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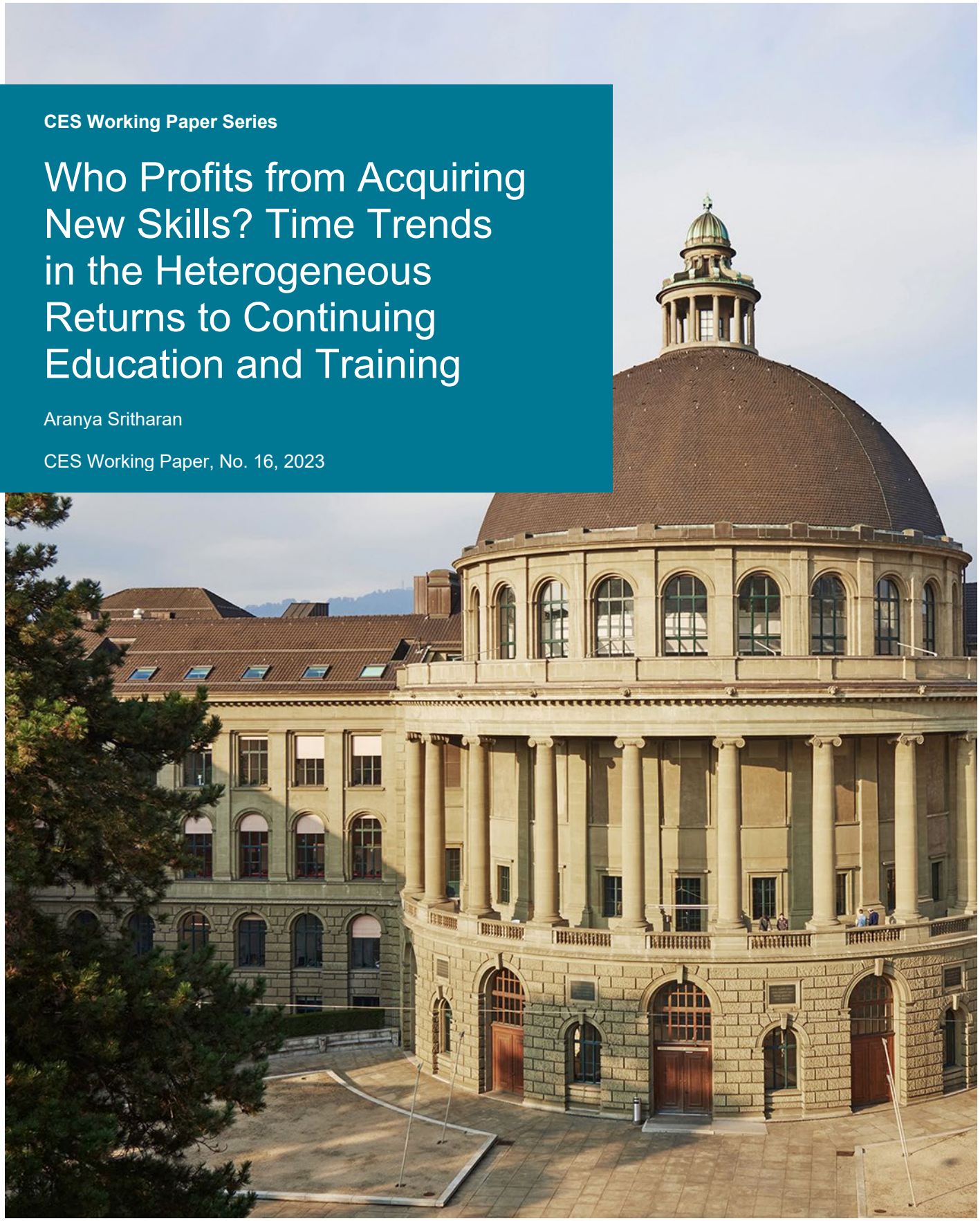

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Who Profits from Acquiring New Skills? Time Trends in the Heterogeneous Returns to Continuing Education and Training

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Data availability

The data are available from the Swiss Federal Statistical Office upon placing an order.

Abstract

As technological change progresses, workers need to update their skills continuously. One method to adapt to rapid changes in the job-relevant skills is the participation in continuing education and training (CET) – the non-formal sector of the education system. I use Swiss panel data to estimate the effect of CET on a worker's wage growth. I contribute to the literature by estimating the effect of different lengths of CET on workers' wage, and effect changes over time by skill level of workers. Results show that CET, especially longer courses, has a small but positive effect on wage growth. The results further show that lower-skilled workers profit more from CET than their higher-skilled counterparts. Moreover, I find positive effect changes these returns over time for the highly-skilled, and negative trends for the lower-skilled. However, these results depend on the skill proxy. These results provide evidence in support of both the human capital theory framework and the skill-biased technological change hypothesis. When promoting CET to workers, policy makers should consider that longer courses might result in better labour market outcomes and that workers with lower skill levels might face challenges due to technological change in the future.

1. Introduction

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

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

The human capital theory framework (Becker, 1993) states that new skills enhance productivity, and thus are worthwhile for individuals, since a higher productivity improves their labour market outcomes. The skill-biased technological change (SBTC)

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

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

Scholars studying CET as an active labour market policy, i.e., to re-integrate and to increase employment probability, find heterogeneous effects by type of training (Card et al., 2018; Gerfin & Lechner, 2002) and also length of training (Biewen et al., 2014; Kluve et al., 2012; Lechner et al., 2007). Other studies show that the demand for higher-skilled workers has increased over time and their wages have increased, as the SBTC hypothesis predicts (Hémous & Olsen, 2022; King et al., 2017; Mouw & Kalleberg, 2010). Therefore, so far, the studies on the relation between CET and wages find mixed evidence, and heterogeneity by group of individuals.

This study investigates the effect of CET on the wage growth of workers in Switzerland. Moreover, the study analyses which group of workers profits most from acquiring new skills, and whether this effect has changed over time for either group. I contribute to the literature in two ways: First, I investigate the effect of different intensities of CET

on workers' labour market outcomes, i.e., I analyse the effects on wage growth depending on the length of a CET course. I hypothesise that longer CET courses have a larger positive effect on wage growth. Second, I analyse the development of the relation between CET and wage growth over time by skill level of a worker to show if the returns have changed for a specific group. Following the framework underlying the SBTC hypothesis, I hypothesise that the highly-skilled experience an increased positive effect of CET on wage growth over time.

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

Switzerland provides an interesting case study because, participation in CET in Switzerland is traditionally high (FSO, 2021), and in Switzerland CET is mostly privately and firm-based organised, i.e., that the skills acquired in CET are expectedly closely related to a person's occupation (Denzler et al., 2022). This study limits its scope by measuring the effect on wages growth only, thereby omitting other outcomes, such as occupational mobility, changes in work tasks or satisfaction with work, which are undoubtedly as relevant for workers.[1]

The results show that the effect of CET on wage growth is significantly positive, while this effect is driven by longer CET courses. Furthermore, the results show that workers with lower education levels and occupations with low skill demand have a

[1] A linking of other data sets (such as the household panel) with the SLFS might provide grounds to analyse the effects of CET on these other outcomes.

statistically significant positive wage growth. However, the changes in effects on wage growth over time show a slight upward trend for the highly-skilled, and a slight downward trend for the lower-skilled, depending on the skill proxy I use.

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

2. Literature on CET and its Relation to Wages

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

1.1. CET as human capital accumulation

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

The most common way to build a human capital stock is to invest in formal education or 'schooling' (Mincer, 1989). As adults sooner or later enter the labour market

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

As participation in training enhances skills and signals an individual’s readiness to adapt to changing job requirements, Becker (1993) argues that general as well as specific training pays off in the labour market. Hence, if workers participate in training – be it general or specific – they arguably become more productive, which their current or a future employer is ready to reward (Konings & Vanormelingen, 2015). Consequently, my first sub-hypothesis to hypothesis set H1 reads as follows:

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

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

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

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

These previous elaborations imply a linear relation between human capital and returns. While this might be still true for short-term education such as CET, much empirical evidence, however, provides reason to believe that additional schooling has different effects depending on how many years of education a person has already completed (Balestra & Backes-Gellner, 2017; Brand & Xie, 2010; Henderson et al., 2011). These studies find that the slope of wage returns is steeper for individuals with lower educational levels or from disadvantaged backgrounds, and has significant decreasing returns at high educational levels. Despite individuals with high levels of education having higher wages, additional investment after a certain threshold yields lower marginal returns (Trostel, 2004). In other words, highly-educated individuals who invest in more education might acquire a surplus, for which there might not be a significant positive return anymore. Individuals with lower levels of education, in turn, might only take up additional education if they expect positive returns, which compensate the costs for education (Oreopoulos & Petronijevic, 2013). Consequently, I formulate a second set of hypotheses, H2, for which the first sub-hypothesis reads as follows:

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

1.2. Skill-biased technological change and CET

While scholars developed the human capital theory, many disruptive technologies were just emerging, with a rapid surge of technological change only to happen later in the 20th century (Powell & Snellman, 2004). As these technologies started to interfere more strongly into the labour market, scholars developed a hypothesis to explain how the labour market and the labour force might adapt to this restructuring of jobs. Therefore, the skill-biased technological change (SBTC) hypothesis (Acemoglu, 2002; Goldin & Katz, 2009) was introduced to explain how technological change fosters a concentration of the workforce, while favouring the highly-skilled. As the SBTC hypothesis relates the accumulation of skills to an increased productivity, it is an elaboration based on the HCT framework (see Mincer, 1989 for his elaborations on the effect of technologies).

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

Therefore, the SBTC hypothesis assumes different consequences of technological change for different types of job-relevant tasks. Autor et al. (2003) reason that

technologies substitute both routine manual and routine cognitive tasks, while they complement non-routine cognitive tasks. Consequently, firms decrease labour input in routine (manual and cognitive) tasks, and increase labour input into non-routine cognitive tasks.[2] Non-routine cognitive tasks are presumably best performed by highly educated individuals, for which the demand increases in industry sectors with high levels of computerisation. The empirical evidence indeed shows that workers with higher skill levels and new technologies are complementary (Arvanitis, 2005; Bolli & Pusterla, 2023; Michaels et al., 2014), i.e., that new technologies make them more productive. Hence, the profitability of training, according to Mincer (1989), should increase for this type of workers.

Moreover, scholars argued that SBTC contributes to an increase in wage inequality in high-income countries (Lemieux, 2008)[3]: individuals who accumulate skills that enable them to work in highly technologized occupations, i.e., managers, professionals, technical workers, are rewarded better than individuals who work in occupations with less computerisation where there is less or no need for technology-related skills. Therefore, higher-skilled workers are labour market winners who receive higher wages because of their presumed productivity, and often have the bargaining power for other benefits too (Guadalupe, 2007; King et al., 2017; Li et al., 2019). Lower-skilled workers, in turn, lack the skills that are complementary to productivity increasing technologies, leading to fewer employment opportunities in rewarding jobs.

Thus, higher-skilled workers have a larger 'bundle' of skills, which they can apply in the labour market (Hanushek et al., 2015; Spitz-Oener, 2006). Moreover, the highly-skilled can optimise their skill bundle by engaging in CET and acquiring new, up-to-date

[2] Workers in non-routine manual tasks, in turn, are said to switch to other lower-skilled occupations, which are less likely to be automated (Autor & Dorn, 2013; Frey & Osborne, 2017).
[3] Already when the SBTC hypothesis emerged, scholars acknowledged that it only partly explains wage inequality (Card & DiNardo, 2002; Goldin & Katz, 2009; Lemieux, 2008).

skills. Therefore, relying on the SBTC hypothesis, I complete hypothesis H2 with a second sub-hypothesis, which contrasts the first sub-hypothesis and reads as follows:

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

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

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

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

1.3. Review of the Empirical Evidence

As this study investigates the outcomes of CET, the following sections review selected studies on the relation between CET and mainly wages. There exists a large body of empirical studies testing the relation between non-formal education and labour market

attainment. When reviewing this literature, it becomes apparent that the relevant studies provide mixed evidence on the effect of CET on different labour market outcomes. According to Bills (2005), these heterogenous results stems from the large variety of CET courses and its different purposes.

Since CET is vastly heterogeneous in its contents and depends highly on the institutions of the education system and the labour market of a country (Dieckhoff, 2007; Dieckhoff et al., 2007; Vogtenhuber, 2015), its effect on wages expectedly strongly varies across countries. Triventi and Barone (2014) e.g., find effects between 0%-8% on the gross individual income, depending on the European country. In line with human capital theories, studies find that general training seems to yield higher individual returns than firm-provided training (Acemoglu & Pischke, 1999; Li et al., 2000; Muehler et al., 2007; O'Connell & Byrne, 2012), most likely because employers reap the benefits of firm-provided training more than the workers (Muehlemann & Wolter, 2020).

However, as with formal education, participation in CET is often prone to a selection bias. Studies show that participation in CET highly depends on individual characteristics – such as the level of education (Kramer & Tamm, 2018; Saar & Räis, 2017; Schwerdt et al., 2012), sometimes with employers intentionally favouring the highly-skilled for training (Goux & Maurin, 2000). Against this backdrop, many studies apply experimental and quasi-experimental designs to account for selection into CET. One approach to moderate these issues is a comparison-group approach, by examining non-participants, who are very similar to CET participants, as the untreated counterfactual. These studies find mixed evidence, i.e., that there is evidence for small (around 0.5%) and sometimes insignificant wage returns to CET (Görlitz, 2011; Leuven & Oosterbeek, 2008), but also for larger (around 5%) and significant effects (O'Connell & Byrne, 2012; Ruhose et al., 2019).

For Switzerland, Denzler et al. (2022), using a difference-in-difference approach, find that CET has a positive effect on annual wages and reduces risk of unemployment,

but that the effects are heterogeneous to gender, age, education, and regional labour market conditions. Schwerdt et al. (2012) use the same data as in this paper combined with a voucher distribution experiment, but they, in turn, find no statistically significant effect on wages.

Other scholars also use the randomised distribution of training vouchers to gauge not only the causal effect on participation in and returns to CET, but also effect heterogeneity by skill level of individuals. These studies find mixed evidence. Doerr et al. (2017) find overall small positive employment effects, but no effects on wages long-term. Yet, they find that mainly individuals with lower skill levels experience wage benefits, but that they mainly participate in formal degree programmes. Focussing only on the lower-skilled, Hidalgo et al. (2014) in turn find that participation increases in the medium term, but no effects on wages or job mobility. Furthermore, Rinne et al. (2011) find no heterogeneous treatment effect depending on skill level.

The empirical literature also discusses the effect of different lengths, measured in weeks or months, of CET. These studies mostly analyse CET as an active labour market policy, i.e., a public intervention to reduce inequalities in the labour market to e.g., bring back unemployed individuals to the labour market (Biewen et al., 2014; Gerfin & Lechner, 2002; Kluve et al., 2012; Lechner et al., 2007). These studies find that short to medium length training are most effective for labour market reintegration. Longer training courses appear not to have any effect or even negative effects on labour market outcomes (so-called “lock-in effects”).

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

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

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

3. Continuing Education and Training in Switzerland

As this study focuses on non-formal education and its effects on labour market outcomes, it is important to outline the distinction to formal education from the onset. The OECD (2021) defines formal education as an activity, which individuals undertake

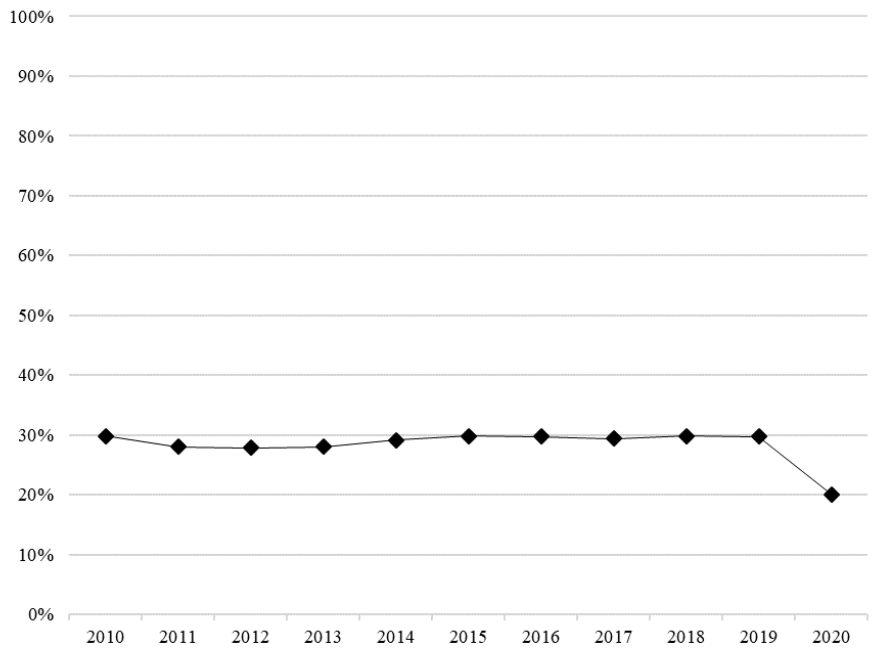
intentionally and which leads to a certification and encompasses clear learning goals. Furthermore, formal education is recognised at the national level, with a more or less high degree of standardisation, and usually is part of primary, secondary or tertiary education levels. Non-formal continuing education and training in most countries is also rather organised and mostly intentional, but does not lead to a widely recognised certificate (Ehlert, 2017).

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

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

The SLFS shows for the time period 2010-2020 that on average, 29% of the working population participated in CET (Figure 1).

Figure 1: Participation in continuing education in Switzerland 2010-2020



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

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

4. Data and Variable Selection

4.1. The Swiss Labour Force Survey

I use data from the Swiss Labour Force Survey (SLFS) to undertake this analysis. The SLFS is a representative panel initiated in 1991. It provides information on the labour force structure and labour force behaviour of the Swiss population, more precisely on current or previous employment, unemployment, retirement, working conditions,

occupation, income, job search, occupational mobility, but also on formal and non-formal education, the composition of the household and on demographic characteristics. This survey constitutes the main information provider on employment-related topics. Residents – nationals and foreigners – in Switzerland above 15 years are eligible to participate in the SLFS.

For this study, I use a sub-sample of the SLFS. As the questionnaire has changed from 2010 and again from 2021 onwards[4], I restrict the data to the time period between 2010 to 2020. As of 2010, each selected individual gives four interviews over the course of 15 months and then leaves the panel.[5] Furthermore, I transform the longitudinal structure of the panel to obtain one cross-section per individual by introducing time-lagged variables. I do so because information on annual wage and thus the dependent variable 'wage growth' – which I describe in a later section – is available twice, i.e., in the first and the third survey wave. I rely on CET activities of individuals from the first two survey waves. Hence, I estimate the effect of CET on wage growth nine months after CET activities took place.[6] I rely on previous empirical studies that state that investigating short-term effects of CET on wage growth is reasonable (Dieckhoff, 2007; Pischke, 2001). Furthermore, estimating the short-term effects of CET on wage growth allows me to plausibly exclude firm-switching – another potential outcome of CET activities and thus a source of wage growth.

Before performing the analyses, I impose further restrictions on the sample. I limit the data to employed individuals, i.e., I exclude unemployed persons and those in upper-

[4] The first relevant change is the survey mode, i.e., the change from annual to quarterly interviews. The second change concerns the question on CET from 2021 onwards, where CET activities are surveyed for a different time frame. Furthermore, as there was a remarkable decline in CET activities in 2020 due to the COVID-19 pandemic, I reasonably exclude survey periods after 2020 from the analysis.
[5] While the survey followed annual conduction from 1991 to 2009, its structure was fundamentally revised, and it now surveys individuals on a quarterly base since 2010. Furthermore, the sample experienced a substantial increase in size, and now consists of 126,000 interviews per year.
[6] There are three months between the first and the second survey wave, and also between the third and the fourth survey wave. Between the second and the third, there are nine months. This procedure results in 15 months of panel time per individual.

secondary vocational education and training. Furthermore, the analytical strategy combined with this specific data structure requires that there be at least three observations per individual, meaning that individuals with fewer observations drop out. The final analytical sample consists of 114,908 observations.

4.2. Dependent variable

I use a worker's wage growth as my dependent variable. Wages are available only twice per person, i.e., in the first and the third survey wave. I use the imputed variable by the Swiss federal statistical office (FSO), who transformed the indications of wages to gain information on annual wages.[7] I take the natural logarithm of the value to standardise the wage and to display relative changes to the worker's wage level. Furthermore, I calculate wages for full-time equivalents.

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

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

[7] The FSO do so because some individuals indicate hourly wages, and others indicate monthly wages.

4.3. Explanatory variables

The explanatory variables are a worker's CET activities. As engagement in CET activities is not systematically documented in Switzerland, all available information on the population's CET is self-reported.[8] Individuals in the SLFS report their CET activities retrospectively, i.e., the questions state as follow: "during the last four weeks, did you attend any CET courses?" and "during the last four weeks, how many hours in total did you spend on CET courses?".

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

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

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

[8] The case is different for formal education, where formal education participation in Switzerland is documented by the federal statistical office via the individual's old age and survivor's insurance number.

4.4. Heterogeneity by skill level

To test my second and third hypothesis, I investigate heterogeneity by skill level of a worker. Many data sources, such as the SLFS, do not contain direct measures of skills.[9] Therefore, I approximate skills with two variables, which the empirical literature frequently uses (e.g. Oesch & Rodríguez Menés, 2011; Spitz-Oener, 2006). These proxies are based on the education level and the skill level of the occupation, respectively, which are included in the SLFS:

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

The data show – as expected – that a worker having a tertiary education and a high-skilled occupation correlate significantly. A principal component factor analysis confirms that these two variables load onto the same factor (Table 25 and Table 26 in the Appendix).

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

As we know from previous empirical studies (e.g., from Switzerland), the highly-skilled are more likely to take up CET (Denzler et al., 2022; Gerfin, 2004; Schwerdt et al., 2012). To illustrate that this is the case also for the individuals surveyed in the SLFS, Table 1 displays the means of the two CET variables by skill proxy and two-sample t-tests of difference in means to illustrate whether they significantly differ by skill level. We see that the two groups significantly differ in all respects, i.e., that the highly-skilled in this sample are more actively engaging in CET.

Table 1: Summary statistics of CET variables by skill proxy

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

Notes: Summary statistics (means of CET variables) and results of two-sample t-tests. *=10%, **=5%, ***=1% significance. Source: SLFS 2010-2020. N= 114,908. Aside from the true zeros of the variable, the category 'no CET' of the variable 'length of CET course' includes everyone who indicated 0 for the variable 'participation in CET', and also individuals who have missing values for the variable 'length of CET course'. This coding explains the discrepancies between the two zero-categories of the two variables.

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

4.5. Empirical Strategy

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

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

Where $\Delta lnwage_{it}$ is the outcome variable that measures the individual wage growth of a worker. $CET_{it_{-1}}$ is a placeholder for each of the two the explanatory variables, which capture CET activities. β_1 thus represents the coefficient of interest. $X_{i,t_{-1}}$ is a vector of control variables that includes worker and firm characteristics measured at t_{-1} – the time of CET participation. α_t are the year dummies, and $\varepsilon_{i,t}$ is the error term. The vector of control variables, $X_{i,t_{-1}}$, measures characteristics of a worker and the firm or organisation they work for. Table 2 displays a description of each variable, while Table 6 in the Appendix displays their summary statistics. As the index t_{-1} already indicates, all control variables were measured at the time of participation in CET.

Table 2: Description of covariates in the estimated regressions

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

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

To analyse heterogeneity in effects of CET on wage growth, I estimate the same linear regressions as in Eq. (1) but include the interaction term $CET_{i,t-1} * Skill_{i,t-1}$, where $Skill_{i,t-1}$ stands for one of the two proxies that measure skills, i.e., the education level and skill level of the occupation. Furthermore, to investigate the change over time, I estimate Eq. (1) with sample splits for each year between 2011 and 2020.[10] Note that as my analytical period starts in 2010, I cannot estimate the effect of CET activities from 2009 on wage growth between 2009 and 2010.

This wage equation is similar yet different to the traditional Mincer wage equation. The difference is that – because this information is missing in the data – I omit the continuous and the squared term for work experience, which in my estimation is only represented by the inclusion of variables such as age and tenure in firm. Similarly to the updated Mincer wage equation, Eq. (1) includes a number of other independent variables,

[10] Note that as my analytical period starts in 2010, I cannot estimate the effect of CET activities from 2009 on wage growth between 2009 and 2010.

which are shown to affect a worker's wage, and thus potentially wage growth (Polachek, 2008).

5. Results

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

5.1. Baseline Regressions

The results for the baseline regressions show that both explanatory variables have a positive significant effect on wage growth. The first explanatory variable – 'participation in CET' – has a positive significant effect on wage growth by 0.4% in the full model (2). The second explanatory variable, which differentiates between shorter and longer CET courses, only has positive significant effect for its second category, i.e., for long CET courses. Long CET courses lead to a positive annual wage growth of 0.4% (model 6) compared to not participating in CET. I do not find an effect on wage growth when a worker participates in a short CET course. Furthermore, the covariates also show the expected sign of their effects, highlighting the credibility of the estimated models. The full results table is listed in the Appendix in Table 7. Thus, the baseline regressions provide evidence for hypothesis H1a, which states that CET has a positive effect on wage growth and for H1b, which states that longer CET courses have a larger positive effect that shorter CET courses.

Table 3: Effect of CET on annual wage growth

Annual wage growth	**(1)**	**(2)**	**(3)**	**(4)**
Participation in CET	0.005***	0.004***		
	(0.001)	(0.001)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.001	0.001
			(0.002)	(0.002)
Long CET course			0.007***	0.004**
			(0.002)	(0.002)
Survey years	Yes	Yes	Yes	Yes
Employment variables				
Temporary contract		0.030***		0.030***
		(0.004)		(0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003*		-0.003*
		(0.002)		(0.002)
8 years and more		-0.007***		-0.007***
		(0.002)		(0.002)
Working part-time		-0.014***		-0.014***
		(0.002)		(0.002)
In leadership position or self-employed		-0.003**		-0.003**
		(0.001)		(0.001)
High-skilled occupation		0.001		0.001
		(0.001)		(0.001)
Firm variables				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002		-0.002
		(0.002)		(0.002)
100+		-0.003		-0.003
		(0.002)		(0.002)
Industry sector		Yes		Yes
Region of firm residence		Yes		Yes
Demographic variables				
Tertiary education		0.004***		0.004***
		(0.001)		(0.001)
Female		0.006***		0.006***
		(0.002)		(0.002)
Age				
15-24		Ref.		Ref.
25-39		-0.013***		-0.013***
		(0.004)		(0.004)
40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
N of observations	114,908	114,908	114,908	114,908

R^2	0.000	0.006	0.000	0.006

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

5.2. Heterogeneity by skill level

The following sections outline the results of the heterogeneity analyses. In a first step, I test whether the effect of the explanatory variables differs by skill level of a worker. By interacting the explanatory variables with two proxies for a worker's skill level, I show whether there exists heterogeneity regarding wage growth for these different groups of workers when they engage in CET. These analyses serve to test my second set of hypotheses, H2a and H2b. Table 8 and Table 9 in the Appendix show the full results tables.

In a second step, to investigate potential changes in effect by skill level over time, I estimate models with sample splits by survey year and the same interaction terms as in Table 8 and Table 9. This final set of estimations serve to test my hypothesis H3. Table 10 through Table 17 in the Appendix show the respective results tables. The following tables include different specifications; models (1), (3) and (5) are models with only year dummies, models (2), (4) and (6) include all covariates.

5.3. Tertiary educated workers

The first heterogeneity analysis focuses on the education level as a proxy for the skill level of a worker. Here I distinguish between workers who completed tertiary education (and above) and those with lower levels of education. Table 4 displays the results for linear regression models, which include the two CET variables and the level of education of a worker as interaction terms. I again estimate baseline models with only the year dummies as covariates, and full models with the same covariates as in the baseline regressions.

Table 4 shows that there is no presence of an interaction effect for the highly-skilled, i.e., those with a tertiary education or above in any of the six models. I detect no statistically significant results (except for short CET courses, which are only significant

at the 10%-level), but the effects are negative in qualitative terms. Furthermore, the baseline effects of the CET variables are significantly positive for the variable ‘participation in CET’. The variable ‘length of CET course’ has no effect in the full model. These baseline effects represent the effect for those without a tertiary education. Thus, workers with lower skill levels experience a positive effect when engaging in CET, the effect sizes are even comparable to the baseline effects of workers with tertiary education who do not participate in CET. Consequently, the analysis of the first proxy for skill levels provides evidence in support of H2a, which states that workers with lower skill levels profit more from CET than higher-skilled workers.

Table 4: Heterogeneity by skill level – tertiary education

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

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

5.4. Workers in higher-skilled occupations

Table 5 displays the results for the second proxy for skills, i.e., whether a worker works in a high-skilled occupation or not. I again included this binary variable in an interaction term with the explanatory variables separately. When including the occupation of a worker as a proxy for skills, the results are very similar to when including the level of education. Hence, these two variables likely provide a similar skills measure, as also shown by the PCF analysis. The estimations yield no significant effect for the interaction terms with the skill proxy and the respective CET variable in the full models. Hence, workers in high-skilled occupations do not profit from engaging in CET. The baseline effects – i.e., the effects for workers from a lower-skilled occupation engaging in CET – are positive, with the baseline effect of 'participation in CET' on wage growth being significant at a 1%-level. Thus, this analysis too provides evidence in favour of hypothesis H2a.

Table 5: Heterogeneity by skill level – high-skilled occupation

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

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

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

5.5. Change over time in the effect of CET on wage growth by skill level

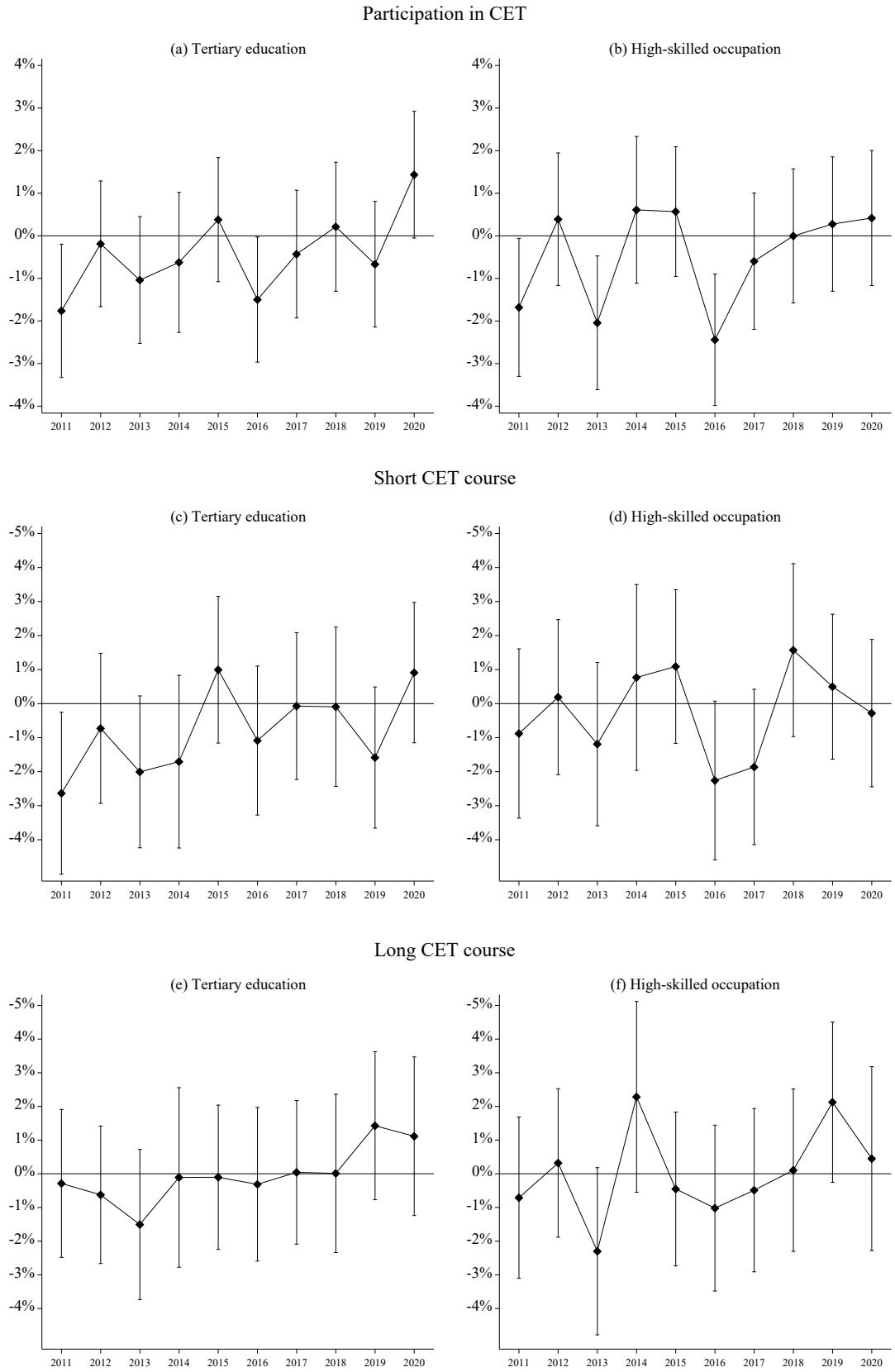
As a last heterogeneity analysis, I investigate the change over time in the returns to CET for workers depending on their skill level. To this end, I use sample splits by each year within the analytical period, where I include the aforementioned interaction terms as in the previous heterogeneity analyses to account for the different skill levels of the workers. To efficiently illustrate the change over time, Figure 2 and Figure 3 include average marginal effects (AME) with 95% confidence intervals of the two CET variables at the

respective skill level of a worker for each time period. I include a single plot for each explanatory variable and each proxy for a worker's skill level.

I first focus on the effects over time for the highly-skilled, i.e., those with tertiary education and in higher-skilled occupations. In Figure 2 the first two plots display the change over time for the variable 'participation in CET'. For tertiary educated workers, there seems to be a stable AME over time, except for the first and last point in the time-line, where there is a larger difference detectible. For workers in high-skilled occupations, the AME of participating in CET displays some trendless fluctuations in the first half of the decade, while the effect seems to stabilise in the second half of the decade. For both, the AME moves closely around zero within this time period, and rarely deviates significantly from zero, as the confidence intervals depict.

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

Figure 2: Effect of CET on wage growth over time for higher-skilled workers

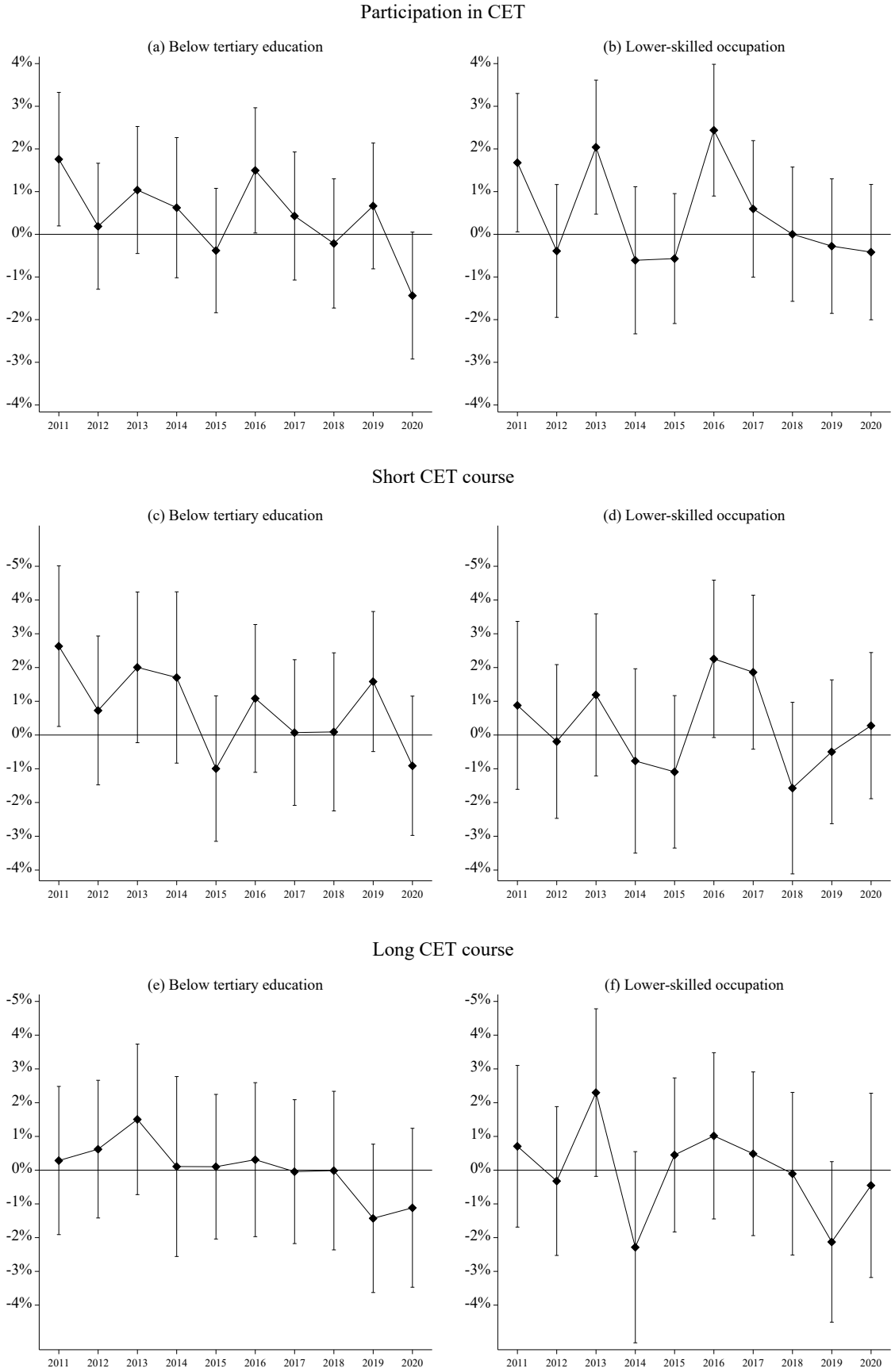


Notes: Plots of linear regression results with average marginal effects and 95%-confidence intervals by survey year. Point estimates display the average marginal effect of CET for higher-skilled workers. N per year=~11'000. Source: own illustration based on SLFS 2010-2020.

When turning to Figure 3 and the AME over time for the lower-skilled, we see that the trend points towards a slight negative trend in AME of the two CET variables. The first variable 'participation in CET' shows strong fluctuations for both skill proxies, with a slight downward trend. For workers with education below the tertiary level, the AME are almost always close to zero, with statistically significant deviations from zero only in three time periods. For workers in occupations with lower skill demand, there are strong fluctuations over this time period, with a downward trend in the second half of the decade.

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

Figure 3: Effect of CET on wage growth over time for lower-skilled workers



Notes: Plots of linear regression results average marginal effects and 95%-confidence intervals by survey year. Point estimates display the average marginal effect of CET for lower-skilled workers. N per year=~11'000. Source: own illustration using SLFS 2010-2020.

Overall, an analysis over this time period provides no compelling evidence regarding hypothesis H3. Nonetheless, for most variables for the highly-skilled, there is a slight upwards trend detectible, while the trends for the lower-skilled are slightly negative. As most effects remain close to zero and deviations from zero are only occasionally statistically significant, the estimations with sample splits provide no intuitive evidence regarding a trend in the effect of CET on wage growth over time. Hence, I turn to a three-way interaction of the CET variables, the skill proxies and the survey years (included as a continuous variable) to make statements on the slope of the time period variable as a function of the interaction of CET activities and a worker's skill level. Table 18 and Table 19 in the Appendix show these three-way interactions for the highly-skilled.

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

5.6. Robustness of Results

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

As Table 20 illustrates, when estimating regressions with absolute values of wage growth as a dependent variable, the effects are almost identical to the main results. For the variable 'length of CET course', the second category is only significant at the 10%-level in the full model.

Estimating models with a lagged dependent variable (LDV) constitutes the second robustness test for the baseline regressions. Regressing a worker's current wage ($wage_{it}$) on the LDV $wage_{it-1}$ allows for controlling for unobserved heterogeneity, as an individual's previous wage is highly indicative of their ability and therefore their skill level. Table 21 shows that the effects for the explanatory variables are qualitatively similar but larger in effect size to effects from the main models.

The explanatory variable 'length of CET course' is based on the question on how many hours were spent on CET during the last four weeks prior to the interview. Reporting training in hours in hindsight might be difficult, resulting in a variable with much noise. Therefore, I also test whether outliers of individuals who are highly engaged in CET affect the main estimates. Table 22 displays the results of this robustness test. This test only concerns the variable 'participation in CET', as 'length of CET variable' already

distinguishes between high and low CET intensity[11]. Thus, I restrict observations to individuals participating only one survey wave in total. As Table 22 shows, the results for the variable 'participation in CET' are almost identical to the results of the main models.

To test the robustness of the heterogeneity analyses for the different effects by skill level, I estimate the baseline regressions with sample splits by skill level. Table 23 and Table 24 display the results of linear regressions with sample splits. The highly-skilled experience almost no significant positive effects, irrespective of the operationalisation of CET, meaning that the positive returns to CET remain with the lower-skilled workers, confirming the main models for the heterogeneity analyses.

Within the human capital theory framework and the empirical evidence, the effect is heterogeneous depending on the nature of CET, i.e., whether it is firm-specific/employer-initiated or general (see e.g. Muehler et al., 2007; O'Connell & Byrne, 2012). The SLFS includes information on whether individuals engage in CET for private reasons or for work-related reasons. I estimate the same OLS regressions as in the main models, but with a reduced sample by the variable 'CET for work-related or private reasons', comparing a model with and without said variable.[12] Results (Table 27) show that neither the variable 'length of CET course' nor the variable 'CET for work-related or private reasons' have an effect on wage growth in any of the models. Consequently, the reduction of the sample size presumably drives the changes in effect.

Nevertheless, the variable 'CET for work-related or private reasons' does not provide us with information on whether the respective CET course is general or work-related, i.e., the more relevant distinction for this analysis.[13] However, Bills and Hodson (2007) argue that CET generally enhances skills, whereas it is not clearly distinguishable whether these skills are general, transferable or for private use only or whether they are

[11] I already excluded implausible values for this variable, as described in the section 'Explanatory variables'.
[12] Note that these tests are only possible for the variable 'length of CET', as the variable 'CET for work-related or private reasons' is filtered by 'participation in CET'.
[13] Additionally, the SLFS does not strategically categorise the content of the attended CET courses.

useful for the current employment of the worker. Similarly, there is no information in the SLFS on who financed the CET course(s)[14]. This lack of information hence does now allow for estimating models including the costs of CET.

5.7. Is there a selection bias to the returns to CET?

As Heckman (1974) illustrated, there is a selection bias to which wages we can observe in the labour force. Individuals – and in Heckman's case study especially women – whose reservation wages are higher than the expected wage rate from employment usually opt out of the labour market because the benefits from engaging in non-work activities are higher. To test whether this is the case in this sample of the Swiss labour force, I estimate a Heckman two-step model to account for this selection bias. The SLFS data include information on unemployed individuals, allowing to test for the likelihood of employment in a first step, with a person having children under 15 years as an instrument (leaning on Leuven & Oosterbeek, 2008). As expectedly women are more likely to leave the labour market when caring for young children – due to wage penalties and weaker career prospects (Oesch et al., 2017) –, I interact the instrument with the gender of the surveyed individual. Table 28 in the Appendix displays the results of this test. I find that the instrument, i.e., having children below 15 years, has a significant positive effect on labour market participation in both specifications. This effect, however, is different for men and women, i.e., that the interaction effect with the instrument and gender is highly and significantly negative. Thus, women with children are less likely to remain in the labour market. However, the inverse mills ratio is insignificant for all specifications, meaning that there is no selection bias in the effect of CET.

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

6. Discussion and Conclusion

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

This study investigates the effect of CET on a worker's short-term wage growth. I use representative Swiss panel data between 2010 and 2020 to first estimate the effect depending on the length of a CET course, and second, changes in effect over time depending on the skill level of a worker. Hereby, I use two variables, i.e., 'participation in CET' and 'length of CET of course'. I find that both variables have a positive effect on a worker's wage growth, especially longer CET courses, for which there seems to be no lock-in-effect. Furthermore, the results show that mainly workers with lower skill levels – i.e., with lower levels of education and within occupations with lower skill demand – profit from CET (corroborating the findings of e.g. Doerr et al., 2017). These results are in line with the previous empirical evidence, which finds that CET has a small short-term effect on wages or wage growth (e.g. Görlitz, 2011; Leuven & Oosterbeek, 2008; Ruhose et al., 2019). Furthermore, these results provide evidence in support of human capital theories over the SBTC hypothesis.

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

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

The results of the heterogeneity analyses confirm previous empirical studies (e.g. Denzler et al., 2022; Schwerdt et al., 2012; Wolter & Schiener, 2009). There exist several explanations as to why lower-skilled workers stronger profit from CET. Scholars argue that CET might be more specifically targeting the lower-skilled, i.e., that there is no general effect of CET, as in many countries the contents might specifically targets the lower-skilled (see e.g. Doerr et al., 2017). Against this assumption speaks that the highly-skilled engage most often in CET (CSRE, 2023; Denzler et al., 2022; Schwerdt et al., 2012). As the highly-skilled have diminishing returns to education in general and experience a saturation effect (Wolter & Schiener, 2009), they presumably hope to reap other benefits, such as a larger professional network, or just enjoyment of education (Marginson, 2019). The lower-skilled, in turn, are expected to only take up education if the expected benefits are high as there are high discount rates. Scholars nowadays acknowledge that the benefits of education go beyond an individual's wage and that their wage is not always directly linked to their productivity (Klees, 2016).

The analysis of potential effect changes over time for the highly-skilled shows that the highly-skilled indeed faced a positive trend in returns over time, depending on the skill proxy. According to the third hypothesis, accelerating technological change causes this positive effect. The returns to CET for the lower-skilled have slightly declined over time. Regarding the overall heterogeneity analyses, these results show that the

returns to CET for the highly-skilled have caught up to the returns for the lower-skilled. Thus, as hypothesised by the SBTC, the labour market seeks workers with large skill bundles and therefore rewards CET for the highly-skilled. This reasoning might also explain the slightly declining returns for the lower-skilled.

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

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

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

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

exists large within-group variation by level of education or type of occupation regarding skills.

This analysis provides evidence in support of the effectiveness of CET concerning wage benefits. As many studies show that the highly-skilled engage in CET most often, while the lower-skilled so far have benefitted more. Previous studies show that the highly-skilled are more likely to receive CET, especially with increasing technological change, and this study provides evidence that their returns increased as well over time. To ensure equity in the labour market, policy makers could encourage and financially support firms to invest in their lower-skilled workforce, such that they do not fall behind in a rapidly changing labour market. While formal education might be more effective for job changes or career re-orientation, many workers lack the time to invest in formal education after labour market entry. Thus, creating targeted and longer CET courses, which foster career changes and job safety, are desirable.

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Appendix I: Summary Statistics

Table 6: Summary statistics of regression variables

	N	Mean	Std. Dev.	Min	Max
Dependent variable					
Wage growth in %	114,908	0.02	0.22	-1.37	1.35
Explanatory variable: CET in t-1	114,908				
Participation in CET	114,908	0.32	-	0	1
Length of CET course	114,908				
0	114,908	0.78	-	0	1
1 (1-12 h)	114,908	0.11	-	0	1
2 (12+ h)	114,908	0.11	-	0	1
Proxies for skill level					
Tertiary education	114,908	0.44	-	0	1
High-skilled occupation	114,908	0.53	-	0	1
High-skilled worker (factor analysis variable)	114,908	0.62	-	0	1
Covariates in t-1					
Employment variables					
Temporary contract	114,908	0.05	-	0	1
Tenure in firm	114,908				
3 years and less	114,908	0.25	-	0	1
Between 3 and 8 years	114,908	0.3	-	0	1
8 years and more	114,908	0.45	-	0	1
Leadership position	114,908	0.37	-	0	1
Part-time employment	114,908	0.35	-	0	1
Firm variables					
Firm size (Number of employees)	114,908				
1-10	114,908	0.19	-	0	1
11-99	114,908	0.41	-	0	1
>=100	114,908	0.4	-	0	1
Region of firm in Switzerland	114,908				
Geneva	114,908	0.18	-	0	1
Espace Mittelland	114,908	0.21	-	0	1
North-Western Switzerland	114,908	0.12	-	0	1
Zurich	114,908	0.21	-	0	1
Eastern Switzerland	114,908	0.12	-	0	1
Central Switzerland	114,908	0.11	-	0	1
Ticino	114,908	0.05	-	0	1
Firm sector NOGA 2008	114,908				
Agriculture, forestry and fishing	114,908	0.01	-	0	1
Mining and quarrying	114,908	0.00	-	0	1
Manufacture of goods	114,908	0.15	-	0	1
Electricity, gas, steam and air-conditioning supply	114,908	0.01	-	0	1
Water supply, sewerage, waste management and remediation	114,908	0.00	-	0	1
Construction	114,908	0.05	-	0	1
Wholesale and retail trade, repair of motor vehicles and motorcycles	114,908	0.13	-	0	1
Transportation and storage	114,908	0.05	-	0	1
Accommodation and food service activities	114,908	0.03	-	0	1
IT, telecommunications and other information services	114,908	0.04	-	0	1
Financial and insurance activities	114,908	0.07	-	0	1
Real estate	114,908	0.01	-	0	1

	N	Mean	Std. Dev.	Min	Max
Other professional, scientific and technical activities	114,908	0.08	-	0	1
Administrative and support service activities	114,908	0.03	-	0	1
Public administration and defence, compulsory social security	114,908	0.06	-	0	1
Education	114,908	0.09	-	0	1
Health and social work	114,908	0.15	-	0	1
Arts, entertainment and recreation	114,908	0.01	-	0	1
Other services	114,908	0.03	-	0	1
Activities of households as employers; undifferentiated goods- and services-producing, activities of households for own use	114,908	0.00	-	0	1
Activities of extra-territorial organisations and bodies	114,908	0.00	-	0	1
Demographic variables					
Age categories	114,908				
15-24	114,908	0.05	-	0	1
25-39	114,908	0.33	-	0	1
40-54	114,908	0.44	-	0	1
55-64	114,908	0.17	-	0	1
>=65	114,908	0.01	-	0	1
Gender: female	114,908	0.48	-	0	1
Swiss nationality	114,908	0.68	-	0	1
Civil status: married	114,908	0.58	-	0	1
Household size (number of persons in household)	114,908	2.78	1.29	1	9
Variables for robustness tests					
CET for work-related reasons (variable from 2010-2015)	14,685	0.82	-	0	1
CET for work-related reasons (variable from 2016 onwards)	15,572	0.87	-	0	1
Participation in CET (only one survey wave)	114,849	0.25	-	0	1

Notes: Summary statistics table for variables included in regressions.

Appendix II: Full Results Tables

Table 7**:** Full results table of baseline regressions

Annual wage growth	**(1)**	**(2)**	**(3)**	**(4)**
Participation in CET	0.005***	0.004***		
	(0.001)	(0.001)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.001	0.001
			(0.002)	(0.002)
Long CET course			0.007***	0.004**
			(0.002)	(0.002)
Survey years				
2011	Ref.	Ref.	Ref.	Ref.
2012	-0.007**	-0.007***	-0.007**	-0.007***
	(0.003)	(0.003)	(0.003)	(0.003)
2013	-0.010***	-0.010***	-0.010***	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)
2014	-0.009***	-0.008***	-0.009***	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
2015	-0.007***	-0.007***	-0.007***	-0.007***
	(0.003)	(0.003)	(0.003)	(0.003)
2016	-0.009***	-0.009***	-0.008***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
2017	-0.009***	-0.010***	-0.009***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
2018	-0.008***	-0.009***	-0.008***	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
2019	-0.006**	-0.006**	-0.006**	-0.006**
	(0.003)	(0.003)	(0.003)	(0.003)
2020	-0.005*	-0.004*	-0.005*	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Employment variables				
Temporary contract		0.030***		0.030***
		(0.004)		(0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003*		-0.003*
		(0.002)		(0.002)
8 years and more		-0.007***		-0.007***
		(0.002)		(0.002)
Working part-time		-0.014***		-0.014***
		(0.002)		(0.002)
In leadership position or self-employed		-0.003**		-0.003**
		(0.001)		(0.001)
High-skilled occupation		0.001		0.001
		(0.001)		(0.001)
Firm variables				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002		-0.002
		(0.002)		(0.002)
100+		-0.003		-0.003
		(0.002)		(0.002)
Industry sector				
Agriculture, forestry and fishing		Ref.		Ref.

Mining and quarrying	-0.011	-0.011
	(0.012)	(0.012)
Manufacture of goods	-0.016**	-0.016**
	(0.006)	(0.006)
Electricity, gas, steam and air-conditioning supply	-0.015*	-0.015*
	(0.008)	(0.008)
Water supply, sewerage, waste management and remediation	-0.006	-0.006
	(0.010)	(0.010)
Construction	-0.014**	-0.014**
	(0.007)	(0.007)
Wholesale and retail trade, repair of motor vehicles and motorcycles	-0.016**	-0.016**
	(0.006)	(0.006)
Transportation and storage	-0.014**	-0.014**
	(0.007)	(0.007)
Accommodation and food service activities	-0.019**	-0.019**
	(0.008)	(0.008)
IT, telecommunications and other information services	-0.011*	-0.011*
	(0.007)	(0.007)
Financial and insurance activities	-0.012*	-0.012*
	(0.007)	(0.007)
Real estate	-0.008	-0.008
	(0.010)	(0.010)
Other professional, scientific and technical activities	-0.009	-0.009
	(0.007)	(0.007)
Administrative and support service activities	-0.012	-0.012*
	(0.007)	(0.007)
Public administration and defence, compulsory social security	-0.013*	-0.013*
	(0.007)	(0.007)
Education	-0.013*	-0.013*
	(0.007)	(0.007)
Health and social work	-0.012*	-0.012*
	(0.007)	(0.007)
Arts, entertainment and recreation	-0.008	-0.008
	(0.009)	(0.009)
Other services	-0.016**	-0.016**
	(0.008)	(0.008)
Activities of households as employers; undifferentiated goods- and services-producing, activities of households for own use	-0.110	-0.110
	(0.109)	(0.109)
Activities of extra-territorial organisations and bodies	-0.036**	-0.037**
	(0.018)	(0.018)
Region of firm residence		
Geneva	Ref.	Ref.
Espace Mittelland	-0.002	-0.002
	(0.002)	(0.002)
North-Western Switzerland	-0.001	-0.001
	(0.002)	(0.002)
Zurich	-0.002	-0.002
	(0.002)	(0.002)
Eastern Switzerland	-0.003	-0.003
	(0.002)	(0.002)
Central Switzerland	-0.003	-0.003
	(0.002)	(0.002)
Ticino	-0.003	-0.003
	(0.003)	(0.003)
Demographic variables		
Tertiary education	0.004***	0.004***
	(0.001)	(0.001)
Female	0.006***	0.006***

		(0.002)		(0.002)
Age				
15-24		Ref.		Ref.
25-39		-0.013***		-0.013***
		(0.004)		(0.004)
40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
Constant	0.022***	0.064***	0.023***	0.064***
	(0.002)	(0.008)	(0.002)	(0.008)
N of observations	114,908	114,908	114,908	114,908
R^2	0.000	0.006	0.000	0.006

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

Table 8: Full results table – interaction with 'tertiary education'

Annual wage growth	**(1)**	**(2)**	**(3)**	**(4)**
Participation in CET	0.006***	0.005***		
	(0.002)	(0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.004	0.004
			(0.003)	(0.003)
Long CET course			0.007**	0.005
			(0.003)	(0.003)
Tertiary education	0.008***	0.006***	0.008***	0.005***
	(0.001)	(0.002)	(0.001)	(0.002)
Participation in CET # Tertiary education	-0.004*	-0.004		
	(0.002)	(0.002)		
Length of CET course # Tertiary education				
No CET course			Ref.	Ref.
Short CET course # Tertiary education			-0.007*	-0.007*
			(0.004)	(0.004)
Long CET course # Tertiary education			-0.002	-0.000
			(0.004)	(0.004)
Survey years	Yes	Yes	Yes	Yes
Employment variables				
Temporary contract		0.030***		0.030***
		(0.004)		(0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003*		-0.003*
		(0.002)		(0.002)
8 years and more		-0.007***		-0.007***
		(0.002)		(0.002)
Working part-time		-0.014***		-0.014***
		(0.002)		(0.002)
In leadership position or self-employed		-0.003**		-0.003**
		(0.001)		(0.001)
High-skilled occupation		0.001		0.001
		(0.001)		(0.001)
Firm variables				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002		-0.002
		(0.002)		(0.002)
100+		-0.003		-0.003
		(0.002)		(0.002)
Industry sector	No	Yes	No	Yes
Region of firm residence	No	Yes	No	Yes
Demographic variables				
Female		0.006***		0.006***
		(0.002)		(0.002)
Age				
15-24		Ref.		Ref.

25-39		-0.013***		-0.013***
		(0.004)		(0.004)
40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
Constant	0.020***	0.063***	0.020***	0.057***
	(0.002)	(0.008)	(0.002)	(0.008)
N of observations	114,908	114,908	114,908	114,908
R^2	0.001	0.006	0.001	0.006

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

Table 9: Full results table – interaction with 'high-skilled occupation'

Annual wage growth	**(1)**	**(2)**	**(3)**	**(4)**
Participation in CET	0.008***	0.006***		
	(0.002)	(0.002)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course			0.002	0.002
			(0.003)	(0.003)
Long CET course			0.009***	0.004
			(0.003)	(0.003)
High-skilled occupation	0.006***	0.002	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.002)
Participation in CET # High-skilled occupation	-0.006**	-0.004*		
	(0.003)	(0.003)		
Length of CET course				
No CET course			Ref.	Ref.
Short CET course # High-skilled occupation			-0.003	-0.002
			(0.004)	(0.004)
Long CET course # High-skilled occupation			-0.003	-0.000
			(0.004)	(0.004)
Survey years				
	Yes	Yes	Yes	Yes
Employment variables				
Temporary contract		0.030***		0.030***
		(0.004)		(0.004)
Tenure in firm				
Less than 3 years		Ref.		Ref.
3-8 years		-0.003*		-0.003*
		(0.002)		(0.002)
8 years and more		-0.007***		-0.007***
		(0.002)		(0.002)
Working part-time		-0.014***		-0.014***
		(0.002)		(0.002)
In leadership position or self-employed		-0.003***		-0.003**
		(0.001)		(0.001)
Tertiary education of worker		0.004***		0.004***
		(0.001)		(0.001)
Firm variables				
Firm size (N of employees)				
1-10		Ref.		Ref.
11-99		-0.002		-0.002
		(0.002)		(0.002)
100+		-0.003		-0.003
		(0.002)		(0.002)
Industry sector	No	Yes	No	Yes
Region of firm residence	No	Yes	No	Yes
Demographic variables				
Female		0.006***		0.006***
		(0.002)		(0.002)
Age				
15-24		Ref.		Ref.
25-39		-0.013***		-0.013***
		(0.004)		(0.004)

40-54		-0.025***		-0.025***
		(0.004)		(0.004)
55-64		-0.030***		-0.030***
		(0.004)		(0.004)
65		-0.019		-0.019
		(0.012)		(0.012)
Swiss nationality		0.000		0.001
		(0.001)		(0.001)
Married		-0.003*		-0.003*
		(0.001)		(0.001)
Household size		0.001		0.001
		(0.001)		(0.001)
Constant	0.020***	0.063***	0.021***	0.064***
	(0.002)	(0.008)	(0.002)	(0.008)
N of observations	114,908	114,908	114,908	114,908
R^2	0.001	0.006	0.000	0.006

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

Table 10**:** 'participation in CET' interaction with 'tertiary education' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Participation in CET	0.016***	0.001	0.009	0.007	-0.001	0.012**	0.005	0.000	0.010*	-0.003
	(0.006)	(0.006)	(0.006)	(0.007)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Tertiary education	0.016***	0.005	0.007	-0.005	0.007	0.020***	0.001	0.003	0.008	-0.004
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Participation in CET # Tertiary education	-0.018**	-0.002	-0.010	-0.006	0.004	-0.015**	-0.004	0.002	-0.007	0.014*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.014

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 11: ‘length of CET course’ interaction with ‘tertiary education’ over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	0.022**	0.000	0.013	0.004	-0.013*	0.011	0.003	-0.007	0.015**	0.001
	(0.009)	(0.008)	(0.009)	(0.010)	(0.008)	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)
Long CET course	0.012	0.006	0.012	0.005	0.011	0.007	-0.011	0.006	-0.006	-0.002
	(0.008)	(0.008)	(0.009)	(0.011)	(0.008)	(0.010)	(0.008)	(0.010)	(0.009)	(0.009)
Tertiary education	0.013**	0.006	0.008	-0.005	0.007	0.016***	0.000	0.004	0.007	-0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Tertiary education	-0.026**	-0.007	-0.020*	-0.017	0.010	-0.011	-0.001	-0.001	-0.016	0.009
	(0.012)	(0.011)	(0.011)	(0.013)	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)
Long CET course # Tertiary education	-0.003	-0.006	-0.015	-0.001	-0.001	-0.003	0.000	0.000	0.014	0.011
	(0.011)	(0.010)	(0.011)	(0.014)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 12**:** 'participation in CET' interaction with 'high-skilled occupation' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Participation in CET	0.017***	-0.002	0.016**	0.000	-0.003	0.019***	0.007	0.002	0.004	0.002
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
High-skilled occupation	0.008	0.001	0.001	0.006	-0.009*	0.008	-0.001	0.004	0.000	0.006
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Participation in CET # High-skilled occupation	-0.017**	0.004	-0.020**	0.006	0.006	-0.024***	-0.006	-0.000	0.003	0.004
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.007	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 13**:** 'length of CET course' interaction with 'high-skilled occupation' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	0.015	-0.004	0.010	-0.010	-0.015	0.019**	0.015	-0.018	0.004	0.007
	(0.010)	(0.009)	(0.010)	(0.012)	(0.009)	(0.010)	(0.009)	(0.011)	(0.009)	(0.009)
Long CET course	0.015	0.001	0.019*	-0.011	0.014	0.012	-0.008	0.005	-0.012	0.001
	(0.010)	(0.009)	(0.011)	(0.012)	(0.010)	(0.011)	(0.011)	(0.011)	(0.010)	(0.012)
High-skilled occupation	0.004	0.002	-0.001	0.005	-0.008	0.004	0.000	0.002	-0.001	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # High-skilled occupation	-0.009	0.002	-0.012	0.008	0.011	-0.023*	-0.019	0.016	0.005	-0.003
	(0.013)	(0.012)	(0.012)	(0.014)	(0.012)	(0.012)	(0.012)	(0.013)	(0.011)	(0.011)
Long CET course # High-skilled occupation	-0.007	0.003	-0.023*	0.023	-0.005	-0.010	-0.005	0.001	0.021*	0.005
	(0.012)	(0.011)	(0.013)	(0.014)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.014)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.010	0.010	0.006	0.012	0.007	0.014	0.008	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 14**:** 'participation in CET' interaction with 'below tertiary education' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Participation in CET	-0.002	-0.001	-0.002	0.001	0.002	-0.003	0.001	0.003	0.003	0.012**
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Below tertiary education	-0.016***	-0.005	-0.007	0.005	-0.007	-0.020***	-0.001	-0.003	-0.008	0.004
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Participation in CET # Below tertiary education	0.018**	0.002	0.010	0.006	-0.004	0.015**	0.004	-0.002	0.007	-0.014*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.014

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 15**:** 'length of CET course' interaction with 'below tertiary education' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	-0.004	-0.007	-0.007	-0.013	-0.003	0.000	0.002	-0.008	-0.000	0.010
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Long CET course	0.009	0.000	-0.003	0.004	0.010	0.004	-0.011	0.006	0.008	0.009
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.008)
Below tertiary education	-0.013**	-0.006	-0.008	0.005	-0.007	-0.016***	-0.000	-0.004	-0.007	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Below tertiary education	0.026**	0.007	0.020*	0.017	-0.010	0.011	0.001	0.001	0.016	-0.009
	(0.012)	(0.011)	(0.011)	(0.013)	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)
Long CET course # Below tertiary education	0.003	0.006	0.015	0.001	0.001	0.003	-0.000	-0.000	-0.014	-0.011
	(0.011)	(0.010)	(0.011)	(0.014)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.006	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 16**:** 'participation in CET' interaction with 'lower-skilled occupation' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Participation in CET	0.001	0.001	-0.005	0.006	0.003	-0.005	0.001	0.002	0.007	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lower-skilled occupation	-0.008	-0.001	-0.001	-0.006	0.009*	-0.008	0.001	-0.004	-0.000	-0.006
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Participation in CET # Lower-skilled occupation	0.017**	-0.004	0.020**	-0.006	-0.006	0.024***	0.006	0.000	-0.003	-0.004
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.011	0.010	0.007	0.011	0.007	0.014	0.007	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 17**:** 'length of CET course' interaction with 'lower-skilled occupation' over time (2011-2020)

Annual wage growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course	0.006	-0.002	-0.002	-0.002	-0.004	-0.003	-0.004	-0.002	0.009	0.005
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
Long CET course	0.008	0.004	-0.004	0.012	0.009	0.002	-0.013**	0.006	0.009	0.005
	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Lower-skilled occupation	-0.004	-0.002	0.001	-0.005	0.008	-0.004	-0.000	-0.002	0.001	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Length of CET course										
No CET course	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Short CET course # Lower-skilled occupation	0.009	-0.002	0.012	-0.008	-0.011	0.023*	0.019	-0.016	-0.005	0.003
	(0.013)	(0.012)	(0.012)	(0.014)	(0.012)	(0.012)	(0.012)	(0.013)	(0.011)	(0.011)
Long CET course # Lower-skilled occupation	0.007	-0.003	0.023*	-0.023	0.005	0.010	0.005	-0.001	-0.021*	-0.005
	(0.012)	(0.011)	(0.013)	(0.014)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.014)
All control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	10,818	11,561	11,476	10,607	12,383	11,246	11,692	11,751	11,821	11,553
R^2	0.010	0.010	0.006	0.012	0.007	0.014	0.008	0.010	0.013	0.013

Notes: Results of linear regression with robust standard errors in parentheses. All models include the full set of control variables. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 18**:** Three-way interaction with CET variables x skill proxy x time – tertiary education

Annual wage growth	**(1)**	**(2)**
Survey year	0.000	0.000
	(0.000)	(0.000)
Tertiary education	0.009***	0.008***
	(0.003)	(0.003)
Tertiary education # Survey year	-0.001	-0.001
	(0.000)	(0.000)
Participation in CET	0.011***	
	(0.004)	
Length of CET course		
No CET course		Ref.
Short CET course		0.010
		(0.006)
Long CET course		0.015**
		(0.006)
Participation in CET # Tertiary education	-0.014***	
	(0.005)	
Length of CET course		
No CET course		Ref.
Short CET course # Tertiary education		-0.019**
		(0.008)
Long CET course # Tertiary education		-0.012
		(0.008)
Participation in CET # Survey year	-0.001	
	(0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Survey year		-0.001
		(0.001)
Long CET course # Survey year		-0.002**
		(0.001)
Participation in CET # Tertiary education # Survey year	0.002**	
	(0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Tertiary education # Survey year		0.002*
		(0.001)
Long CET course # Tertiary education # Survey year		0.002*
		(0.001)
All control variables	Yes	Yes
N of observations	114,908	114,908
R^2	0.006	0.006

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

Table 19**:** Three-way interaction with CET variables x skill proxy x time – high-skilled occupation

Annual wage growth	**(1)**	**(2)**

Survey year	-0.000	-0.000
	(0.000)	(0.000)
High-skilled occupation	0.004	0.002
	(0.003)	(0.003)
High-skilled occupation # Survey year	-0.000	-0.000
	(0.000)	(0.000)
Participation in CET	0.010**	
	(0.004)	
Length of CET course		
No CET course		Ref.
Short CET course		0.004
		(0.007)
Long CET course		0.014**
		(0.007)
Participation in CET # High-skilled occupation	-0.011**	
	(0.005)	
Length of CET course		
No CET course		Ref.
Short CET course # High-skilled occupation		-0.005
		(0.008)
Long CET course # High-skilled occupation		-0.008
		(0.008)
Participation in CET # Survey year	-0.001	
	(0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # Survey year		-0.000
		(0.001)
Long CET course # Survey year		-0.002
		(0.001)
Participation in CET # High-skilled occupation # Survey year	0.001	
	(0.001)	
Length of CET course		
No CET course		Ref.
Short CET course # High-skilled occupation # Survey year		0.001
		(0.001)
Long CET course # High-skilled occupation # Survey year		0.001
		(0.001)
All control variables	Yes	Yes
N of observations	114,908	114,908
R^2	0.006	0.006

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

Appendix III: Results of Robustness Tests

Table 20**:** Baseline regressions – absolute wage values

Annual wage growth (absolute values)	**(1)**	**(2)**	**(3)**	**(4)**

Participation in CET	541.222***	247.497**		
	(102.906)	(106.776)		
Length of CET course				
Short CET course			257.903*	98.933
			(155.152)	(156.478)
Long CET course			712.996***	307.295*
			(160.370)	(163.465)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
N of observations	114,908	114,908	114,908	114,908
R^2	0.000	0.006	0.000	0.006

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

Table 21**:** Regressing current annual wage on CET variables and lagged dependent variable

Annual wage	**(1)**	**(2)**	**(3)**	**(4)**
Participation in CET	0.020***	0.010***		
	(0.001)	(0.001)		
Length of CET course				
Short CET course			0.012***	0.005***
			(0.002)	(0.002)
Long CET course			0.024***	0.013***
			(0.002)	(0.002)
Wage of previous year	0.883***	0.767***	0.884***	0.767***
	(0.002)	(0.003)	(0.002)	(0.003)
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
N of observations	114,908	114,908	114,908	114,908
R^2	0.773	0.787	0.773	0.787

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

Table 22**:** Baseline regressions – Exclude high participation in CET

Annual wage growth	**(1)**	**(2)**
Participation in CET	0.005***	0.004***
(only in one survey wave)	(0.001)	(0.001)
Year dummies	Yes	Yes
Control variables	No	Yes
N of observations	114,849	114,849
R2	0.000	0.006

Notes: Results of linear regression with robust standard errors in parentheses. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020. For this robustness test, I exclude workers who were highly active in CET at t-1, i.e., workers who participated in CET in two survey waves.

Appendix IV: Results of Robustness Tests for Heterogeneity Analyses

Table 23**:** Sample splits 'tertiary education'

Annual wage growth	**Below tertiary education**				**Tertiary education**			
	(1a)	**(2a)**	**(3a)**	**(4a)**	**(1b)**	**(2b)**	**(3b)**	**(4b)**
Participation in CET	0.006***	0.006***			0.001	0.001		
	(0.002)	(0.002)			(0.001)	(0.001)		
Length of CET course								
No CET course			Ref.	Ref.			Ref.	Ref.
Short CET course			0.003	0.004			-0.005**	-0.005**
			(0.002)	(0.002)			(0.002)	(0.002)
Long CET course			0.008***	0.006**			0.004*	0.002
			(0.003)	(0.003)			(0.002)	(0.002)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
N of observations	63,187	63,187	63,187	63,187	50,231	50,231	50,231	50,231
R^2	0.000	0.004	0.000	0.004	0.000	0.010	0.001	0.010

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

Table 24**:** Sample splits 'high-skilled occupation'

Annual wage growth	**Lower-skilled occupation**				**High-skilled occupation**			
	(1a)	**(2a)**	**(3a)**	**(4a)**	**(1b)**	**(2b)**	**(3b)**	**(4b)**
Participation in CET	0.008***	0.007***			0.002	0.002		
	(0.002)	(0.002)			(0.001)	(0.002)		
Length of CET course								
No CET course			Ref.	Ref.			Ref.	Ref.
Short CET course			0.002	0.002			-0.000	0.000
			(0.003)	(0.003)			(0.002)	(0.002)
Long CET course			0.009**	0.005			0.005**	0.004*
			(0.003)	(0.003)			(0.002)	(0.002)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
N of observations	53,579	53,579	53,579	53,579	61,329	61,329	61,329	61,329
R^2	0.000	0.004	0.000	0.004	0.000	0.010	0.001	0.010

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

Table 25**:** Factor analysis for skill proxies

Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor1	1.509	1.019	0.755	0.755
Factor2	0.491	.	0.245	1.000

Notes: Table displays results of principal-component factor analysis of the familiarity variables. N=114,751.

Table 26**:** Rotated factor loadings and unique variances after PCF analysis

Factor	**Factor 1**	**Uniqueness**
Tertiary education	0.869	0.245
High-skilled occupation	0.869	0.245

Notes: Table displays results of principal-component factor analysis of the familiarity variables after rotation.
N=114,751.

Table 27**:** Including the reason for CET as a covariate

Annual wage growth	**(1)**	**(2)**	**(3)**	**(4)**
Length of CET course				
No CET course	Ref.	Ref.	Ref.	Ref.
Short CET course	-0.019	-0.019	-0.001	-0.001
	(0.018)	(0.018)	(0.004)	(0.004)
Long CET course	-0.011	-0.011	-0.002	-0.002
	(0.018)	(0.018)	(0.004)	(0.004)
CET for work-related reason (variable from 2010-2015)		0.003		
		(0.004)		
CET for work-related reason (variable from 2016 onwards)				-0.002
				(0.005)
Year dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
N of observations	14,685	14,685	15,572	15,572
R2	0.002	0.011	0.000	0.013

Notes: Results of linear regression with robust standard errors in parentheses. Models (1) and (2) include the variable 'CET for work-related reasons', which was used in the survey waves 2010-2015. Models (3) and (4) include the variable, which was used from 2016 onwards. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

Table 28**:** Selection into work – Heckman two-step selection model

Annual wage growth	**(1)**	**(2)**
Participation in CET	0.004**	
	(0.001)	
Length of CET course		
No CET course		Ref.
Short CET course		0.001
		(0.002)
Long CET course		0.004*
		(0.002)
All control variables	Yes	Yes
Selection eq. with dependent variable: 'Employment'		
Instrument:		
Children under 15 years in household	0.577***	0.577***
	(0.016)	(0.016)
Gender: female	-0.255***	-0.255***
	(0.008)	(0.016)
Children under 15 # Female	-0.885***	-0.886***
	(0.018)	(0.018)
/mills		
lambda	0.01	0.01
	(0.007)	(0.007)
N of observations	220,616	220,546
N of selected observations	117,288	117,218
N of non-selected observations	103,328	103,328

Notes: Results of heckman twostep estimations with robust standard errors in parentheses. The selection equation includes year dummies, the variables tertiary education, gender, age, Swiss nationality, civil status and household size. The outcome equation includes the same control variables as the baseline regressions. *=10%, **=5%, ***=1% significance. Source: Swiss Labour Force Survey 2010-2020.

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