview (coefficient: -0.385 and -0.395). This effect is the only one which is statistically significant for the position of HR assistant.

To summarize the effect of the type of education, we present the average marginal effects and confidence intervals in Figure 5.2. For the position of accountant, the effect of vocational education is positive and statistically significant for both men and women and for profiles aged 35-40 as well as those aged 50-55. This effect is larger for women and for profiles aged 50-55. However, there is no difference between general and vocational education for the position of HR assistant, in any of the situations (men and women, 35-40 and 50-55). These results are robust when including profiles aged 45 (see Table A8.12 in the appendix).

Figure 5.2: Average marginal effect of vocational education relative to general education on the chance of being invited for an interview (on a scale from 0 to 10)



This figure is based on the models shown in Table 5.1 and (full models) and shows 95% confidence intervals  
 Jobvul, respondent-level fixed-effect regressions

## 5.5 Discussion

Our theoretical framework sets out the case for employers' preferences towards holders of vocational education. Due to an education based on practice and specific skills, these candidates may be seen as immediately more productive and better-prepared for the labour market and, as a consequence, more likely to be invited to job interviews (hypothesis 1). This hypothesis is supported by results for the accountant position: both when controlling for gender and age, holders of a tertiary vocational degree are significantly more likely to be invited for a job interview than holders of a general tertiary degree. Our interactions highlight that this effect is significantly stronger for women. Results from the appendix (see Table A8.13) show that holders of vocational education are also preferred for the occupation of concierge, but the comparison is made with holders of general education at a different level (upper-secondary versus no more than compulsory education). This case acts thus more as a control than as an argument in favour of the hypothesis. Finally, we find no preferences of employers regarding the type of upper-secondary education for the position of HR assistant. Our results thus partially support our first hypothesis.

Our second hypothesis investigates gender differences, arguing that employers prefer profiles of women with general education and profiles of men with vocational education in comparison with women with vocational education and men with general education. Results for the position of accountant support the part of the hypothesis about men. For women, we find the opposite results to those we had expected: women with vocational education are preferred over those with general education – in fact, the preference towards holders of a vocational degree compared to a general one is even stronger for women than for men. Results for the position of HR assistant show no difference between men and women regarding the type of education. Our second hypothesis is therefore not supported by our results.

We note, however, that women are more likely to be invited for a job interview for the position of HR assistant, and less likely for the position of concierge. If our assumption of existing gender stereotypes from employers about occupations is correct, the stereotyping would then take place mainly at the occupation level, and not in the interaction with the type of education. Even in positions not clearly dominated by one or the other gender in the labour market, employers seem to have preferences towards women for office work (HR assistant) and towards men for more physical activity (concierge). This is in line with the expectations of the literature on occupational segregation and stereotyping that argues that women sort themselves into jobs that they can balance with home life and those that require good interpersonal and communication skills, while men will be more strongly represented in occupations that require more manual labour (Cejka and Eagly 1999; Estévez-Abe 2005), and employers seemingly respond to these expectations in their hiring decisions.

Finally, our third hypothesis is about a possible difference for younger and older workers regarding the type of education. We argued that employers prefer younger workers with vocational rather than general education, but this preference reverses as worker age increases. For the position of accountant, we find no effect of age, neither for the simple effect nor the interaction. For the position of accountant, we again find no effect of the interaction between age and type of education. Note that for this position, profiles 50-55 are on average less likely to be invited for a job interview, but this disadvantage is similar for profiles 50-55 with a vocational or general degree. Our third hypothesis is thus not supported by our results.

Our conclusions are not the same for the position of accountant and the position of HR assistant, especially regarding employers preferences towards the type of education. It is difficult to say if this difference is due to the different level of qualification (the position of accountant requires a tertiary level of education while the position of HR assistant requires an upper-secondary one) or if the results are specific to the occupation. Since vocational

education at the tertiary level has a more even balance between practical and theoretical elements, holders of vocational education at the tertiary level may master a high level of both practical and theoretical skills, making them attractive, well-rounded labour market prospects. In terms of signalling, holders of vocational tertiary education may present the advantages of vocational upper-secondary education holders such as high employability and strong occupational skills, but without the possible shortcomings in terms of theoretical skills and school abilities. By graduating at the tertiary level, the signal sent in terms of capability to learn is probably very positive. This tendency seems particularly true in the case of female candidates, meaning obtaining a tertiary education may moderate some of the effects of gender discrimination.

## **5.6 Conclusion**

We examine whether employers express preferences concerning type of education (vocational or general), as well as the variation in these preferences by gender and age. We find a preference towards holders of tertiary vocational education in comparison with general tertiary education for the position of accountant, and similar chances of being invited for a job interview for holders of a vocational upper-secondary degree and those with a general upper-secondary one for the position of HR assistant. Preference towards holders of vocational education is stronger for women than for men for the position of accountant, which is the only statistically significant interaction effect. Regarding the debate about the advantages and disadvantages of vocational education, our article makes a new contribution to the literature by investigating employers' preferences and brings some new evidence to the debate. First of all, we show no systematic preference regarding the type of education from employers for positions where both type of education (vocational and general) are possible paths to employment. However, vocational education seems to be especially attractive for employers

combined with a tertiary degree. Secondly, and contrary to the results from Hanushek et al. (2017), we do not find diminished perspectives for older workers with vocational education. In our study, profiles 50-55 are less likely to be invited for a job interview than profiles 35-40 for the position of HR assistant only. However, older jobseekers with a vocational degree have similar chances to those with a general one for both occupations. While the design chosen (workers being aged 35-40 versus those being 50-55) does not allow us to examine the trend over the full working trajectory, it enables us to present the contrast between two different age groups. Finally, further analyses presented in the appendix show that upper-secondary vocational education has a clear value in comparison with no upper-secondary education, even after several years of experience.

We acknowledge the limits of our research. First, although the three occupations were chosen because they are commonplace across sectors and firms, their even gender split and their accessibility to candidates with either general or vocational education, it is difficult to extrapolate the results presented for three occupations to the labour market in general. Second, given the overrepresentation of large organisations in our sample, we have less access to information about smaller firms, which are likely not to have the same HR departments and processes in place. Fuller (2018) shows that firms without a dedicated HR department show higher levels of gender discrimination than those with one, suggesting our results could underestimate the gender effects and should therefore be considered lower-bound estimates. Thirdly, the two educational options for the position of concierge are not only different in terms of type, but also in terms of level; this means that it can be used as a control occupation only. And finally, readers need to be aware that the answers provided to our factorial survey demonstrate hiring intentions and not behaviour such as sending invitation letters for job interviews.

Despite these limitations, our results give a unique opportunity to address the question of employers' preference towards the type of education, gender, and their interaction, with a design that limits selection bias. Thanks to the vignette study, we have presented profiles which differ only on the variables chosen and no other aspects. Furthermore, there is no collinearity between variables. This design enables us to take into consideration all the information available in the simulated recruitment process, avoid unobserved heterogeneity, and therefore isolate the effect of the type of education itself on the labour market success of employees across education levels.



## **6. Conclusion**

This dissertation aims to contribute to the topic of labour market returns to vocational education over the life course. Through four empirical articles, we present results concerning employment and wages over the career for holders of vocational education in comparison with other groups. We present a summary of the results of the dissertation as well as the main contributions, the limitations of this work and finally, the implications of these results for public policy.

### **6.1 Summary of the results**

We summarise the main results of this dissertation for our two outcome variables, employment and wages, and for women and men separately. To investigate the situation of holders of vocational education over the life course, we proceeded by comparison: we compared vocational education with general education at the same level in chapter 2 for the upper-secondary level, and in chapters 4 and 5 at the upper-secondary and tertiary level. In chapter 3, we compared holders of vocational education with holders of lower education. We present the main results for each of those comparisons in Table 6.1.

First of all, we find a better situation both in terms of employment rate and wages for holders of vocational education at the upper-secondary level than for holders of lower education throughout the entire career. In the United Kingdom and Switzerland, holders of lower education do not “catch up” with holders of vocational upper-secondary education, even after several years of work experience.

Table 6.1: main results of the dissertation: effect of vocational education on employment and wages at different steps of the life course

			Beginning of the career (until 30)	Middle of career/evolution	Last part of the career (after 50)
Employment	Voc upper-secondary vs. lower education	M	Higher for voc (3)	Higher for voc (3)	Higher for voc (3)
		W			
	Voc upper-secondary vs. general upper-secondary	M	Higher for voc (2)	Similar chances job interview (5)	Slightly higher for voc (2) Similar chances job interview (5)
		W	No difference (2)	Similar chances job interview (5)	No difference (2) Similar chances job interview (5)
	Voc tertiary vs. gen tertiary	M		Higher chances job interview voc (5)	Higher chances job interview voc (5)
		W		Higher chances job interview voc (even stronger than for men) (5)	Higher chances job interview voc (even stronger than for men) (5)
Wage	Voc upper-secondary vs. lower education	M	Higher for voc (3)	Higher for voc (3)	Higher for voc (3)
		W			
	Voc upper-secondary vs. general upper-secondary	M	No difference (2) No difference (4)	No difference (4)	Higher for gen (2)
		W	Higher for gen (2) No difference (4)	Higher experience returns for gen (4)	
	Voc upper-secondary with a tertiary degree vs. general upper-secondary with a tertiary degree	M	No difference (4)	No difference (4)	
		W			

M = men, W = women; voc = vocational, gen = general; number between parentheses indicates the chapter where the result is from.

Secondly, when comparing vocational education and general education at the upper-secondary level, we see different results for men and women, as well as for employment and wages. We find a higher employment rate for men with vocational education during early careers, and a similar one afterwards (chapter 2). For women, we find a similar employment rate for the two groups during the entire career. In the same line, profiles of job seekers with vocational and general upper-secondary education have similar chances of being invited for job interviews, for both men and women. We do not find larger unemployment risk during late careers for holders of vocational education.

We find similar wages for men with vocational and general education at the upper-secondary level during the first part of the career, but higher wages later on. Women with general education also have higher wages during late career, and this advantage appears earlier. In chapter 2, we present higher hourly wages for women with general education from the age of 25. However, when taking selection into account (based on school abilities, social origin and context) in chapter 4, we find similar hourly wages for women with vocational and general education at the entry into the labour market but a larger experience pay-off for holders of general education already in early careers.

Finally, the comparison of vocational and general education at the tertiary level showed higher chances of being invited for a job interview for holders of vocational education in the middle of the career and later. Furthermore, this effect is stronger for women than for men. Wages at the entry into the labour market as well as the experience returns during early careers are similar for holders of vocational and general upper-secondary degrees who additionally obtained a tertiary degree.

## 6.2 Main contributions

We address the recent debate about the returns to vocational and general education (see notably Forster et al. 2016, Hampf and Woessmann 2017, Hanushek et al. 2017), which suggests that vocational education is associated with high employment rates and wages at the entry into the labour market, but with lower ones during the second part of the career.

Employment prospects are high for holders of a vocational degree in Switzerland, including among older workers. While we observe lower employment rates (chapters 2 and 3) and lower chances for older workers to be invited for a job interview (chapter 5), the situation seems to be similar for holders of vocational and general education. Consequently, we have no reason to think that workers who have learnt specific skills at the beginning of their careers have been unable to adapt to technological change in Switzerland. Note that in a “lightly regulated labour market” (Mueller and Schweri 2015, p. 1057), such as the Swiss one, older workers are at risk of unemployment in most fields. The relatively high employment rate at the end of the working trajectories shows thus a real employability of this group, and is not the result of strong job protection for older workers.

The situation is slightly different when focusing on wages: our results show stronger wage growth for holders of general education than for holders of vocational education, already during early careers, and even earlier for women, and when addressing the selection bias by a matching method for women (chapter 4). Consequently, workers with vocational education have lower wages than holders of general education during most of their career (chapter 2), but substantially higher wages than workers with compulsory education only (chapter 3). Our analyses reveal important differences in terms of careers opportunities depending on the type of education at the upper-secondary level. The chances to access a job with a higher wage than the first job may be limited with a vocational upper-secondary degree, because the tasks

being completed are possibly similar in most positions for the same occupation. While the productivity of the worker is already high at the end of the apprenticeship, the possibility to improve it without further education at the tertiary level seems more limited.

Our results do not support the idea of lower employment prospects during late careers for holders of vocational education. However, they highlight lower wages for older workers with vocational education than their peers with general education at the upper-secondary level. The question of the future use of specific skills taught during education, and especially apprenticeships, seems thus fully relevant, but should perhaps focus on the possibility of wage growth over the career rather than on unemployment risk for older workers, at least in Switzerland.

While our main focus was on vocational education at the upper-secondary level, some of our investigations suggest that wage differences depending on the type of education disappear with a tertiary level of education. It seems thus important to investigate, first, if this point is confirmed by analyses on this aspect specifically, and second, if we can learn from the success of vocational education at the tertiary degree to reinforce the possibility of wage growth for the upper-secondary level.

Finally, we presented in this dissertation an alternative comparison group for holders of a vocational degree at the upper-secondary: holders of a lower level of education. We consider it important to remember that for at least some holders of a vocational degree, the reasonable counterfactual is not general education, but rather the absence of an upper-secondary degree. Results show a clear advantage for holders of a vocational degree, which highlight the strong role of this track, not only in Switzerland but also in the UK.

### 6.3 Limits

While we have done our best in this dissertation to present original findings dealing with the methodological challenges linked to the topic of returns to vocational education, we acknowledge the limits of our analyses.

One of the main concerns was to take the selection issue into account. The first two empirical chapters are based on data that allow us to document the situation over the whole working trajectories, but not to address the issue of selection. In a second step, we have used data rich in information concerning individual characteristics before the selection into the upper-secondary track, which enabled us to apply a matching model. If this method is recognised as a relevant way to deal with selection (Rosenbaum and Rubin 1983, Heckman et al. 1997), its main limitation is to deal with selection on observables only. Consequently, bias from non-observed variables, such as personality, is still present in our analyses. Finally, we used a vignette study, which enables us to avoid unobserved heterogeneity in the profiles of the workers, contrary to profiles of real workers. This method is efficient to avoid “real” bias but does not inform us as to why employers prefer one candidate or another – because of the type of education or a stereotype associated to it. Additionally, this experimental method gives us no access to the actual situation in the labour market, but only reflects the stated preferences of employers.

Five different datasets are used in this dissertation, and all five are survey data. We believe that we are using not only appropriate data, but the best existing ones to answer our research question. However, each institution collecting responses for these datasets had to face the same problems inherent to surveys: the difficulty of accessing a sample that is representative of the population. In the panel data, this problem is even more important since it occurs at each wave of the survey and the attrition is not randomly distributed (Sacchi 2011 for TREE,

Antal and Rothenbühler 2015 for the SHP). We address this problem by using control variables, such as gender, age and nationality, to take these biases into account. Using register data would solve this problem, but it was not possible to combine register data from the educational system with income data from tax declarations or social insurance records in Switzerland at the moment of writing this dissertation.

In this dissertation, we aim at addressing reflexion and empirical work to reply to questions about vocational education globally. However, as mentioned in the introduction, vocational education is not a homogenous category, but an agglomeration of several programmes. Our results are mainly based on the average outcomes for the category of vocational education overall, and do not investigate differences between those programmes – apart from some robustness checks in the appendix of chapter 2 (see Figure A8.5). While this point is driven by a choice of research design, we also have to acknowledge its limits.

As a last point, we need to address the issue of the generalisation of our results. If we aim to answer the question of returns to vocational education over the life-course generally speaking, our results are valid only for Switzerland (and the UK for results from chapter 3), and the possibility of finding similar patterns in other countries is an open question. It is plausible that in countries with similar VET systems, such as Austria and Germany, mechanisms and trajectories in the labour market for holders of vocational education are comparable to the situation shown for Switzerland. However, some differences in the labour market regulation as well as cultural aspects may impact the mechanisms and result in different outcomes. The question of generalisation is also open in terms of cohort. As mentioned in the introduction, we chose to follow (pseudo-)cohorts rather than using cross-sectional data because we have doubts about the assumption that employment and wage trajectories are stable across cohorts. As a consequence, we cannot be sure whether our results are generalisable to different cohorts than the ones presented. Additional results (appendix chapter 2) do not suggest any strong

cross-cohort differences among holders of upper-secondary vocational education, but decreasing advantages for holders of general education for younger cohorts in comparison to older cohorts. Finally, if the three first empirical chapters aim at taking the whole labour market into account – all fields and occupations – the last empirical chapter focuses on three occupations only. While the results from this chapter are interesting to understand employers' stated preferences towards vocational or general education, we cannot generalise these results to all occupations.

Pathways from vocational education to tertiary education have been facilitated in the nineties in Switzerland (Meyer 2009). Therefore, the composition of the group of holders of a vocational upper-secondary degree may change between cohorts who entered the labour market before the nineties and after. It seems thus possible that the overall situation of workers with vocational upper-secondary “only” becomes on average more disadvantaged than for the older cohorts. However, it is also possible that apprentices include more and more skills that are more transferable, such as computer science or use of informatics tools, and subsequently increase their chances of getting higher salaries after several years of experience.

## **6.4 Implications**

Research about the impact of education on careers can bring forth elements for public policy and political debates. We discuss the possible implications of our results for the educational system and the labour market.

Some concerns about the situation of older workers with vocational education have emerged recently in the academic literature (mainly from Hanushek et al. 2017). While the topic of older workers' unemployment is definitely relevant in Switzerland, notably because of the risk of long-term unemployment (Oesch and Baumann 2014), we found no evidence that

holders of vocational education are more at risk than other middle-skilled workers. However, holders of vocational education seem to have lower chances to improve their salary during their working trajectories, and may therefore have fewer resources (notably savings) to help them face difficulties in the second part of their careers. While in addition to this, a part of workers with a VET diploma execute daily demanding physical tasks, the risk on inequality during the end of one's working trajectory and at retirement depending on the type of upper-secondary education seem notable.

An important question for public policy is how to reduce such inequalities. Advocates of general education would probably argue that a larger access to general skills might help improve wages over one's career. Facilitating access to tertiary education may thus be a way to reduce inequalities among holders of vocational and general education at the upper-secondary level. This is supported by our findings, which show the advantageous labour market situation of holders of vocational upper-secondary in combination with tertiary education. Pathways existing since the nineties from vocational upper-secondary to tertiary education (summarised in

Figure A8.15 in the appendix) may help decrease inequalities between older workers who either graduated from vocational education or general education at the upper-secondary level. Therefore, accessing jobs with higher wages depends less on the type of upper-secondary education.

This solution also presents some limitations. Access to tertiary education through vocational upper-secondary education presents some social inequalities, meaning that children who have parents with a lower level of education are under-represented among holders of a tertiary degree (Buchmann et al. 2007). Furthermore, it faces a gender segregation effect: while similar rates of men and women graduate from the tertiary level after a general upper-

secondary diploma, the rate of women who graduate from tertiary education after a vocational upper-secondary diploma is lower than the rate of men (see Figure A8.13 in the appendix). Buchmann et al. (2007) identified two explanations for this: there are fewer opportunities of tertiary degrees for female-dominated occupations, and a lower rate of female enrolment in tertiary degrees even when controlling for the field, possibly due to a stronger implication in family tasks. It is important to note that contrary to the general track, vocational education gives access to tertiary education in the field of the previous diploma only. As a consequence, choices made at the age of 15 have strong implications for career trajectories. A more permeable system between tracks may help limit this effect.

Furthermore, even though giving access to tertiary education after vocational upper-secondary education may help reduce some inequalities between holders of a vocational upper-secondary degree and holders of a general one for those who graduate also at the tertiary level, it does not address the issue of the limited wage growth over the career for holders of a vocational upper-secondary degree only. In this sense, we recommend that decision-makers for the VET programmes – Confederation, cantons and employers' organisations – investigate the possibility to offer more general skills in addition to apprenticeships (during it or later). This would, in our opinion, not only give more chances to workers to access better paid jobs or positions during their careers, but may also be a way for employers to keep employees working in their firms for longer. This is especially true in our society, where doing the same task for the same firm for one's entire career is becoming less and less common.

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## 8. Appendix

### 8.1 Appendix from chapter 2

#### 8.1.1 Figures from chapter 2

Figure A8.1: Employment rate by type of education for different cohorts, 20h per week

Figure A8.1a: Men – cohort 1954-66

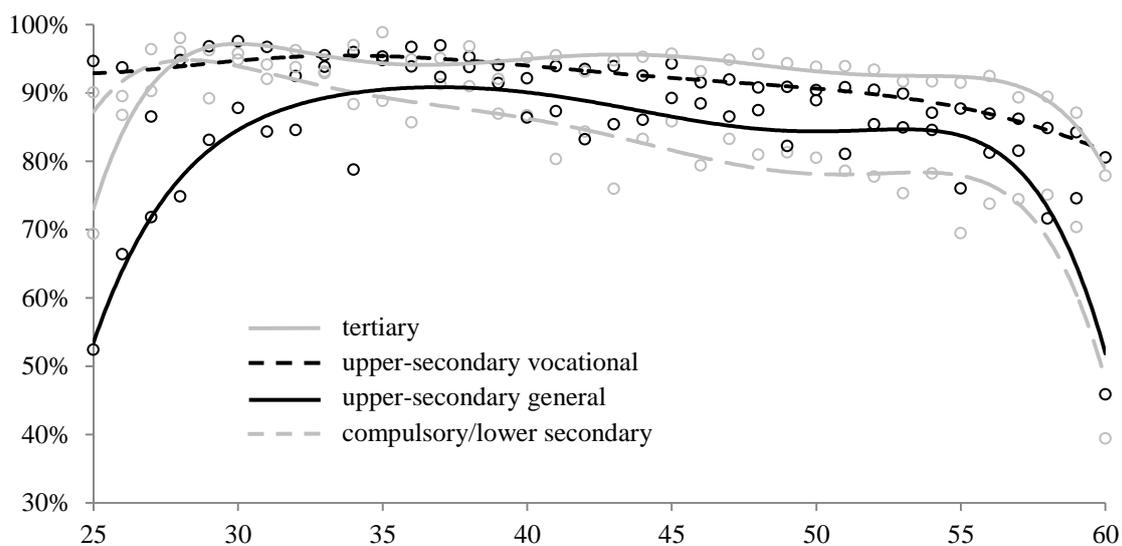
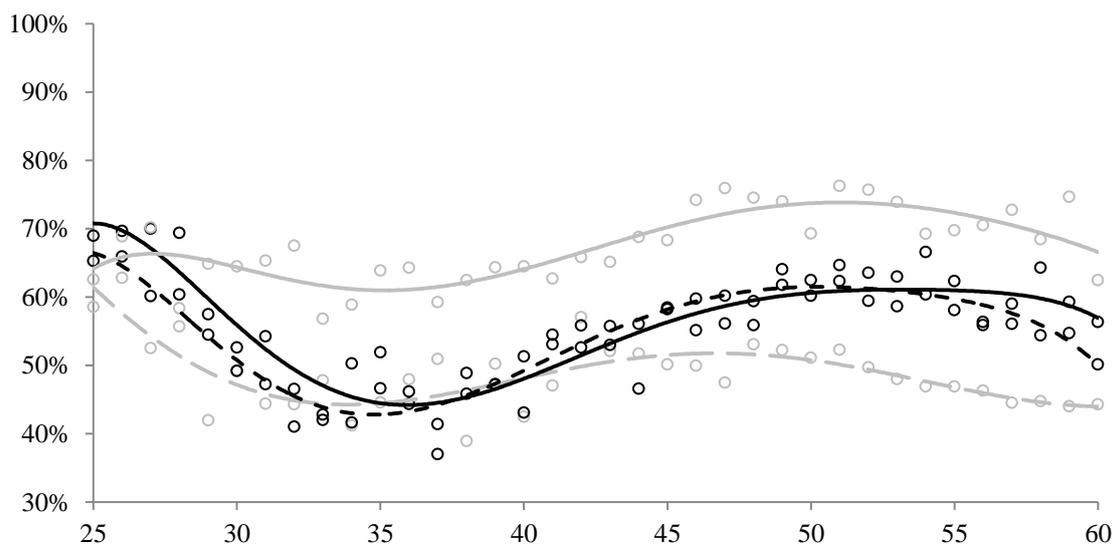


Figure A8.1b: Women – cohort 1954-66



Note: employment of a minimum of 20 hours per week

Data: SLFS1991-2014

Figure A8.2: Difference in unemployment by age for upper-secondary vocational relative to general education (average marginal effects)

Figure A8.2a: Men – SLFS, cohort 1954-66

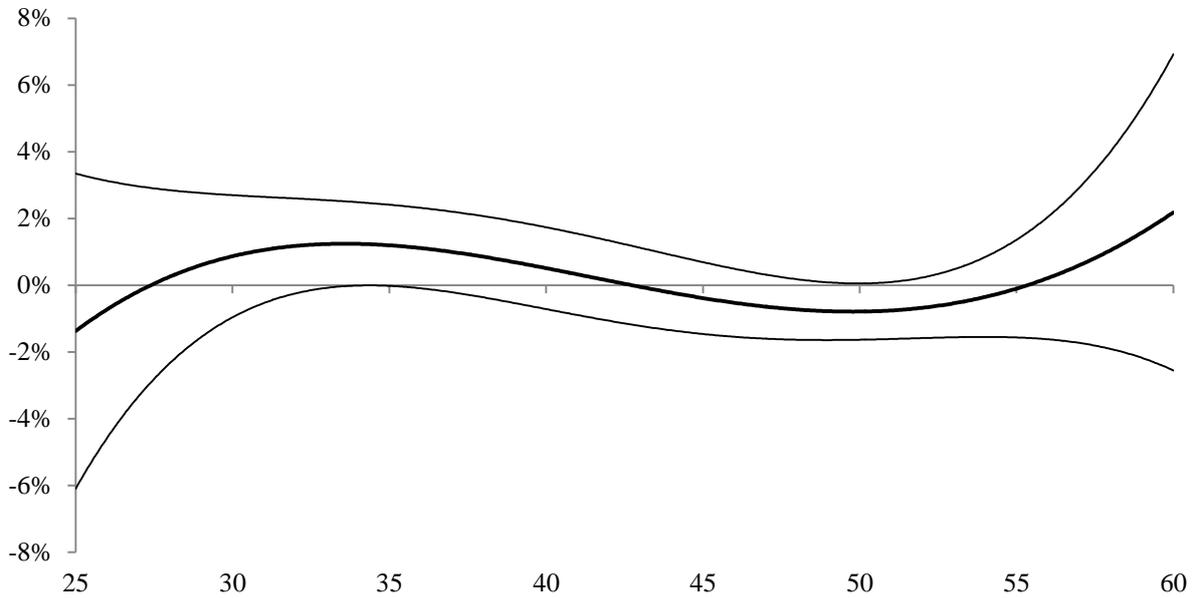
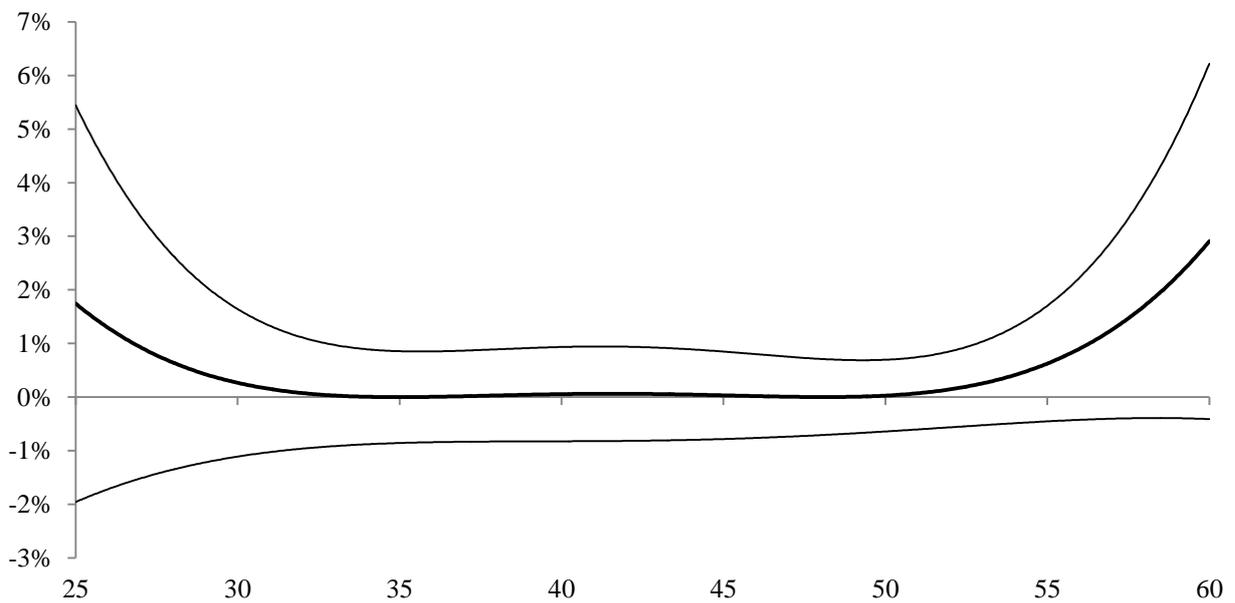


Figure A8.2b: Women – SLFS, cohort 1954-66



Note: average marginal effects based on a linear regression (see legend of Table A8.3 in the appendix for information on the control variables)

Data: SLFS1991-2014

Figure A8.3: Difference in employment by age for upper-secondary vocational relative to general education (average marginal effects) for two birth cohorts

Figure A8.3a: Men – SLFS, cohort 1941-53

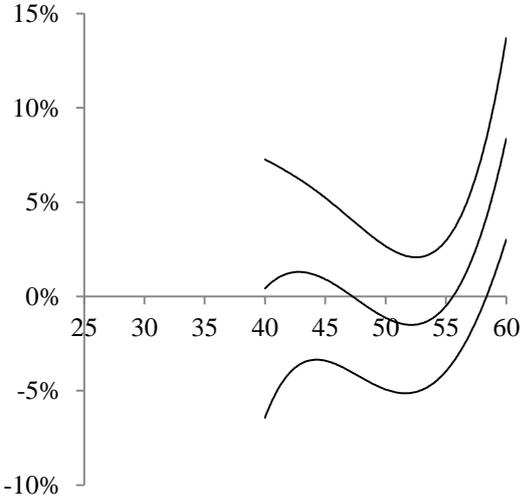


Figure A8.3b: Women – SLFS, cohort 1941-53

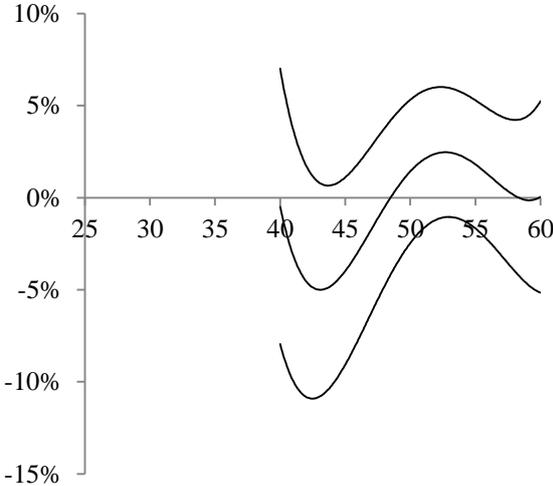


Figure A8.3c: Men – SLFS, cohort 1967-79

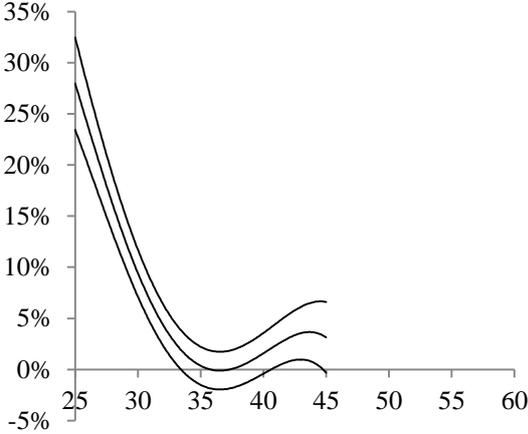
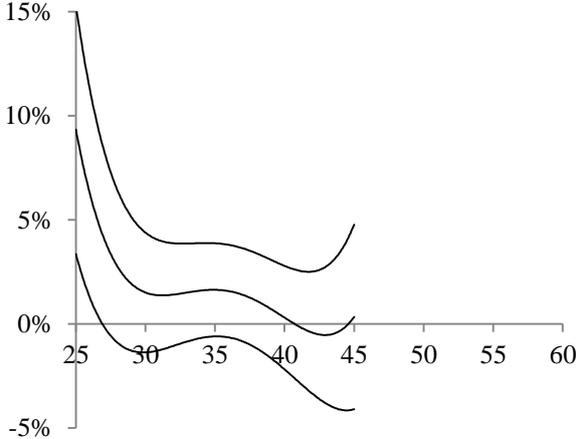


Figure A8.3d: Women – SLFS, cohort 1967-79



Note: average marginal effects based on a linear regression (see legend of Table A8.3 in the appendix for information on the control variables)

Data: SLFS1991-2014

Figure A8.4: Difference in hourly wages (in %) by age for upper-secondary vocational relative to general education (average marginal effects) for two birth cohorts

Figure A8.4a: Men – SLFS, cohort 1941-53

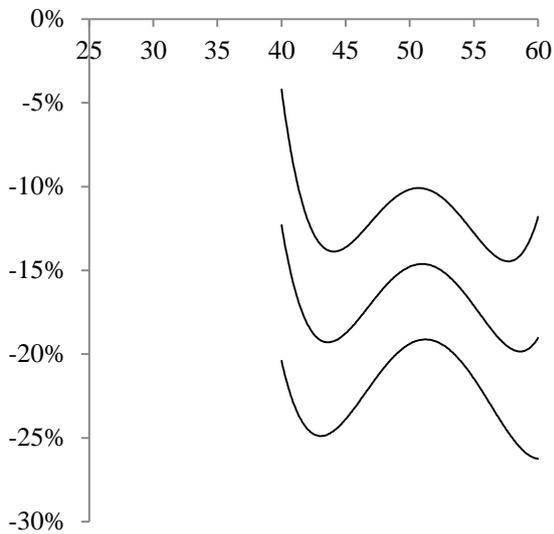


Figure A8.4b: Women – SLFS, cohort 1941-53

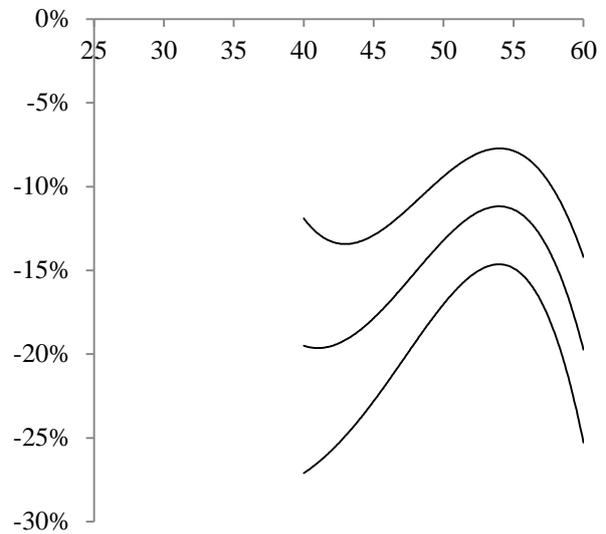


Figure A8.4c: Men – SLFS, cohort 1967-79

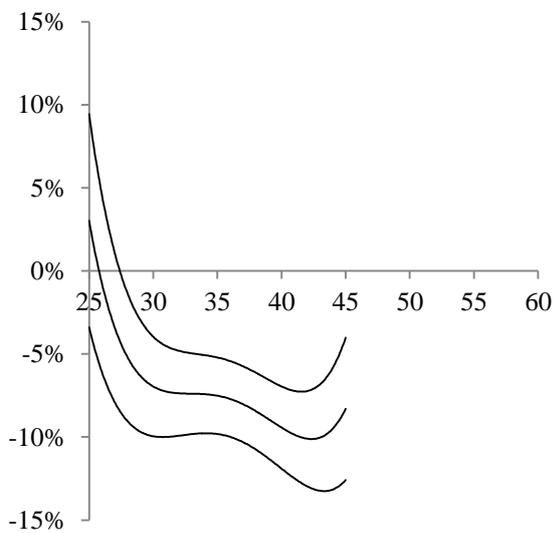
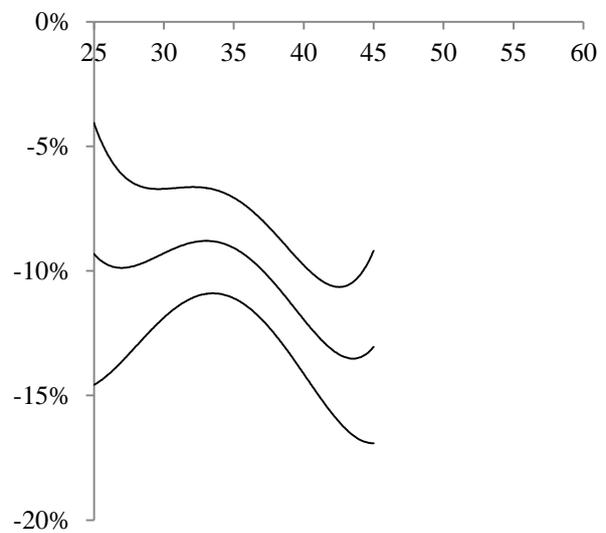


Figure A8.4d: Women – SLFS, cohort 1967-79



Note: average marginal effects based on a linear regression (see legend of Table A8.3 in the appendix for information on the control variables)

Data: SLFS1991-2014

Figure A8.5: Median hourly work income (in constant 2011 Swiss francs) for 6 types of upper-secondary vocational education

Figure A8.5a: Men

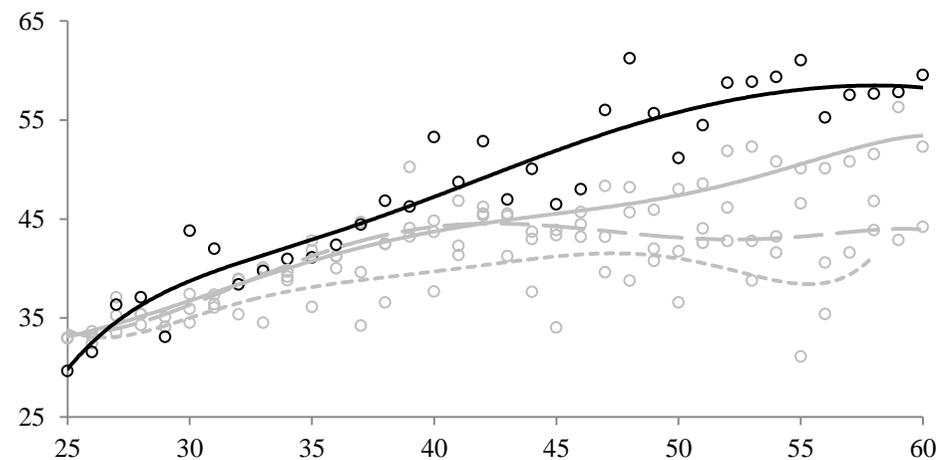


Figure A8.5b: Women

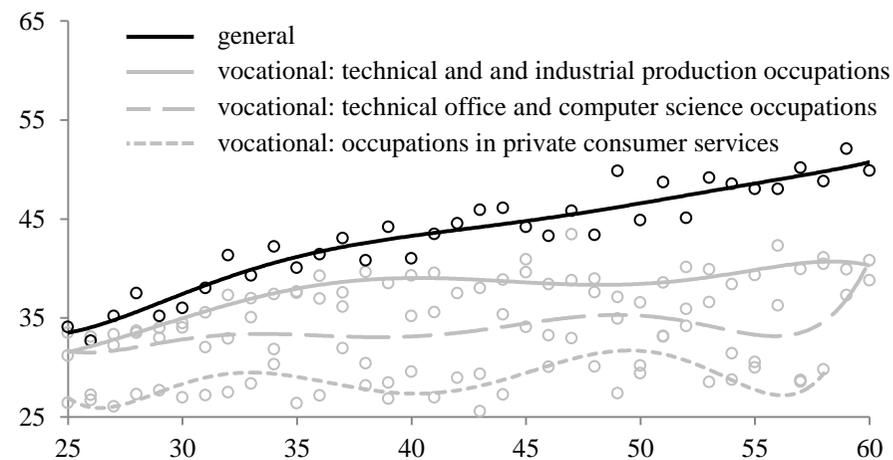


Figure A8.5c: Men

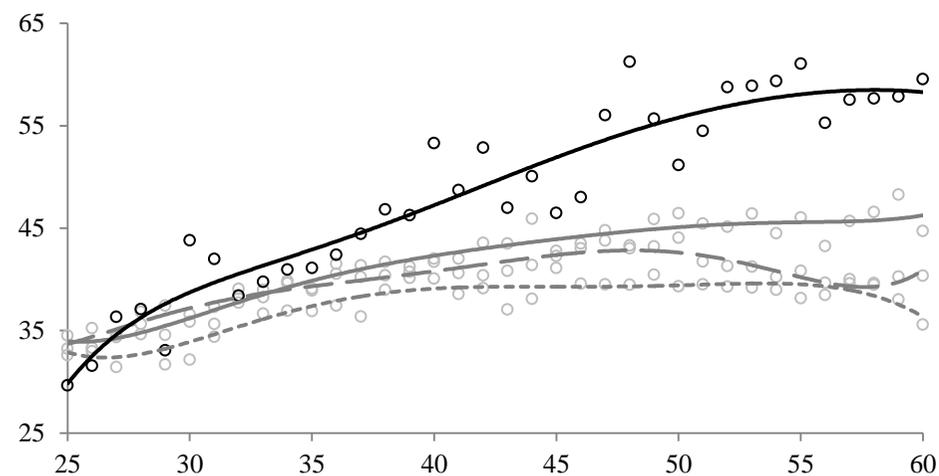
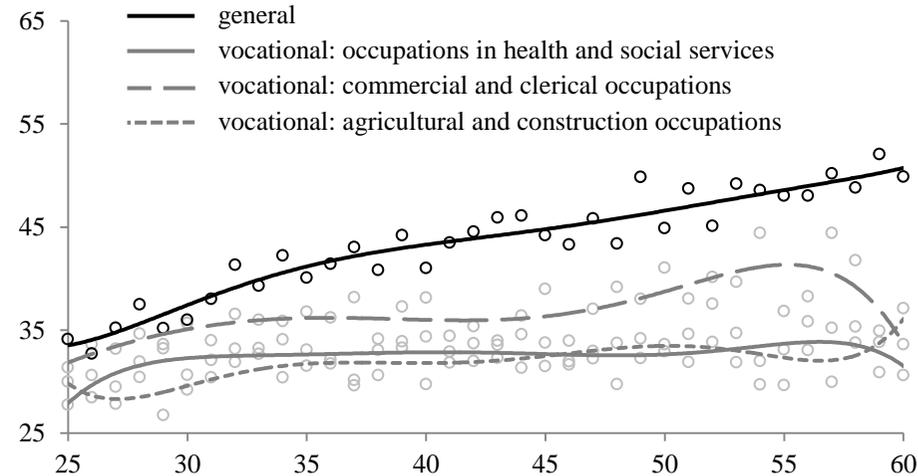


Figure A8.5d: Women



Data: SLFS1991-2014 (for cohorts born 1941-53, 1954-66, 1967-79)

Figure A8.6: Difference in annual work income (in %) by age for upper-secondary vocational relative to general education (average marginal effects)

Figure A8.6a: Men – SLFS, cohort 1954-66

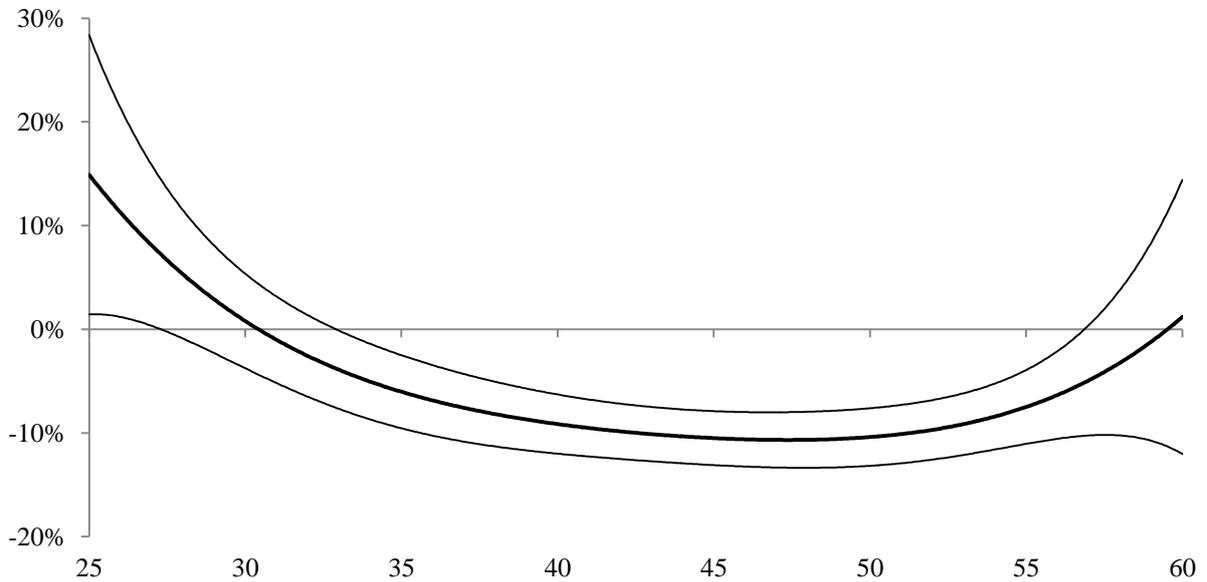
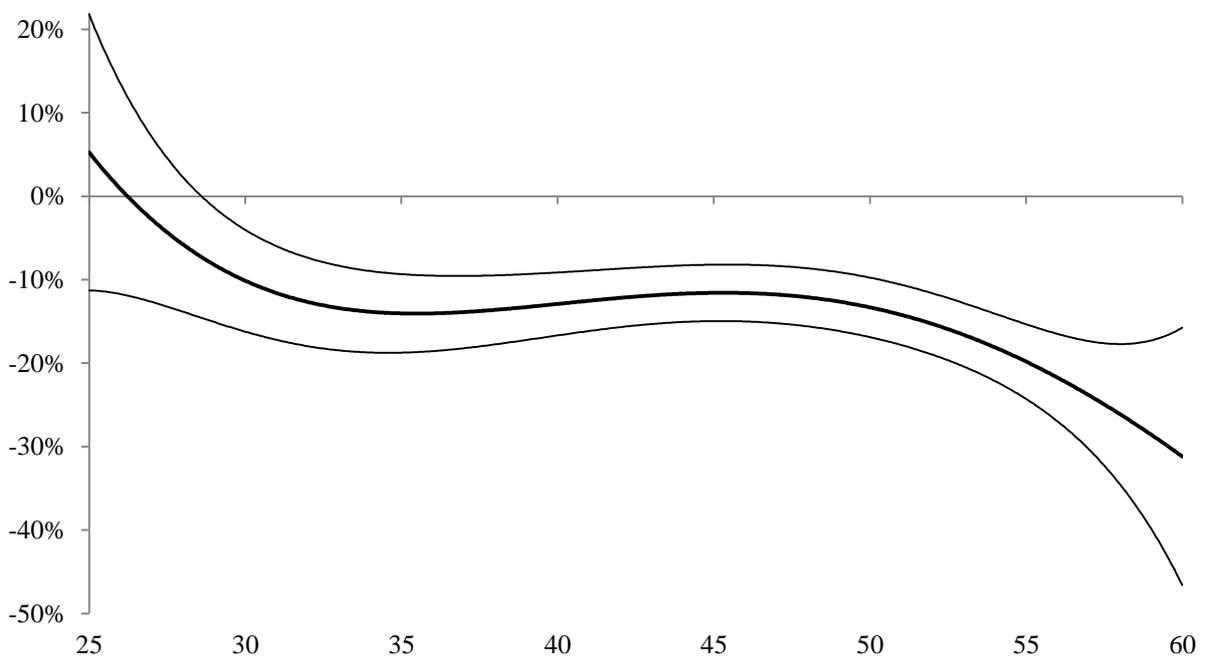


Figure A8.6b: Women – SLFS, cohort 1954-66



Note: average marginal effects based on a multivariate linear regression on annual work income  
Data: SLFS1991-2014

### 8.1.2 Tables from chapter 2

Table A8.1: Highest level of educational attainment by age, cohort 1954-1966

Table A8.1a: Men

	compulsory/ lower secondary	upper-secondary vocational	upper-secondary general	tertiary
25-29	9%	53%	12%	26%
30-34	11%	47%	7%	34%
35-39	12%	47%	7%	34%
40-44	14%	44%	5%	37%
45-49	14%	42%	5%	39%
50-54	13%	41%	5%	41%
55-60	14%	41%	5%	39%

Data: SLFS1991-2014

Table A8.1b: Women

	compulsory/ lower secondary	upper-secondary vocational	upper-secondary general	tertiary
25-29	16%	55%	15%	14%
30-34	16%	54%	14%	16%
35-39	19%	49%	14%	18%
40-44	19%	48%	13%	20%
45-49	21%	45%	10%	24%
50-54	22%	46%	9%	24%
55-60	24%	45%	9%	22%

Data: SLFS1991-2014

Table A8.2: Descriptive statistics of the variables used in the analysis

<i>Variable</i>	Swiss Labor Force Survey (SLFS)			Swiss Household Panel (SHP)		
	<i>mean</i>	<i>min</i>	<i>max</i>	<i>mean</i>	<i>min</i>	<i>max</i>
Education: upper-secondary vocational	0.84	0	1	0.84	0	1
Education: upper-secondary general	0.16	0	1	0.16	0	1
Gender: men	0.44	0	1	0.39	0	1
Gender: women	0.56	0	1	0.61	0	1
Age	43.05	25	60	44.09	25	60
Gross annual work income (after imputation for the SLFS)	68,270	1,843	252,400	66,740	1,590	255,400
Hourly work income	36.94	12	300	44.91	12	300
Number of hours worked per week	34.67	0	45	32.39	0	45
Work (no condition of number of hours): yes	0.83	0	1	0.83	0	1
Work (no condition of number of hours): no	0.17	0	1	0.17	0	1
Work (minimum 8 hours per week): yes	0.80	0	1	0.81	0	1
Work (minimum 8 hours per week): no	0.20	0	1	0.19	0	1
Work (minimum 20 hours per week): yes	0.72	0	1	0.69	0	1
Work (minimum 20 hours per week): no	0.28	0	1	0.31	0	1

SLFS: n=123,155 (individual observations); 97,941 observations for individuals working at least 8 hours per week and providing information on work income.

Cohort 1941-1953 n=23,250, cohort 1954-1966 n=55,391, cohort 1967-1979 n=44,514

SHP: n=5,566 (individuals), N=34,622 (person-year observations); 4,485 individuals working at least 8 hours per week and providing information on work income (24,200 person-year observations)

Table A8.3: Linear regression coefficients for being in employment (min. 8 hours per week)

	Men				Women				
	without controls		with controls		without controls		with controls		
	coeff	SE	coeff	SE	coeff	SE	coeff	SE	
<b>SLFS, cohort 1954-66</b>	age	<b>11.1</b>	2.51	<b>8.47</b>	2.48	-3.88	2.83	-5.36	2.82
	age <sup>2</sup>	<b>-3.89</b>	0.92	<b>-2.92</b>	0.91	1.17	1.03	1.75	1.03
	age <sup>3</sup>	<b>0.59</b>	0.15	<b>0.44</b>	0.15	-0.15	0.17	-0.24	0.16
	age <sup>4</sup>	<b>-0.03</b>	0.01	<b>-0.03</b>	0.01	0.01	0.01	0.01	0.01
	educ: voc	<b>9.95</b>	2.69	<b>8.70</b>	2.66	2.92	3.22	2.22	3.20
	age*educ: voc	<b>-9.43</b>	2.69	<b>-8.19</b>	2.65	-2.96	3.19	-2.17	3.18
	age <sup>2</sup> *educ: voc	<b>3.30</b>	0.98	<b>2.86</b>	0.97	1.03	1.17	0.73	1.16
	age <sup>3</sup> *educ: voc	<b>-0.51</b>	0.16	<b>-0.44</b>	0.15	-0.15	0.19	-0.10	0.19
	age <sup>4</sup> *educ: voc	<b>0.03</b>	0.01	<b>0.03</b>	0.01	0.01	0.01	0.01	0.01
	constant	<b>-10.8</b>	2.51	<b>-8.14</b>	2.48	5.26	2.84	<b>6.614</b>	2.83
	Adjusted R <sup>2</sup>	0.013		0.043		0.016		0.029	
N	25,168		25,168		29,667		29,667		
<b>SHP, cohort 1950-79</b>	age	<b>11.7</b>	4.51	<b>11.7</b>	4.48	0.54	4.769	0.45	4.69
	age <sup>2</sup>	<b>-3.89</b>	1.64	<b>-3.88</b>	1.63	-0.45	1.716	-0.42	1.68
	age <sup>3</sup>	<b>0.57</b>	0.26	<b>0.57</b>	0.26	0.12	0.268	0.11	0.26
	age <sup>4</sup>	<b>-0.03</b>	0.02	<b>-0.03</b>	0.02	-0.01	0.015	-0.01	0.02
	educ: voc	7.54	4.72	7.76	4.68	8.44	5.315	8.14	5.25
	age*educ: voc	-6.22	4.66	-6.44	4.63	-8.00	5.231	-7.64	5.15
	age <sup>2</sup> *educ: voc	1.90	1.69	1.97	1.68	2.77	1.880	2.63	1.85
	age <sup>3</sup> *educ: voc	-0.25	0.27	-0.26	0.27	-0.41	0.293	-0.39	0.29
	age <sup>4</sup> *educ: voc	0.01	0.02	0.01	0.02	0.02	0.017	0.02	0.02
	constant	<b>-12.1</b>	4.56	<b>-12.1</b>	4.54	0.65	4.833	0.45	4.69
	Adjusted R <sup>2</sup>	0.055		0.074		0.011		0.029	
N	13,378		13,378		20,494		20,494		

SLFS: Swiss Labor Force Survey 1991-2014, SHP: Swiss Household Panel 1999-2015

Controls included in both datasets: canton, type of municipality, residence permit. Additionally for SLFS: nationality. Additionally for SHP: fathers' and mothers' education, fathers' and mothers' social class.

Notes: we use random effect models in the SHP and report robust standard errors. Age variables have been divided by 10 (i. e. age 25 is expressed as 2.5, age 45 as 4.5).

Bold: significant at p<0.05.

Table A8.4: Linear regression coefficients for (log) hourly work income

	Men				Women				
	without controls		with controls		without controls		with controls		
	coeff	SE	coeff	SE	coeff	SE	coeff	SE	
<b>SLFS, cohort 1954-66</b>	age	4.22	3.55	0.63	3.41	1.41	2.76	-1.73	2.71
	age <sup>2</sup>	-1.19	1.30	0.10	1.25	-0.39	1.01	0.80	0.99
	age <sup>3</sup>	0.14	0.21	-0.05	0.20	0.04	0.16	-0.15	0.16
	age <sup>4</sup>	-0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01
	educ: voc	4.12	3.79	2.11	3.63	1.73	3.13	-0.50	3.07
	age*educ: voc	-3.60	3.77	-1.65	3.62	-1.66	3.12	0.62	3.06
	age <sup>2</sup> *educ: voc	1.12	1.38	0.44	1.32	0.51	1.14	-0.34	1.12
	age <sup>3</sup> *educ: voc	-0.15	0.22	-0.05	0.21	-0.06	0.18	0.07	0.18
	age <sup>4</sup> *educ: voc	0.01	0.01	0.00	0.01	0.00	0.01	-0.01	0.01
	constant	-1.61	3.56	1.92	3.43	1.84	2.76	4.77	2.72
	Adjusted R <sup>2</sup>	0.031		0.140		0.041		0.109	
	N	22,554		22,554		20,691		20,691	
<b>SHP, cohort 1950-79</b>	age	-3.93	5.20	-4.12	5.09	1.07	3.35	1.28	3.41
	age <sup>2</sup>	1.89	1.86	1.99	1.81	-0.26	1.20	-0.35	1.23
	age <sup>3</sup>	-0.35	0.29	-0.37	0.28	0.03	0.19	0.05	0.19
	age <sup>4</sup>	0.02	0.02	0.02	0.02	-0.00	0.01	-0.00	0.01
	educ: voc	-3.03	5.59	-3.97	5.48	-0.69	3.86	-1.37	3.90
	age*educ: voc	3.72	5.47	4.73	5.37	0.98	3.79	1.67	3.83
	age <sup>2</sup> *educ: voc	-1.59	1.95	-1.98	1.92	-0.49	1.36	-0.73	1.38
	age <sup>3</sup> *educ: voc	0.28	0.30	0.35	0.30	0.09	0.21	0.13	0.22
	age <sup>4</sup> *educ: voc	-0.02	0.02	-0.02	0.02	-0.01	0.01	-0.01	0.01
	constant	6.06	5.31	6.14	5.20	1.95	3.40	2.00	3.47
	Adjusted R <sup>2</sup>	0.070		0.121		0.040		0.076	
	N	11,369		11,369		12,819		12,819	

SLFS: Swiss Labor Force Survey 1991-2014, SHP: Swiss Household Panel 1999-2015

Controls included in both datasets: canton, type of municipality, residence permit. Additionally for SLFS: nationality. Additionally for SHP: fathers' and mothers' education, fathers' and mothers' social class.

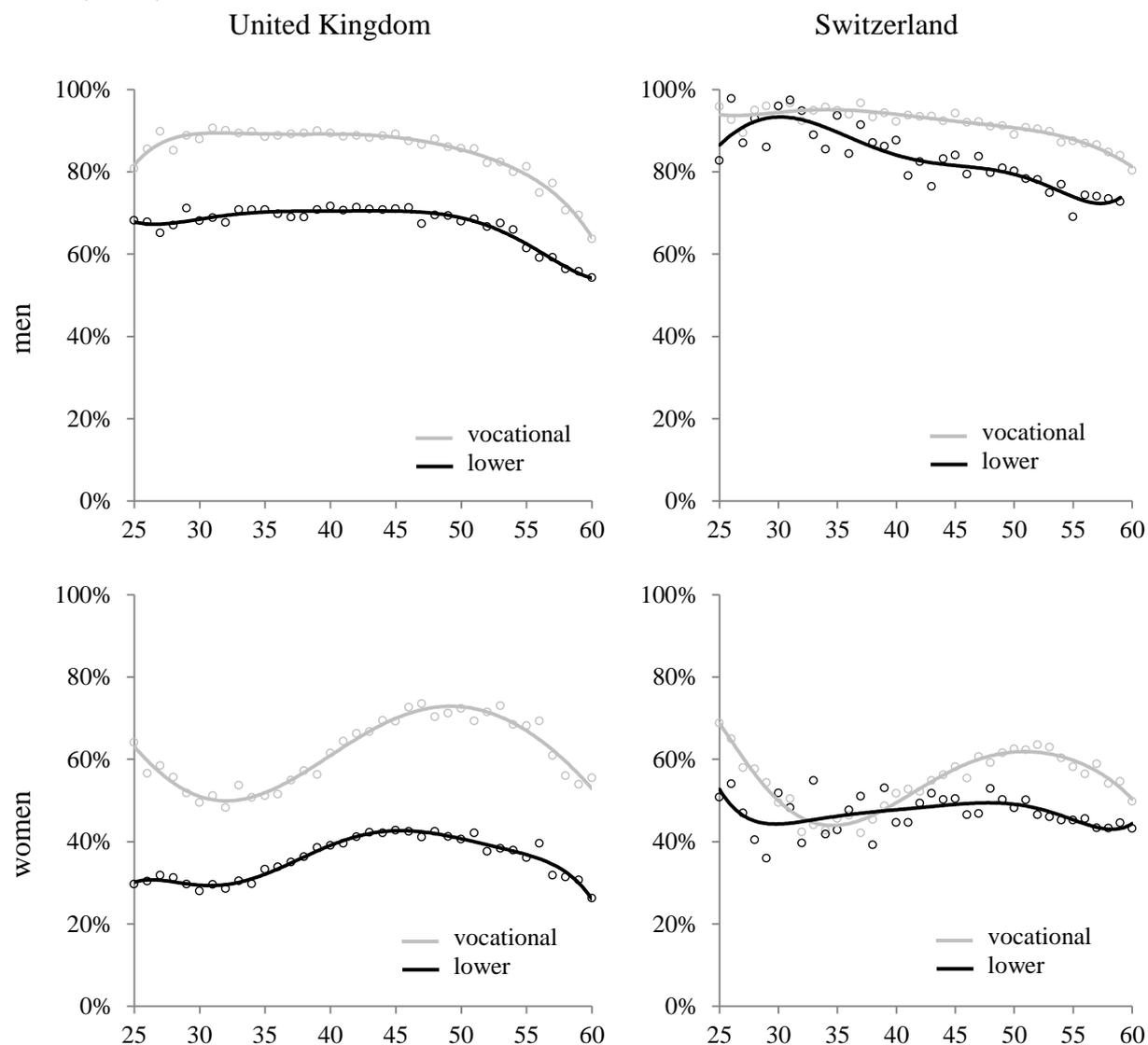
Notes: we use random effect models in the SHP and report robust standard errors. Age variables have been divided by 10 (i. e. age 25 is expressed as 2.5, age 45 as 4.5).

Bold: significant at  $p < 0.05$ .

## 8.2 Appendix from chapter 3

### 8.2.1 Figures from chapter 3

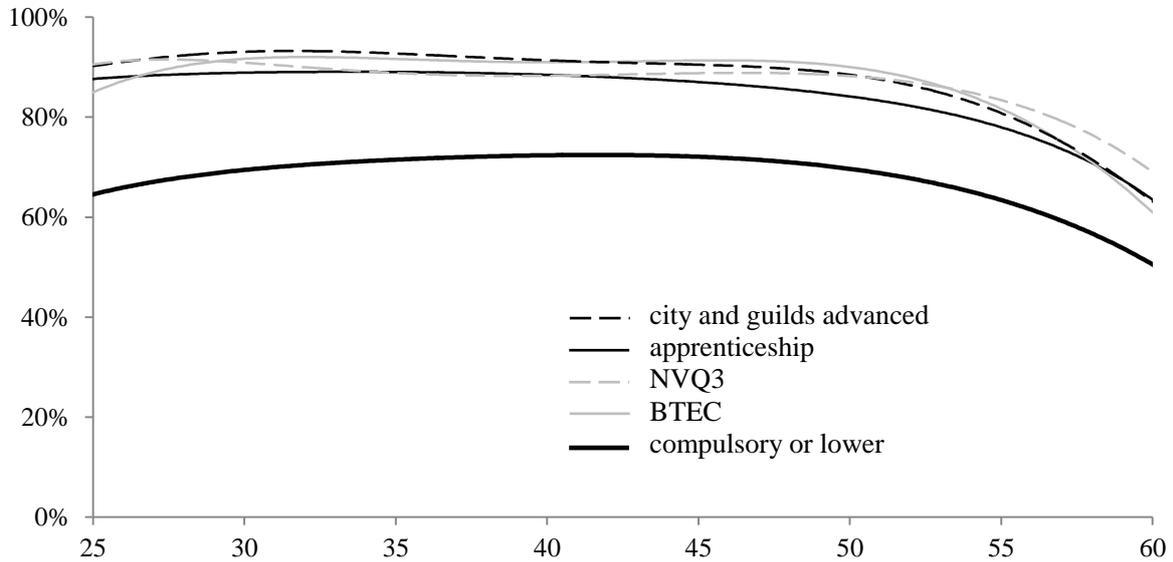
Figure A8.7: Employment rate (min. 20 hours per week) for men and women by level of education: upper-secondary vocational education (*vocational*) and compulsory school level or lower (*lower*)



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968

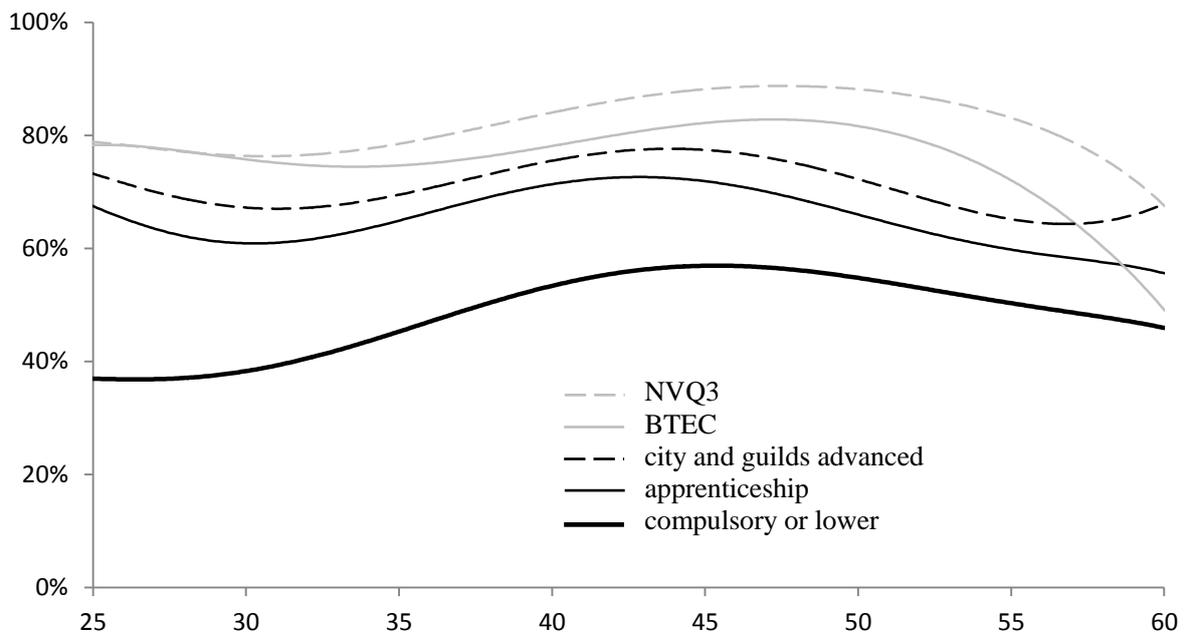
Figure A8.8: Employment rate (min. 8 hours per week) by type of upper-secondary vocational education

Figure A8.8a: Men – United Kingdom



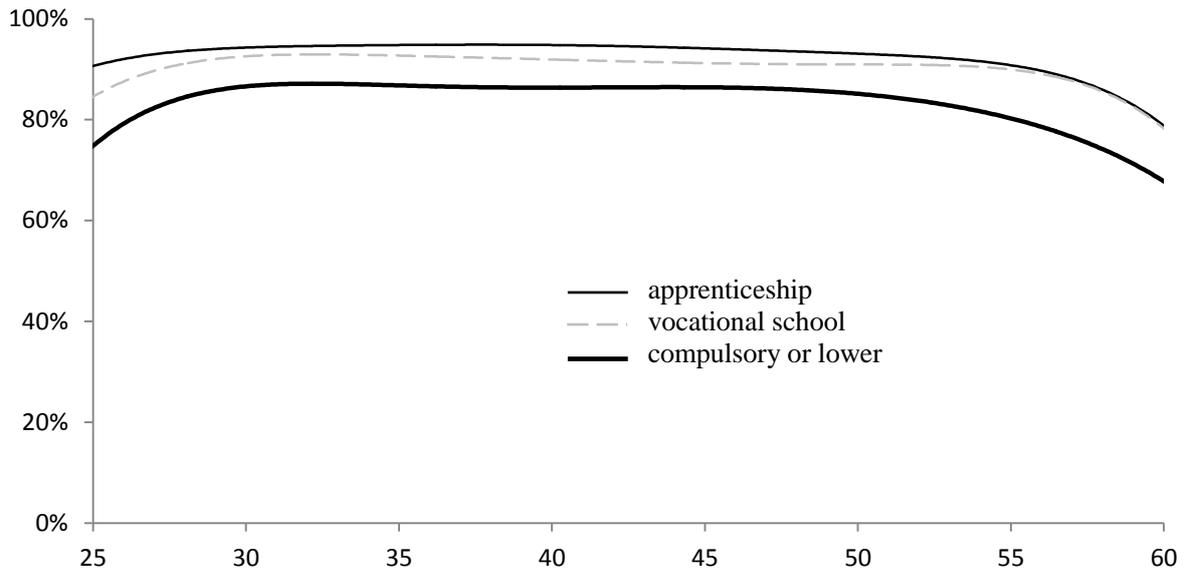
UK Labour Force Survey 1993–2014

Figure A8.8b: Women – United Kingdom



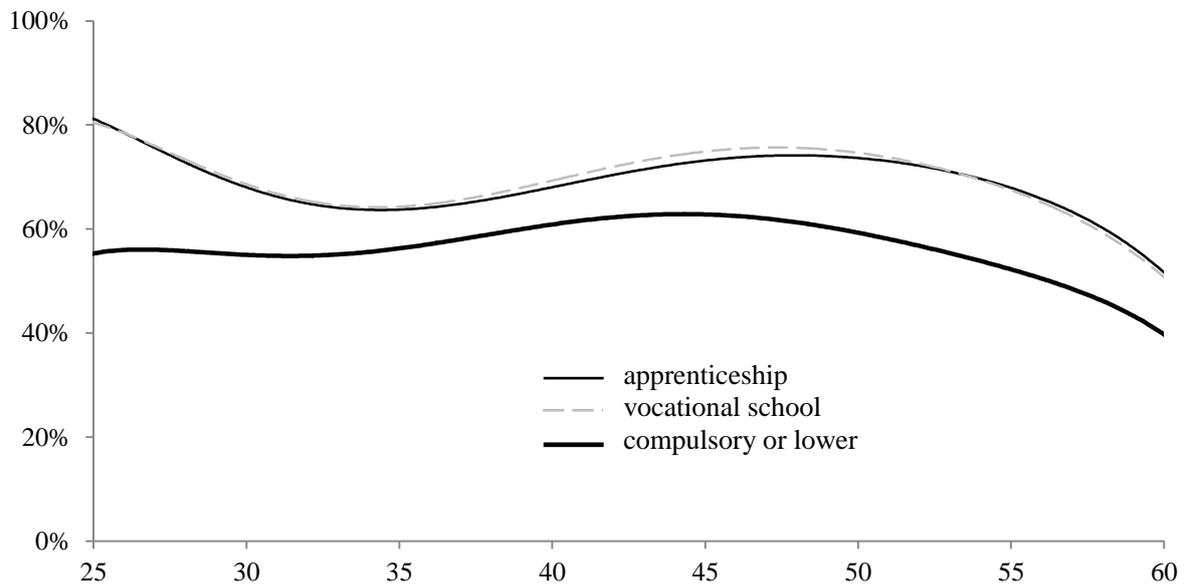
UK Labour Force Survey 1993–2014

Figure A8.8c: Men – Switzerland



Swiss Labour Force Survey 1991–2014

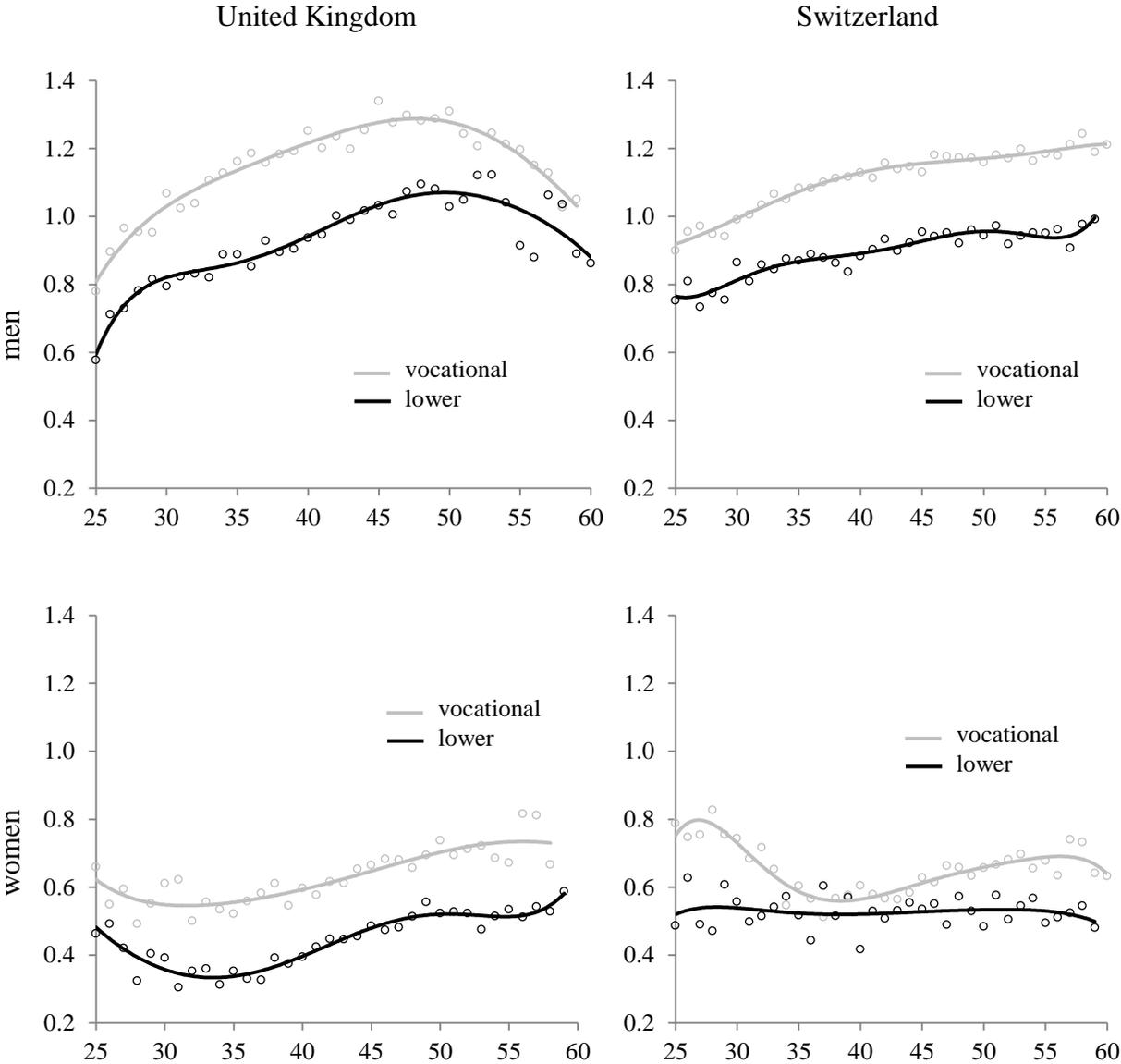
Figure A8.8d: Women – Switzerland



Swiss Labour Force Survey 1991–2014

Figure A8.9: Median annual work income for men and women by level of education: upper-secondary vocational education (*vocational*) and compulsory school level or lower (*lower*)

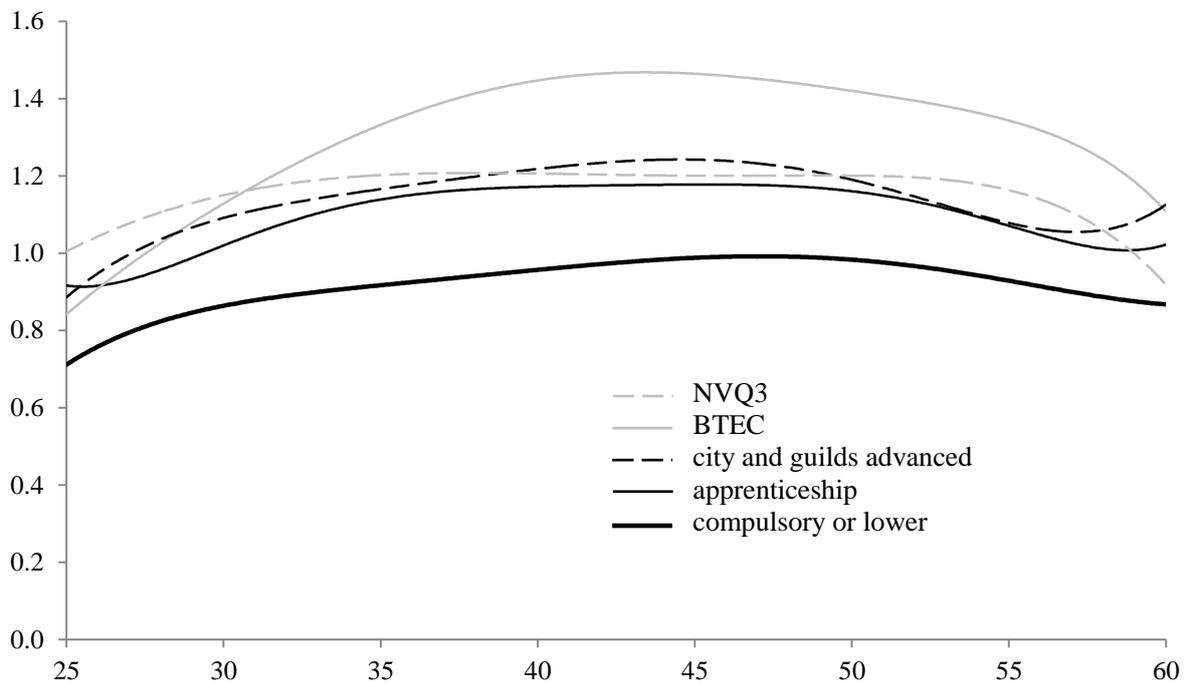
It is of little interest to compare absolute wages between the United Kingdom and Switzerland, since the purchasing power and tax systems are different. For this reason, we do not present wages in real pounds or Swiss francs, but the wages relative to the national median wage in each country. The median annual wage for the cohort 1954–1968 corrected for inflation (expressed in 2010 values) is £ 21,025 in the UK for the period 1993–2014, and CHF 72,300 in Switzerland for 1991–2014. These amounts represent the benchmarks in each country (e.g. value of one).



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968

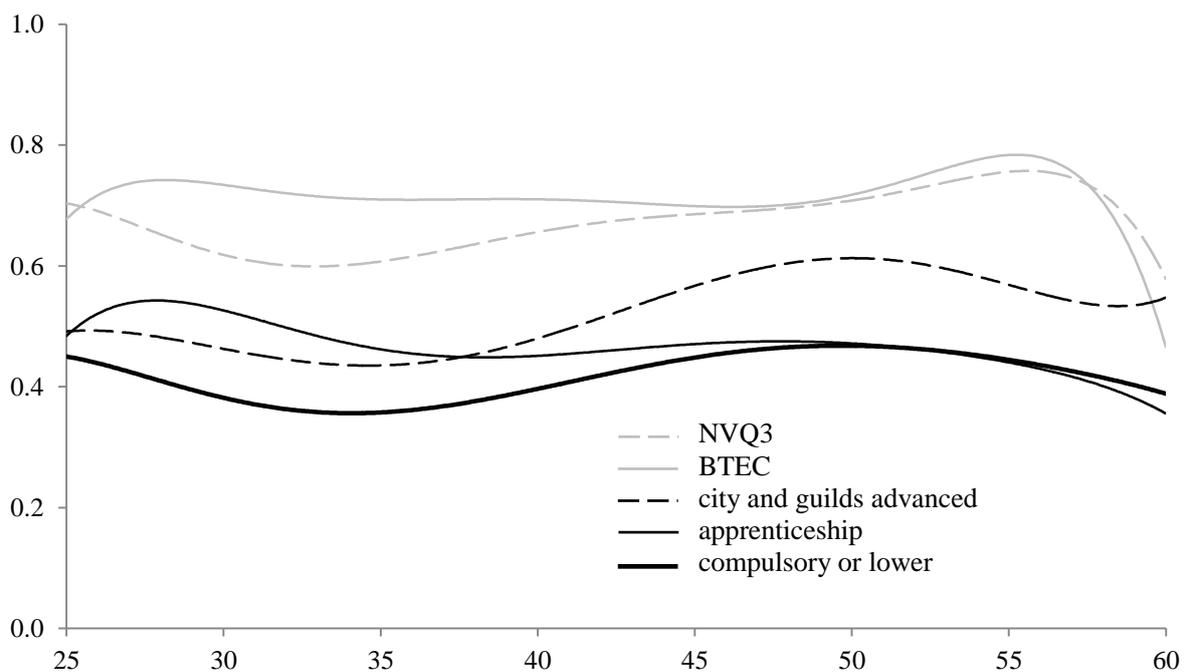
Figure A8.10: Median annual work income by type of upper-secondary vocational education

Figure A8.10a: Men – United Kingdom



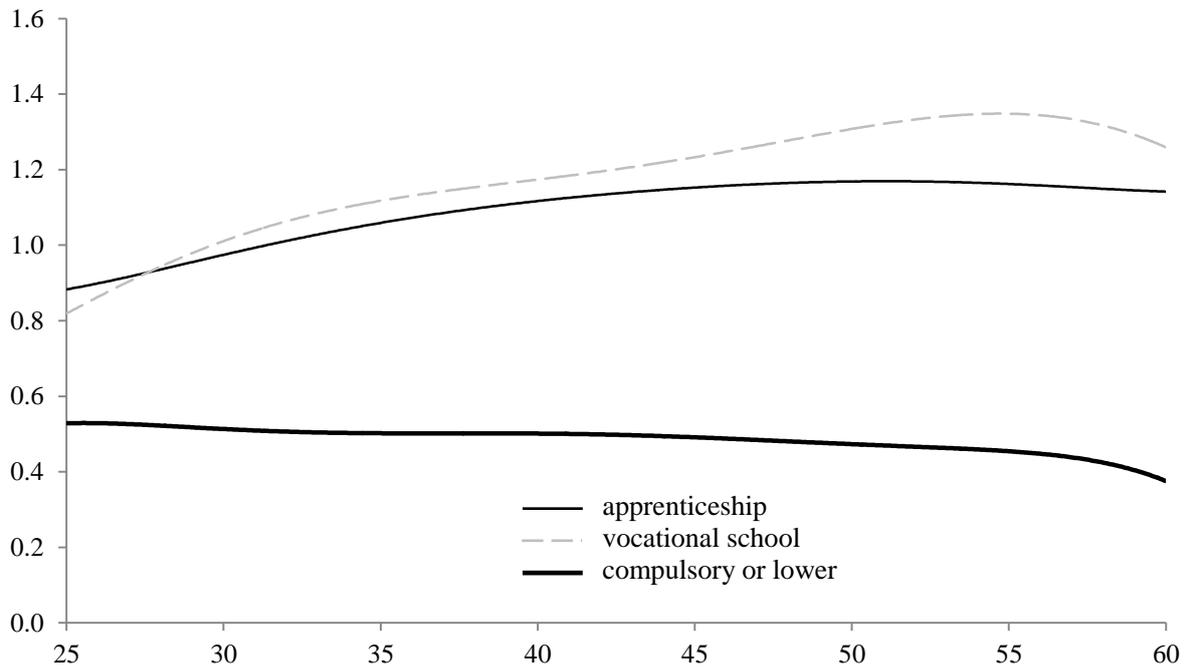
UK Labour Force Survey 1993–2014, 1 = median annual income for UK (£21,025)

Figure A8.10b: Women – United Kingdom



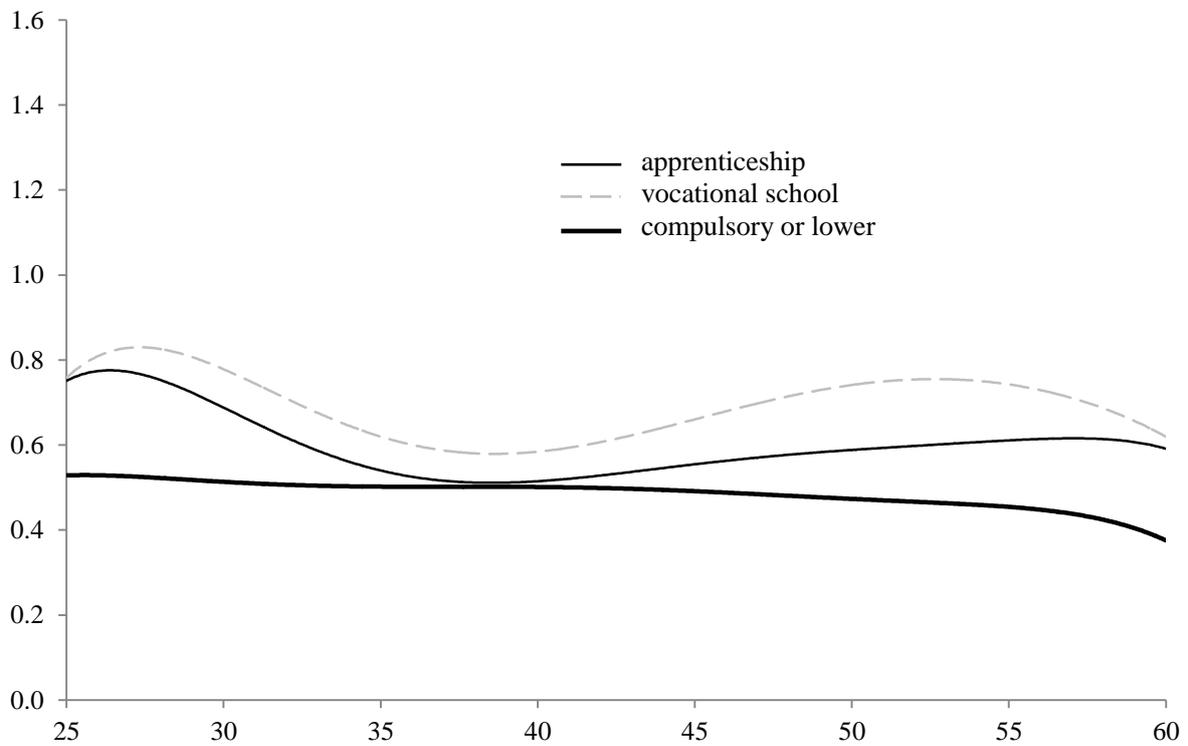
UK Labour Force Survey 1993–2014, 1 = median annual income for UK (£21,025)

Figure A8.10c: Men – Switzerland



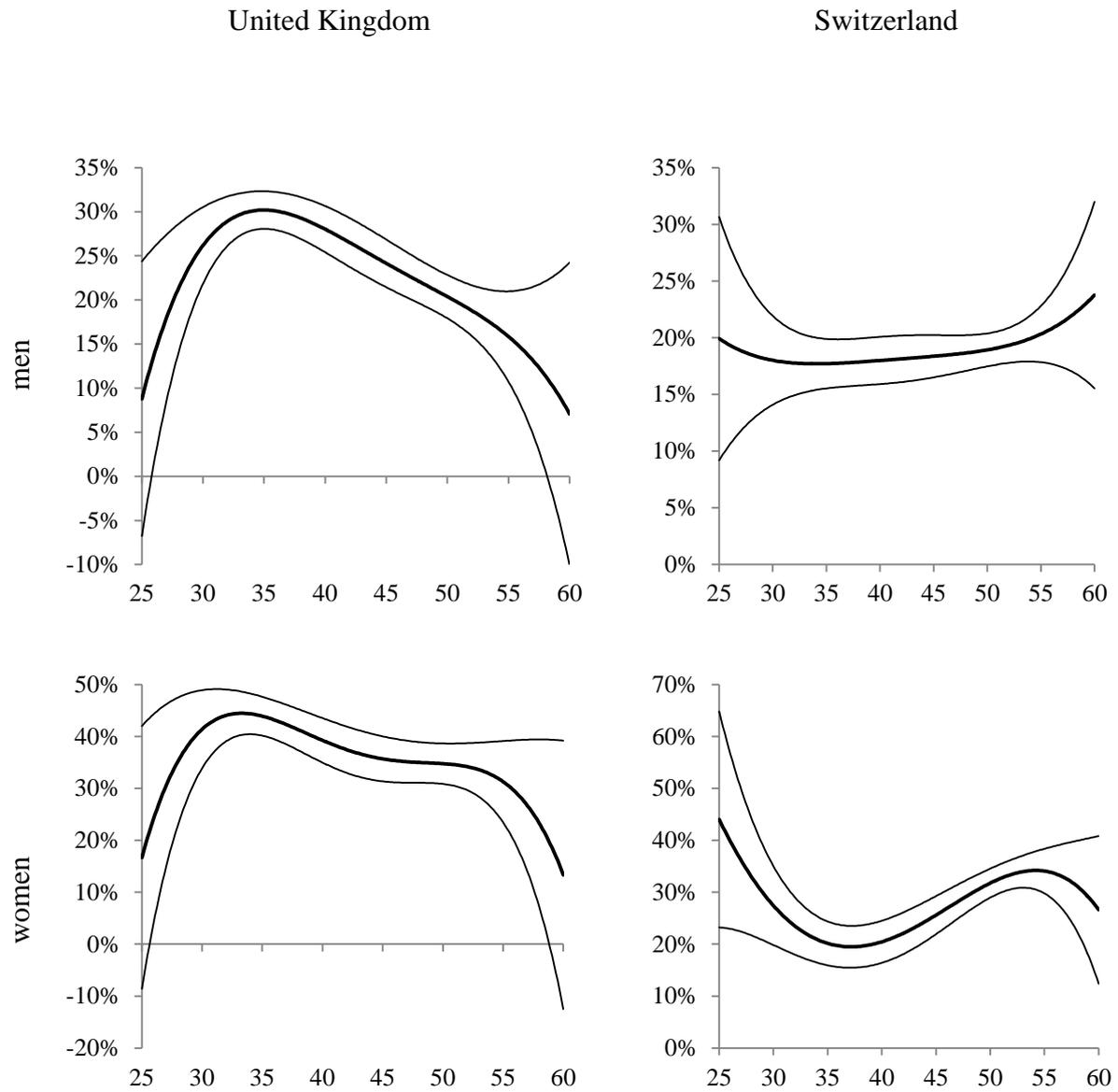
Swiss Labour Force Survey 1991–2014, 1 = median annual work income for CH (CHF72,300)

Figure A8.10d: Women – Switzerland



Swiss Labour Force Survey 1991–2014, 1 = median annual work income for CH (CHF72,300)

Figure A8.11: Difference in annual wages by age for upper-secondary vocational relative to lower education (average marginal effects)



UK Labour Force Survey 1993–2014 and Swiss Labour Force Survey 1991–2014, cohort 1954–1968

Main line: average marginal effect. Thinner lines: 95% confidence intervals.

8.2.2 *Tables from chapter 3*

Table A8.5: Definition of educational categories, United Kingdom and Switzerland

	United Kingdom	Switzerland
Tertiary	higher education below degree, degree or higher	university, technical college and tertiary vocational education
Upper secondary	A level or equivalent, apprenticeship above foundation level, city and guilds advanced craft and similar	apprenticeship and baccalaureate
Intermediate secondary	GCSE A-C or equivalent, apprenticeship foundation level, city and guilds craft part 2 and similar	one or two years of internship or commercial school
Compulsory or lower	primary/compulsory school, unfinished school and no qualifications	

Table A8.6: OLS regression coefficients for being in employment (min. 8 hours per week)

	men		women		
	estimate	std. e	estimate	std. e	
UKLFS	age	0.919	0.817	<b>-3.751</b>	0.917
	age <sup>2</sup>	-0.364	0.301	<b>1.418</b>	0.338
	age <sup>3</sup>	0.068	0.048	<b>-0.221</b>	0.054
	age <sup>4</sup>	-0.005	0.003	<b>0.012</b>	0.003
	educ: voc	-1.126	1.197	1.582	1.820
	age*educ: voc	1.327	1.200	-0.765	1.827
	age <sup>2</sup> * educ: voc	-0.487	0.443	0.061	0.674
	age <sup>3</sup> * educ: voc	0.077	0.071	0.024	0.109
	age <sup>4</sup> * educ: voc	-0.004	0.004	-0.003	0.006
	constant	-0.371	0.816	<b>3.745</b>	0.915
	Adjusted R <sup>2</sup>	0.077		0.077	
N	114,198		98,969		
SLFS	age	1.708	2.041	-4.690	2.468
	age <sup>2</sup>	-0.684	0.731	1.726	0.886
	age <sup>3</sup>	0.116	0.114	-0.268	0.139
	age <sup>4</sup>	-0.007	0.007	0.015	0.008
	educ: voc	1.377	2.280	2.531	2.858
	age*educ: voc	-1.645	2.229	-1.712	2.804
	age <sup>2</sup> * educ: voc	0.688	0.802	0.354	1.011
	age <sup>3</sup> * educ: voc	-0.120	0.126	-0.015	0.159
	age <sup>4</sup> * educ: voc	0.008	0.007	-0.001	0.009
	constant	-0.551	2.095	<b>5.150</b>	2.527
	Adjusted R <sup>2</sup>	0.057		0.041	
N	32,869		38,858		

UKLFS: UK Labour Force Survey 1993–2014, SLFS: Swiss Labour Force Survey 1991–2014, cohort 1954–1968

Controls include region and nationality.

Age variables have been divided by 10 (i.e. age 25 is expressed as 2.5, age 45 as 4.5).

Coefficients in bold are significant at  $p < 0.05$ .

Table A8.7: OLS regression coefficients for log hourly wage

	men		women		
	estimate	std. e	estimate	std. e	
UKLFS	age	<b>6.065</b>	2.476	0.628	2.157
	age <sup>2</sup>	<b>-2.239</b>	0.903	-0.480	0.786
	age <sup>3</sup>	<b>0.375</b>	0.144	0.121	0.125
	age <sup>4</sup>	<b>-0.023</b>	0.008	-0.010	0.007
	educ: voc	-2.850	3.504	-3.204	3.627
	age*educ: voc	2.767	3.473	2.644	3.585
	age <sup>2</sup> * educ: voc	-0.911	1.269	-0.709	1.306
	age <sup>3</sup> * educ: voc	0.131	0.203	0.077	0.208
	age <sup>4</sup> * educ: voc	-0.007	0.012	-0.003	0.012
	constant	-4.262	2.501	1.720	2.183
Adjusted R <sup>2</sup>	0.125		0.157		
N	18,542		14,042		
SLFS	age	4.300	2.480	1.432	2.680
	age <sup>2</sup>	-1.403	0.891	-0.448	0.959
	age <sup>3</sup>	0.206	0.140	0.065	0.150
	age <sup>4</sup>	-0.011	0.008	-0.004	0.009
	educ: voc	4.817	2.739	0.193	3.043
	age*educ: voc	-4.850	2.684	-0.123	2.972
	age <sup>2</sup> * educ: voc	1.820	0.968	0.075	1.068
	age <sup>3</sup> * educ: voc	-0.295	0.152	-0.015	0.167
	age <sup>4</sup> * educ: voc	<b>0.018</b>	0.009	0.001	0.010
	constant	-1.339	2.540	1.623	2.756
Adjusted R <sup>2</sup>	0.191		0.146		
N	21,452		21,249		

UKLFS: UK Labour Force Survey 1993–2014, SLFS: Swiss Labour Force Survey 1991–2014, cohort 1954–1968

Controls include region and nationality.

Age variables have been divided by 10 (i.e. age 25 is expressed as 2.5, age 45 as 4.5).

Coefficients in bold are significant at  $p < 0.05$ .

### 8.3 Appendix from chapter 4

#### 8.3.1 Figures from chapter 4

Figure A8.12: Experience and hourly wage

Figure A8.12a: men vocational education

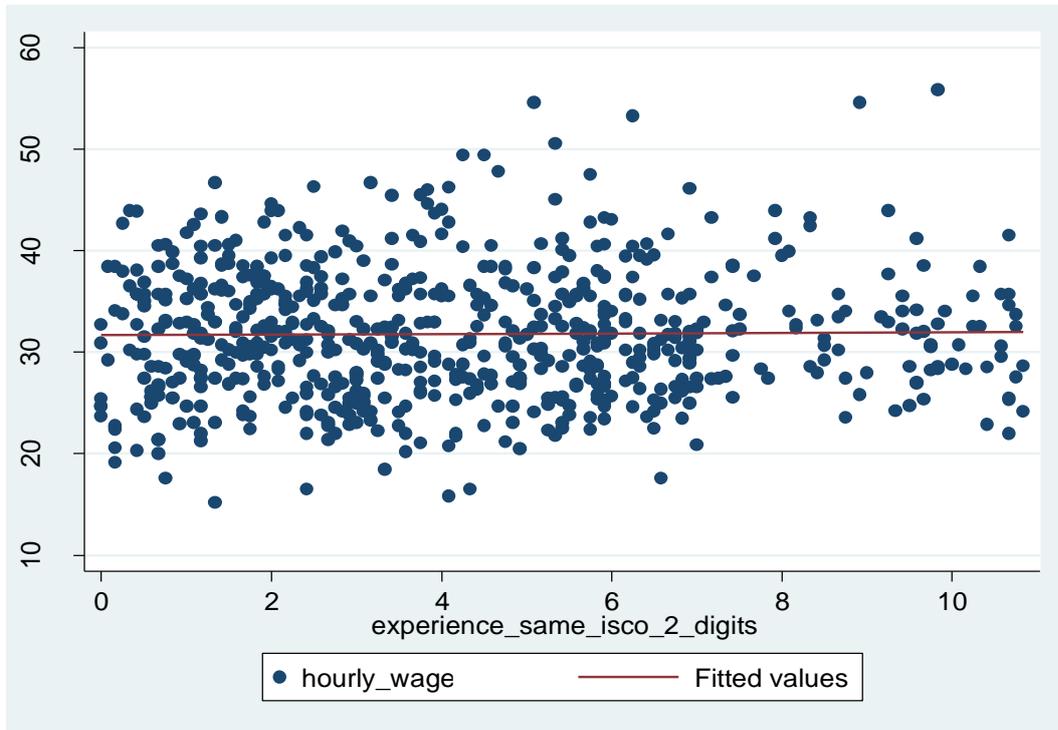


Figure A8.12b: men general education

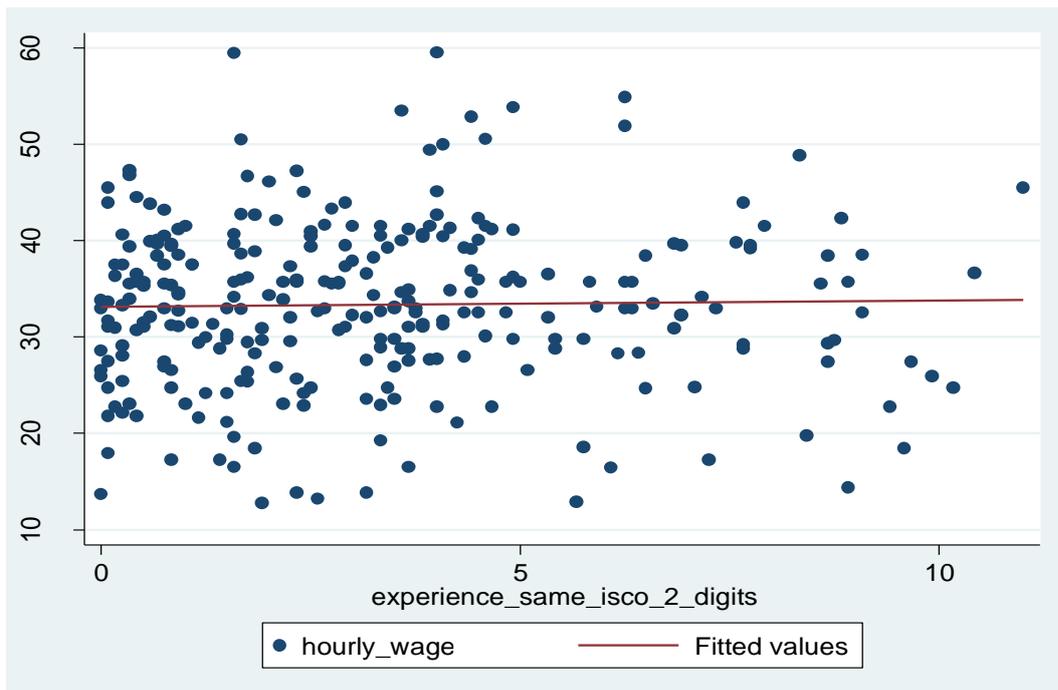


Figure A8.12c: women vocational education

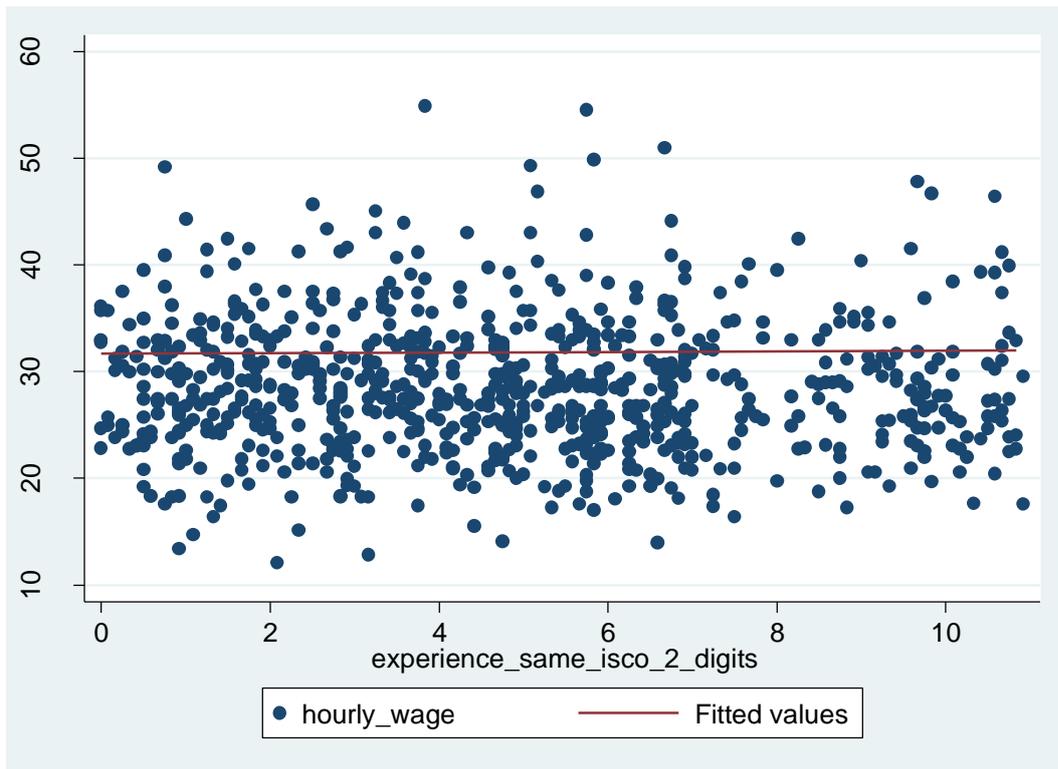


Figure A8.12d: women general education

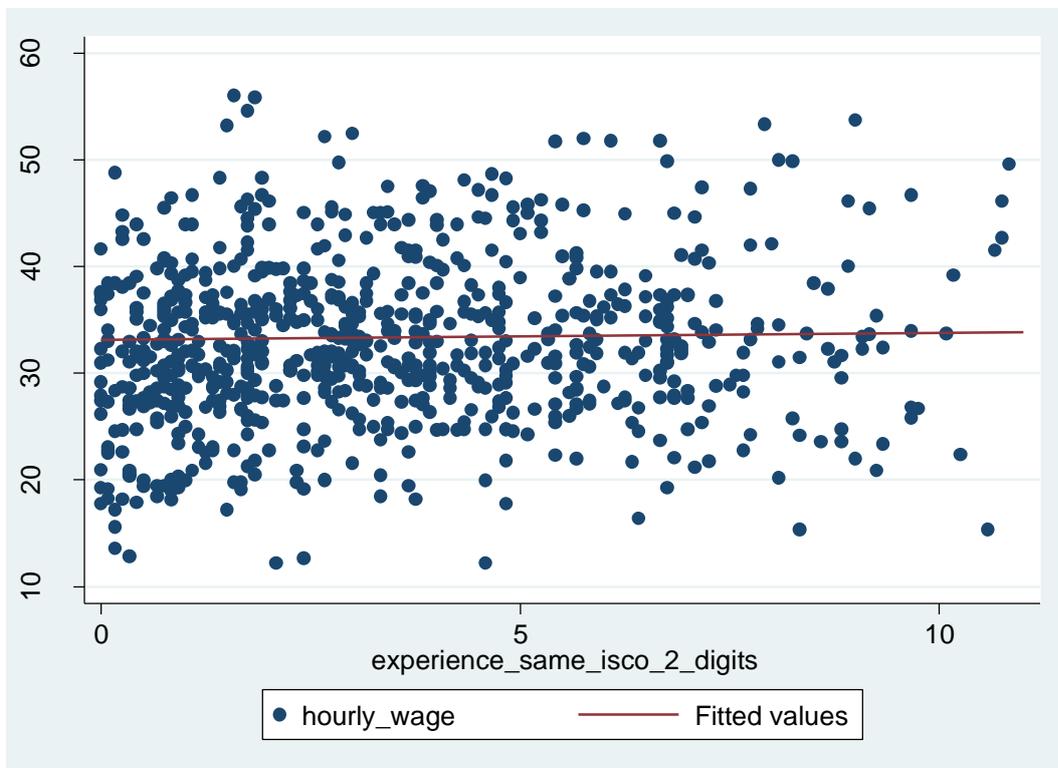
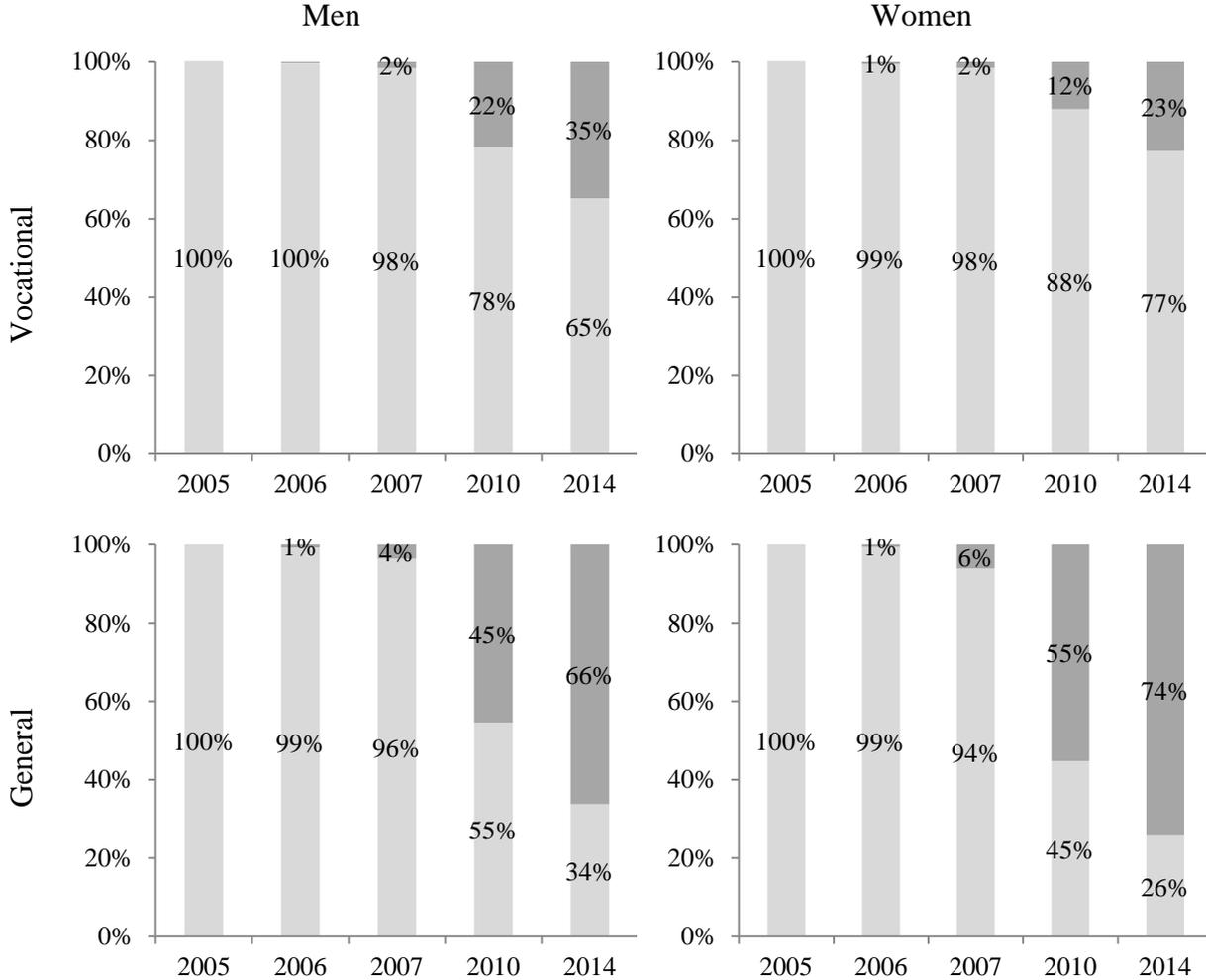


Figure A8.13: Share of respondents with a tertiary degree by type of upper-secondary education

Wave 5 = 2005, average age: 21  
 Wave 9 = 2014, average age: 30  
 N = number of observations

■ No tertiary degree  
 ■ Tertiary degree



TREE, waves 5 to 9 (2005-2014), nonresponse correction weights

Figure A8.14: Predicted evolution of wages for upper-secondary vocational education (relative to upper-secondary general education) by years of work experience

Figure A8.14a: no tertiary degree

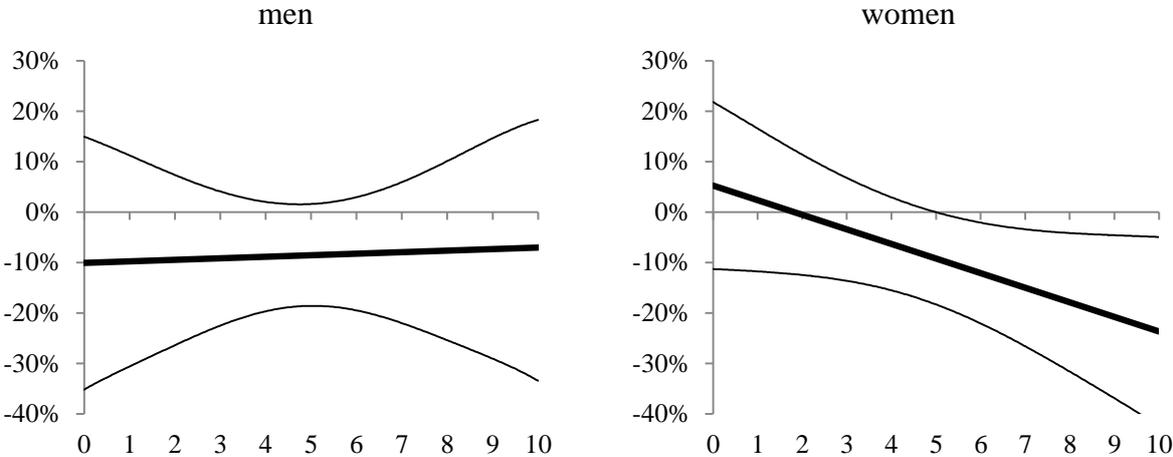
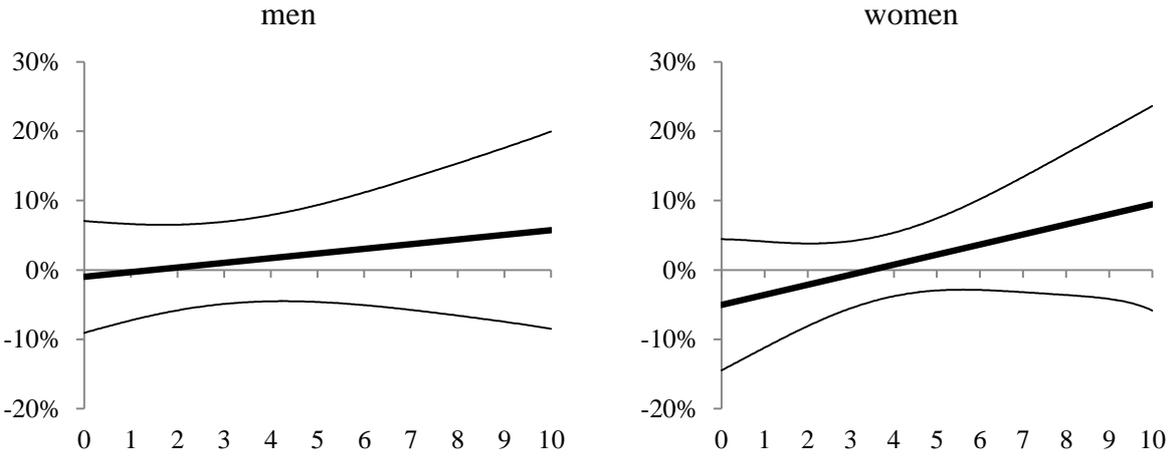


Figure A8.14b: with a tertiary degree



This figure is based on the models shown in Table A8.9 (full model with entropy balancing matching) and shows 95% confidence intervals  
 TREE, waves 8 and 9 (2010, 2014), nonresponse correction weights

8.3.2 Tables from chapter 4

Table A8.8: Sample characteristics before and after matching

	Before reweighting						After reweighting					
	vocational			general			vocational			general		
	Mean	Variance	Skewness	Mean	Variance	Skewness	Mean	Variance	Skewness	Mean	Variance	Skewness
<b>School abilities</b>												
PISA score (reading)	499.8	6268	-0.4669	565.1	5097	-0.1047	499.8	6268	-0.4669	499.8	5985	-0.2851
Track: - pre-gymnasial												
- extended academic requirements	0.413	0.243	0.352	0.208	0.165	1.440	0.413	0.243	0.352	0.413	0.243	0.353
- basic academic requirements	0.313	0.215	0.808	0.062	0.058	3.630	0.313	0.215	0.808	0.313	0.215	0.808
- no (formal) tracking	0.059	0.056	3.742	0.053	0.050	3.992	0.059	0.056	3.742	0.059	0.056	3.742
<b>Origin and context</b>												
ISCED of the father: 1-2-3												
4	0.334	0.222	0.706	0.287	0.205	0.942	0.334	0.222	0.706	0.333	0.222	0.707
5-6	0.294	0.208	0.905	0.552	0.247	-0.211	0.294	0.208	0.905	0.294	0.208	0.905
ISCED of the mother: 1-2-3												
4	0.351	0.228	0.624	0.331	0.222	0.716	0.351	0.228	0.624	0.351	0.228	0.624
5-6	0.221	0.172	1.345	0.460	0.248	0.162	0.221	0.172	1.345	0.221	0.172	1.345
In Switzerland before 5	0.083	0.076	3.033	0.077	0.071	3.177	0.083	0.076	3.033	0.083	0.076	3.034
Maturity rate in the canton	18.54	38.45	0.826	21.23	49.89	0.299	18.54	38.45	0.826	18.55	32.67	0.533

The matching was done for individuals (and not for observations) on the final sample. Vocational=treat  
 Descriptive statistics of the matching weight: Mean: 1.08, Std. Dev.: 3.22, Min: 0.002, Max: 100.32

Table A8.9: The effect of the type of education on wages (linear regression coefficients on log hourly wages), full model

	coeff.	bootstrap std. err.
vocational	0.053	(0.085)
experience	0.026	(0.015)
vocational*experience	-0.029	(0.015)
tertiary	<b>0.204</b>	(0.096)
vocational*tertiary	-0.103	(0.102)
experience*tertiary	-0.030	(0.018)
vocational*experience*tertiary	<b>0.043</b>	(0.019)
male	0.168	(0.146)
male*vocational	-0.154	(0.150)
male*experience	-0.021	(0.027)
male*vocational*experience	0.032	(0.028)
male*tertiary	-0.097	(0.166)
vocational*tertiary*male	0.194	(0.173)
male*tertiary*experience	0.021	(0.030)
vocational*tertiary*male	-0.040	(0.031)
constant	<b>3.285</b>	(0.082)
N observations		2257
N individuals		1679

TREE, waves 8 and 9 (2010, 2014), nonresponse correction weights

Bootstrapping: 2000 replications; Number of nearest neighbours: 10

Variables used for the matching:

Abilities: track, reading score in PISA test

Origin: arrival in Switzerland after the age of 5 (yes/no), isced of the father and of the mother

Regional context: maturity rate for men/women in the canton in 2000 (continuous)

Note: Bold is statistically significant at  $p < 0.05$ ; standard errors in parentheses.



Figure A8.16: Example vignettes (translated from German/French)

*You will now be asked to evaluate 12 fictional candidates for 3 different jobs. For each candidate, please give the likelihood that you would invite him or her to a job interview (0 = very unlikely, 10 = very likely) as well as the monthly salary you would pay them. All the candidates completed their compulsory schooling in Switzerland, have been unemployed for 6 months, and lost their previous job due to the closure of their firm.*

**HR Assistant job candidate:**

*Application:* One of your employees had recommended Mr Ismail Üstgöl for the vacant position.

*Personal details:* He is 45 years old, has 2 school-aged children and is unmarried.

*Education:* He has completed his upper-secondary schooling.

*Professional experience:* He has, amongst other work experience, 8 years of Human Resources experience in the private sector.

*Language skills:* Mr Üstgöl speaks French and Turkish.

*Hobby:* He is a committee member of *Türkgücü*, a Turkish cultural association.

*Further information:* He is currently completing training in human resources management, paid for by the Regional Employment Office.

<b>Invite for an interview:</b>	<b>Monthly gross salary (100%):</b>
<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10	_____ CHF

**Accountant job candidate:**

*Application:* A few days ago, you received a spontaneous application from Ms Nathalie Rochat.

*Personal details:* She is 40 years old, has one school-aged child, and is divorced.

*Education:* She completed professional business studies and has a diploma in accounting.

*Professional experience:* She has, amongst other work experience, 8 years of accounting experience in the public sector.

*Language skills:* Ms Rochat speaks French

<b>Invite for an interview:</b>	<b>Monthly gross salary (100%):</b>
<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10	_____ CHF

**Building caretaker job candidate:**

*Application:* The Regional Unemployment Office has sent you the application of Mr Pedro Martinez.

*Personal details:* He is 45 years old, has no children and is married.

*Education:* He completed an apprenticeship as a commercial building maintenance specialist.

*Professional experience:* He has, amongst other work experience, 8 years of building maintenance experience in the private sector.

*Language skills:* Mr Martinez speaks German and Spanish.

*Hobby:* In his free time, he volunteers as a driver for the Red Cross.

*Further information:* Alongside his job search, he has a part-time job as a sales assistant in a retail business.

<b>Invite for an interview:</b>	<b>Monthly gross salary (100%):</b>
<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10	_____ CHF

#### 8.4.2 Tables from chapter 5

Table A8.10: Variables included in the vignettes of the factorial survey experiment

<i>Dimension (variable)</i>	<i>Levels (values)</i>
Gender*	Male, female
Age	35, 40, 45, 50, 55
Children	0, 1, 2, 3
Civil Status	Single, married, divorced
Type of education	Vocational, general
Type of work experience	Private sector, public sector
Nationality*	Swiss, Spanish, Turkish, Polish
Mother tongue	German/French German/French plus an additional language
Participation in active labour market program**	None, training program, occupational program (matched and unmatched), subsidy, temporary employment
Channel of Application	Advertisement, referral from current employee, unsolicited application, regional employment service
Hobby**	None, swim coaching, board member of a Swiss/foreign cultural association, volunteer for Red Cross driving service

Table A8.11: Correlations between vignette dimensions (Cramer's V)

	1	2	3	4	5	6	7	8	9	10	11
1 ALMP	1										
2 Channel of applic.	0.028	1									
3 Gender	0.015	0.02	1								
4 Age	0.023	0.017	0.018	1							
5 Children	0.017	0.017	0.034	0.024	1						
6 Civil status	0.028	0.01	0.015	0.036	0.011	1					
7 Hobby	0.029	0.027	0.015	0.024	0.021	0.011	1				
8 Education	0.019	0.021	0.003	0.017	0.009	0.017	0.007	1			
9 Nationality	0.02	0.016	0.013	0.021	0.022	0.019	0.027	0.025	1		
10 Experience	0.013	0.016	0.003	0.014	0.019	0.014	0.015	0	0.013	1	
11 Language	0.022	0.015	0.001	0.009	0.018	0.003	0.009	0.002	0.014	0.018	1

No correlation is statistically significant at the 95 per cent level

Table A8.12a: Likelihood of being invited for an interview depending on the type of education and gender (on a scale from 0 to 10), with and without interaction effects, **including respondents aged 45**

	Accountant				HR assistant			
	Coeff	Robust std. err.						
Vocational	<b>0.433</b>	0.088	<b>0.288</b>	0.107	-0.112	0.080	-0.081	0.107
Female	0.061	0.068	-0.094	0.097	<b>0.402</b>	0.067	<b>0.437</b>	0.093
Vocational*Female			<b>0.301</b>	0.139			-0.068	0.136
Constant	<b>6.814</b>	0.057	<b>6.889</b>	0.064	<b>6.088</b>	0.054	<b>6.072</b>	0.064
R <sup>2</sup>	0.025		0.028		0.027		0.028	
N (Vignettes)	1876		1876		1922		1922	
N (respondents)	477		477		490		490	

*Jobvul, respondent fixed-effect regressions*

*Bold coefficients are significant at the 95 per cent level.*

Table A8.12b: Likelihood of being invited for an interview depending on the type of education and age (on a scale from 0 to 10), with and without interaction effects, **including respondents aged 45**

	Accountant				HR assistant			
	Coeff	Robust std. err.						
Vocational	<b>0.433</b>	0.087	<b>0.396</b>	0.118	-0.135	0.080	-0.209	0.110
45	0.017	0.095	0.016	0.138	-0.029	0.093	-0.134	0.132
50-55	<b>-0.213</b>	0.083	<b>-0.260</b>	0.116	<b>-0.394</b>	0.080	<b>-0.433</b>	0.108
Vocational*45			0.000	0.185			0.208	0.185
Vocational*50-55			0.093	0.144			0.081	0.154
Constant	<b>6.924</b>	0.060	<b>6.943</b>	0.075	<b>6.455</b>	0.056	<b>6.493</b>	0.066
R <sup>2</sup>	0.031		0.031		0.024		0.025	
N (Vignettes)	1876		1876		1922		1922	
N (respondents)	477		477		490		490	

*Jobvul, respondent fixed-effect regressions*

*Bold coefficients are significant at the 95 per cent level.*

Table A8.13a: Likelihood of being invited for an interview depending on the type of education and gender (on a scale from 0 to 10), with and without interaction effects, **position of concierge**

	Accountant			
	Coeff	Robust std. err.	Coeff	Robust std. err.
Vocational	<b>0.623</b>	0.107	<b>0.678</b>	0.136
Female	<b>-0.323</b>	0.086	<b>-0.269</b>	0.123
Vocational*Female			-0.110	0.165
Constant	<b>7.168</b>	0.066	<b>7.141</b>	0.080
R <sup>2</sup>		0.058		0.058
N (Vignettes)		1474		1474
N (respondents)		477		477

*Jobvul, respondent fixed-effect regressions*

*Bold coefficients are significant at the 95 per cent level.*

Table A8.13b: Likelihood of being invited for an interview depending on the type of education and age (on a scale from 0 to 10), with and without interaction effects, **position of concierge**

	Accountant			
	Coeff	Robust std. err.	Coeff	Robust std. err.
Vocational	<b>0.611</b>	0.107	<b>0.550</b>	0.131
50-55	<b>-0.418</b>	0.087	<b>-0.478</b>	0.116
Vocational*50-55			0.118	0.159
Constant	<b>7.225</b>	0.072	<b>7.256</b>	0.081
R <sup>2</sup>		0.070		0.070
N (Vignettes)		1474		1474
N (respondents)		477		477

*Jobvul, respondent fixed-effect regressions*

*Bold coefficients are significant at the 95 per cent level.*