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The Social Status of Vocational Education and Training in Switzerland

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This paper analyses how the social status of vocational education and training (VET) in Switzerland has changed over time and how it differs across population groups. The applied measure for the social status of VET compares the cognitive abilities (measured by PISA scores) of prospective students in a VET programme to those in an academic baccalaureate programme. The results suggest that the social status of VET has remained constant between 2000 and 2012. The social status of VET is higher for women than for men, in rural than in urban areas, and for students with a parent born in Switzerland than for those with immigrant parents. In contrast, the social status of VET is independent of parents' education. Surprisingly, we find that the social status of VET is higher in the French- and Italian-speaking parts of Switzerland than in the German-speaking one. The reason is that prospective baccalaureate students have higher average abilities in the German part, while prospective VET students have about the same abilities in the German and French parts.

Keywords: social status, education programmes, vocational education and training, apprenticeship, educational choices

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Introduction

In contrast to general education, vocational education and training (VET) prepares students for direct entry into the labour market. In Switzerland, VET represents a cornerstone of the education system and the parity of esteem between VET and general education is defined in the Federal Constitution of the Swiss Confederation (Art. 61a Abs. 3). While about two third of each upper-secondary cohort are enrolled in a VET programme, only one fourth attends a general education programme, mostly in a baccalaureate school, which prepares for further academic education. The remaining upper-secondary students make a gap year or attend another interim solution (Wolter and Zumbuehl 2017; Swiss Federal Statistical Office SFO 2018).

In the wake of the economic crisis ensuing after 2007, youth unemployment rates have soared in many countries across the world (e.g. Scarpetta, Sonnet, and Manfredi 2010; Choudhry, Marelli, and Signorelli 2012; Pusterla 2016). This worsening situation has sparked a widespread interest in the capacity of the Swiss VET system to integrate young people into the labour market (e.g. Caves and Renold 2016). However, at the same time, Swiss newspapers frequently report that the social status of VET is endangered due to increasing academisation and globalization (e.g. Schöchli 2015; Feldges 2017; Pfister 2017). On the one hand, the increasing harmonization of academic degree cycles in the Bologna process and the process of educational programmes becoming more academic make it difficult to maintain the social status of VET. On the other hand, with increasing shares of foreign employees and firms due to globalization, the social status of VET in Switzerland depends more and more on the perception of VET in other countries.

However, little evidence exists regarding the social status of VET in Switzerland. Bolli and Rageth (2016) analyse the social status of VET based on the

relative ability of prospective VET students compared to the rest of the cohort. They find that the ability difference between prospective VET students and the cohort decreases with the time immigrants spend in Switzerland, suggesting that the social status of VET increases as immigrants live longer in Switzerland. Abrassart et al. (2017) investigate the social status of VET based on survey data. They find that the social status of VET is higher among natives than among immigrants. Finally, Cattaneo and Wolter (2016) present experimental evidence that providing information about VET increases the social status of VET measured by survey data.

To contribute to the literature, this paper provides further evidence on the determinants of the social status of VET in Switzerland. To analyse how the social status of VET has developed over time and whether it differs across population groups, we apply Bolli and Rageths' (2016) empirical approach to measure the social status of upper-secondary education programmes. This approach argues that an increase in the social status of an education programme leads to adolescents with higher cognitive abilities decide to pursue that programme. Hence, the relative abilities of students in different education programmes reveals their social status, ceteris paribus. We use the PISA data for 2000, 2003, 2009 and 2012 to calculate average PISA scores among prospective VET students and their difference to average PISA scores of prospective baccalaureate students. Ceteris paribus, we interpret the variation in that ability difference across time and population groups as a difference in the social status of VET.

As the ability difference between prospective VET and baccalaureate students remains constant between 2000 and 2012, we find no empirical evidence for a decrease in the social status of VET over time. We also show that the social status of VET is higher for women than for men, but does not depend on the education of the parents. Furthermore, our results suggest that the social status of VET is higher in rural areas

than in urban areas. Moreover, as the social status of VET is higher for students with at least one parent born in Switzerland, the parents' national origin matters.

Surprisingly, the results suggest that the social status of VET is lower in German-speaking Switzerland than in the French- and Italian-speaking parts. Our analyses show that the average abilities of prospective VET students are similar in the German and French parts, whereas those of prospective baccalaureate students are higher in German-speaking Switzerland compared to the other language regions. However, one possible explanation for this finding is that baccalaureate schools are more selective in the German part than in the other language regions. We address this concern in two ways. First, we control for the cantonal share of baccalaureate degrees among upper-secondary education degrees. Second, we test whether the unexpected result holds for different quantiles of the ability distribution. Both tests suggest that the social status of VET is indeed lower in the German part than in the French- and Italian parts.

This paper proceeds by discussing the conceptual framework of the social status of VET and summarising the existing measurement approaches. Section 3 develops hypotheses regarding differences in the social status of VET over time and across population groups. Section 4 explains the variables and estimation methods. Section 5 presents the results of our empirical analysis und section 6 concludes.

Literature on the social status of VET

Conceptual framework of the social status of VET

Our conceptual framework builds on Weber (1968) who states that social status refers to a standing in a hierarchy that is accepted by society and thus reflects the prestige or social honour attached to a certain social position. Hence, we conceptualise the social

status of VET as the relative position of VET compared to other education programmes. This conceptual framework draws on the previous literature arguing that institutions can also occupy positions in socially constructed structures (e.g. Podolny 1993; Sauder, Lynn, and Podolny 2012; Bolli and Rageth 2016).

The literature uses a number of concepts and terms that are related to the social status of VET. Some authors use the terms 'preferences' and 'attitudes' towards VET (e.g. TNS Opinion and Social 2011; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014; Abrassart et al. 2017). Others refer to the 'perception' or 'image' of VET (e.g. Haney 2002; Mourshed, Patel, and Suder 2014; Howard and Rimini 2016). Siikaniemi (2005), Lasonen and Gordon (2009), and Cedefop (2014, 2017) analyse the attractiveness of VET observed as 'preferences, attitudes and related behaviour of individuals and groups' (Lasonen and Gordon 2009: 24).

While these authors use the terms 'attractiveness of', 'image of' and 'esteem for' VET interchangeably, they argue that standing or prestige refers to the 'social status of a type of education and training measured as progression opportunities and income returns later in young people's life' (Lasonen and Gordon 2009: 24; see also Forrer 1998; Lasonen and Manning 2001). Thus, the earlier mentioned concepts are related to social status, but they differ in that they generally do not explicitly account for the relation to other education programmes. Accordingly, Bolli and Rageth (2016) define the social status of an education programme as the relative standing of that programme compared to other programmes on the same educational level.

Analysing the relation between these overlapping concepts and terms is beyond the scope of this paper. Instead, we take an agnostic approach and consider the literature referring to either of these concepts and terms when discussing the measurement approaches in the following section.

Approaches to measure the social status of VET

The literature on the social status of VET suggests not only various concepts and terms but also several measures. Table A1 in the appendix summarizes the applied terminologies and measures. We broadly group them into two measurement approaches: measures based on survey questions and those based on observed data.

The first type of survey-based measures asks respondents to directly assess the image (TNS Opinion and Social 2011; Cedefop 2014; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014), valuation (Mourshed, Patel, and Suder 2014), or prestige (Howard and Rimini 2016) of VET. A similar measure asks whether the image is the reason to choose VET (TNS Opinion and Social 2011; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014).

The second type of survey-based measures assesses the social status of VET indirectly by asking respondents to evaluate the impact of VET. This measure type includes questions on whether respondents consider VET as ideal choice for an adolescent, their own child, or themselves (e.g. Cedefop 2014; Mourshed, Patel, and Suder 2014; Abrassart et al. 2017). In addition, questions on opinions on how VET affects labour market outcomes and social status belong to this type (e.g. Cattaneo and Wolter 2013, 2016; Howard and Rimini 2016, Cedefop 2017). A related measure asks about the quality and impact of VET on the entire economy and society (e.g. TNS Opinion and Social 2011).

Finally, the third survey-based measure type asks respondents to assess the social status of individuals who have attained a VET degree (Forrer 1998; Cattaneo and Wolter 2013, 2016; Abrassart et al. 2017) or of occupations that are often held by these individuals (TNS Opinion and Social 2011; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014).

However, Bolli and Rageth (2016) argue that survey-based measures have three disadvantages. First, the particularity of the survey questions restricts data availability. Second, social desirability bias – the tendency to respond in a manner that is viewed favourably by others – might cause measurement errors (e.g. Diekmann 2004). Third, it remains unclear how to aggregate the variety of questions in a single measure of social status.

Cedefop (2014) mention two types of observed data that can be used to assess the social status of VET (see also Lasonen and Gordon 2009). The first type measures the share of VET enrolment compared to enrolment in general education. The drawback of this measurement type is that it ignores selection into VET. We can exemplify this drawback in the following hypothetical scenario: Assume that policy-makers fix the share of baccalaureate degrees at a low level and that the social status of VET is low. In this case, the share of VET enrolment is high. Thus, the VET enrolment share indicates a high social status, though students enter VET only because they have no other option. To consider the demand and supply side, Siikaniemi (2005) suggest to measure the social status of VET by the ratio between primary applicants and available seats in a VET programme.

The second data type mentioned by Lasonen and Gordon (2009) and Cedefop (2014) measures labour market outcomes of VET graduates, such as employment probabilities and wages, compared to general education graduates. However, these relative labour market outcomes depend on two factors, the selection of students into VET and the quality of VET. The relative labour market outcome measure mingles these two factors, thereby diluting the measure of the social status of VET. To see this dilution, consider the following hypothetical scenario. Assume that the quality of VET is high, but the social status of VET is low, suggesting a negative selection of students

into VET programmes. If quality is sufficiently high to offset the negative selection, the relative labour market outcomes of VET are high, thereby providing misleading inference regarding the social status of VET.

To address the issue of selection, Bolli and Rageth (2016) suggest to measure the social status of VET by the quality of students selecting into VET programmes. For that purpose, they compare the average abilities of prospective students in VET programmes to those in other programmes on the same education level. They argue that an increase in the relative ability of prospective VET students shows an increase in the social status of VET. To circumvent the previously mentioned disadvantages of survey measurements and VET shares, this paper uses Bolli's and Rageth's (2016) measurement approach.

Social Status of VET measured by the relative ability of VET students

This section discusses Bolli's and Rageth's (2016) approach to measure the social status of VET as the relative position of VET compared to other education programmes. Building on the theoretical framework of Barone et al. (2017), Bolli and Rageth (2016) argue that the social status of an education programme affects educational choices. According to Barone et al. (2017), educational choices are based on both instrumental considerations and intrinsic preferences. The intrinsic preferences reflect an adolescent's interest and direct value of an education programme. The instrumental considerations cover the profitability that adolescents expect from that programme and are related to the assessment of the own abilities and the expected future earnings and occupational benefits (Breen and Goldthorpe 1997; Becker and Hecken 2009; Barone et al. 2017).

Bolli and Rageth (2016) state that through these expectations, the social status of an education programme affects the probability that adolescents choose that specific programme over the other options. Thus, an increase in the social status of an education programme enhances the probability of selecting that programme—when everything else remains constant. Following that argument, an increase in the relative ability of adolescents choosing an education programme compared to the cohort reflects an increase in the social status of that programme relative to the alternatives, holding everything else constant.

Empirically, we approximate the ability of students in different education programmes by their average PISA reading and mathematics scores[1]. In so doing, we use the Swiss data of the Programme for International Student Assessment (PISA) in the years 2000, 2003, 2009, and 2012 (PISA.ch 2004, 2011, 2012, 2016). In each wave, PISA tested the skills and knowledge in reading, science[2], and mathematics of a representative sample of ninth-grade students in Switzerland (PISA.ch 2008) who are in the process of choosing their prospective upper-secondary education programme.

By comparing the distribution of the cognitive abilities of prospective VET and baccalaureate students, Figure 1 illustrates this measurement approach. While the pink area represents the distribution of prospective baccalaureate students over the different PISA scores, the blue area shows the same distribution for prospective VET students. Starting from the top, the figure reveals that the ninth-grade students with the highest PISA scores choose to attend a baccalaureate school. However, the best students choosing a VET programme also have very high PISA scores.

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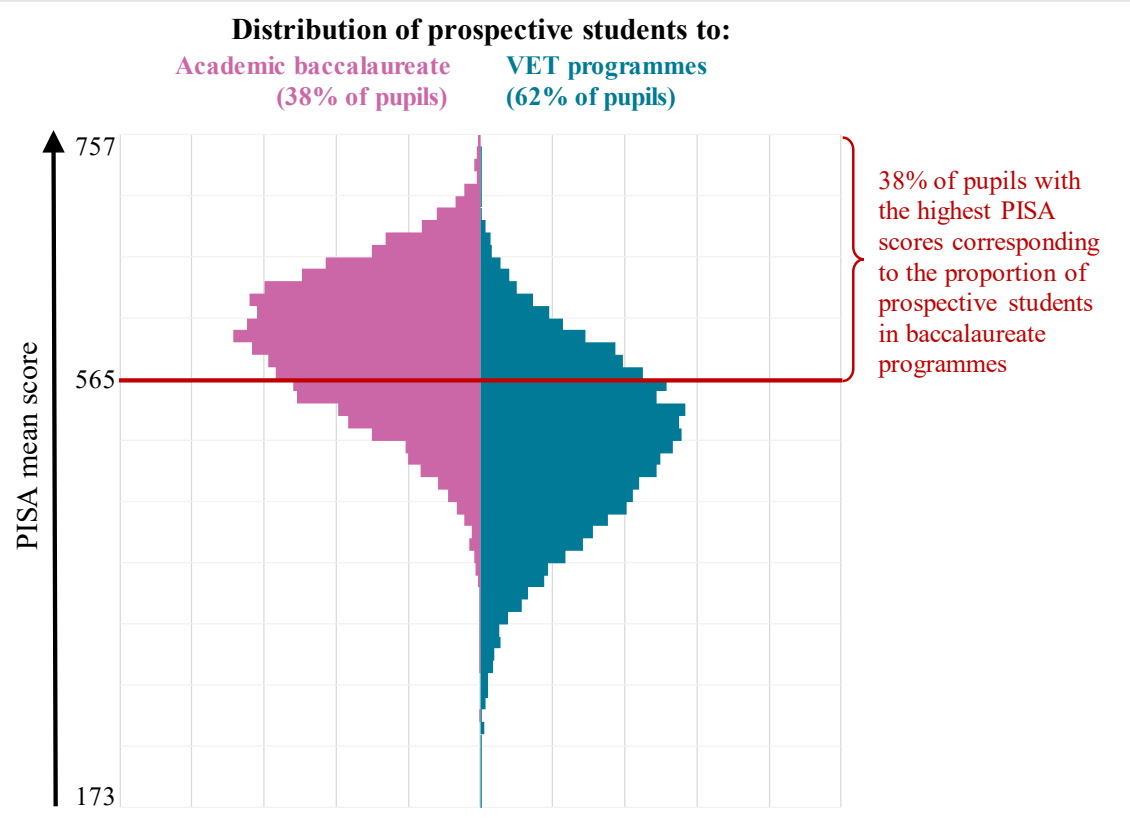
1 The results look qualitatively similar for both reading and mathematics scores.

2 We do not consider science because the scale in changed in 2006.

Figure 1. Ability distribution of prospective baccalaureate and VET students



Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495).

The red horizontal line visualizes that 38 per cent of all students achieved 565 or more scores in the PISA tests. If the baccalaureate had the maximum social status in comparison to VET, all prospective baccalaureate students would be located above the red horizontal line, while all prospective VET students would be below that line. However, Figure 1 shows that the abilities of the two student groups overlap strongly, though the average PISA scores of prospective baccalaureate students are higher than those of VET students.

However, comparing the social status of VET across time and population groups based on the full ability distribution is very difficult. We therefore investigate the social status of VET based on the relative ability, measured by the mean ability difference

between prospective students in a VET programme and those in other education programmes.

Hypotheses on differences in the social status of VET across time and population groups

This section presents the hypotheses on how the social status of VET has developed over time and how it differs across population groups in Switzerland. To derive these hypotheses, we apply Cedefop's (2014) measurement approach that uses the VET share calculated as the proportion of students enrolled in VET programmes compared to those in general education. As discussed above, this measurement approach has the drawback that it ignores selection, which represents the cornerstone of Bolli's and Rageth's (2016) approach. Nevertheless, the VET share represents a useful starting point to develop hypotheses on the social status of VET. In the following sections, we test these hypotheses empirically with Bolli's and Rageth's (2016) more sophisticated measurement approach.

With the Swiss PISA data, we approximate the VET share by the share of students who plan to enter a VET programme rather than a baccalaureate school. The 'Transition from Education to Employment' (TREE)[3] data shows that the prospective education programme reported in the PISA questionnaires highly correlates with the actually chosen education programme. Table 1 displays the VET shares for each PISA survey year and population group.

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[3] The Swiss youth panel study TREE (www.tree-ch.ch) has been running since 2000 and has since been funded by the Swiss National Science Foundation, the University of Basel, the Swiss Federal Office of Statistics, the Federal Office of Professional Education and Technology, and the cantons of Berne, Geneva and Ticino. Distribution: Data service, FORS, Lausanne.

Table 1. Social status of VET according to the VET share

VARIABLE	VET share (%)
Years	
PISA wave 2000	64
PISA wave 2003	65
PISA wave 2009	60
PISA wave 2012	59
Gender	
Male	71
Female	53
Urbanity	
School located in rural area (less than 15,000 inhabitants)	73
School located in urban area (more than 15,000 inhabitants)	41
Education of parents	
No parent with tertiary education (ISCED 5A/B, 6)	74
At least one parent with tertiary education (ISCED 5A/B, 6)	50
Birth country of parents	
At least one parent born in Switzerland (CH)[1]	62
At least one parent born in Austria (AT) / Germany (DE) and no parent born in Switzerland	41
Both parents born in another country	64
Language region of residence	
German-speaking Switzerland	70
French-speaking Switzerland	48
Italian-speaking Switzerland	48

Data source: PISA data 2000, 2003, 2009, and 2012 for Switzerland with sample weighting; N=33,495; [1]Also includes parents who were born in the Principality of Liechtenstein.

Regarding the development over time, Table 1 shows that the VET share has decreased from 64 per cent in 2000 to 59 per cent in 2012. Due to this small decrease and the claim of newspapers that the social status of VET is decreasing in Switzerland (e.g. Schöchli 2015; Feldges 2017; Imwinkelried 2017), we hypothesize that the social status of VET has decreased over time (H1).

According to Table 1, relatively more male than female students plan to transition to a VET programme. We thus expect that the social status of VET is higher among male students than among females (H2).

Table 1 further compares the VET shares depending on two characteristics of the parents. First, parental education captures whether at least one parent has a tertiary education. As the VET share is higher among students without a tertiary educated parent, we hypothesize that the social status of VET is higher for students without a parent with tertiary education than for those with a tertiary educated parent (H3).

Second, parental origin distinguishes whether at least one parent is born in Switzerland or whether both are born in a foreign country. Furthermore, we divide students with only foreign-born parents based on whether the student has at least one parent born in Austria or Germany, which have a similar VET system. Students with at least one parent born in Switzerland have a VET share of 62 per cent. In contrast, the VET share amounts to only 42 per cent among adolescents whose parents are not born in Switzerland but at least one parent is born in Austria or Germany. The VET share among students with both parents born in another country is 64 per cent. Based on this empirical evidence, we hypothesize that the social status of VET is higher for students with a Swiss-born parent (H4a) and for those with both parents born in a country without a similar education system (H4b) compared to those with a parent born in Austria or Germany.

Table 1 further distinguishes between different geographical regions. First, the table shows that the VET share is much higher in rural areas with less than 15,000 inhabitants than in urban areas with more than 15,000 inhabitants. We thus hypothesize that the social status of VET is higher in rural than in urban areas (H5).

Second, Table 1 illustrates the much higher proportion of planned transitions to a VET programme in German-speaking Switzerland compared to the French and Italian parts. We thus hypothesize that the social status of VET is higher in the German- than the French- or Italian-speaking parts of Switzerland (H6).

Research design

Data and variables

In Switzerland, the PISA sample covers ninth-grade students who are at the end of compulsory education and in the process of selecting among four choices of upper-secondary education programmes. 28 per cent of the students plan to enter a general education programme at a baccalaureate school ('Gymnasium') preparing for further academic education, while 4 per cent plan to enter an upper-secondary specialized school ('Fachmittelschule') providing a more specialized general education. 47 per cent plan to enter a VET programme preparing for direct labour market entry in a specific occupation. These programmes either mostly happen in a school environment, the school-based VET programmes (4 per cent), or combine about two weekdays of school-based education with about three weekdays of workplace training, the dual VET programmes (43 per cent). Finally, 21 per cent of a cohort plan an interim solution that consists, for example, of an additional year of schooling, an internship, or a year abroad.

To make the following empirical analysis tractable, we restrict our sample to the students who directly transition to the upper-secondary education level in either a baccalaureate programme (38%) or a VET programme (62%).[4] We thus exclude adolescents who attend either an interim solution or an upper-secondary specialized school. Excluding those students who first choose an interim solution and later transition to a VET or baccalaureate programme does not qualitatively change our findings, as we can show with the data of the TREE survey.[5]

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[4] This paper builds on Bolli, Rageth, and Renold (2018), but analyses the social status of all VET programmes in Switzerland instead of focusing on dual VET programmes. This conceptual difference leads to numerical differences between these studies.

[5] These results are available from the authors upon request.

Table A1 in the appendix shows the descriptive statistics of all variables in our estimations. We measure the abilities of the prospective upper-secondary students by the average PISA scores in reading and mathematics, but we present the results of both PISA scores separately in the appendix. Using the PISA scores, we can account for cognitive abilities but not for other abilities such as social skills or personal abilities.

As explained in the previous section, we first analyse the development of the social status of VET between 2000 and 2012 and then compare it across five population groups. The first group is gender. The second group differentiates between students whose school is located in an urban area (more than 15,000 inhabitants) or a rural area (less than 15,000 inhabitants). The third population group differentiates whether at least one parent has a tertiary education (ISCED 5A/B and 6[6]) or not. The fourth population group compares students dependent on the birth country of parents where we differentiate between students with at least one parent born in Switzerland, students with at least one parent born in a country with a similar VET system (Austria or Germany) and students with both parents born in another country. Finally, the fifth population group is the language region, which can be German-, French- or Italian-speaking.

Estimation methods

As explained in a previous section, we investigate the social status of VET based on the comparison of mean ability differences, measured by PISA scores, across years and population groups. To draw statistical inference regarding these comparisons, we estimate OLS estimations with sample weightings:

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[6] According to ISCED-97, corresponding to ISCED 5 through 8 in ISCED-2011.

$$PISA_i = \beta_0 + \beta_1 VET_i + \beta_2 GROUP_i + \beta_3 VET_i * GROUP_i + \beta_4 YEAR$$
$$+ \beta_5 VET_i * \text{YEAR} + \beta_{,6} X_i + \varepsilon_i \quad (1)$$

$PISA_i$ depicts the average reading and mathematics scores of adolescent i. VET is a dummy variable, indicating whether an adolescent plans to attend a VET or baccalaureate programme, respectively. The coefficient β_1 yields the average relative ability of VET students compared to baccalaureate students. The GROUP variable includes dummy variables for each population group, i.e., being a female, going to school in an urban area, having at least one tertiary educated parent, each birth country group of parents (CH, DE/AT, other countries) and each language region (German, French, Italian). YEAR refers to a continuous variable for the survey year.

The main coefficients are the interaction terms β_3 and β_5, which compare the difference in the relative ability of prospective VET and baccalaureate students and thus the social status of VET among population groups (β_3) and across time (β_5).

Our measurement concept of the social status of VET assumes that everything else is constant. This condition might be violated in some group comparisons when exogenous determinants limit students' choices. This violation is most obvious for the comparison of language regions, which differ substantially in terms of available places in baccalaureate schools. Similarly, apprenticeship place supply, which defines the number of available places in VET programmes, might be higher in rural than in urban areas. Other examples include that women might favour occupations for which no VET exists and that the cohort size increases while the available baccalaureate places remain constant. A lower VET share then suggests that people with lower PISA scores have access to a baccalaureate, which reduces the ability difference mechanically. We address this issue in two ways. First, we include a vector of control variables X, which captures the cantonal transition rates to the academic baccalaureate and whether the

canton conducts an entry examination for baccalaureate schools (SCCRE 2014). Second, we present quantile regression estimates that test whether our results hold across the distribution of PISA scores.

In addition, we examine whether differences in the social status of VET between population groups has changed over time. The following estimation therefore includes additional triple interaction terms between VET, GROUP and YEAR.

$$PISA_i = \beta_0 + \beta_1 VET_i + \beta_2 GROUP_i + \beta_3 VET_i * GROUP_i + \beta_4 YEAR + \beta_5 VET_i * \text{YEAR} + \beta_{,6} X_i + \beta_7 VET_i * GROUP_i * YEAR + \varepsilon_i \quad (2)$$

Empirical evidence

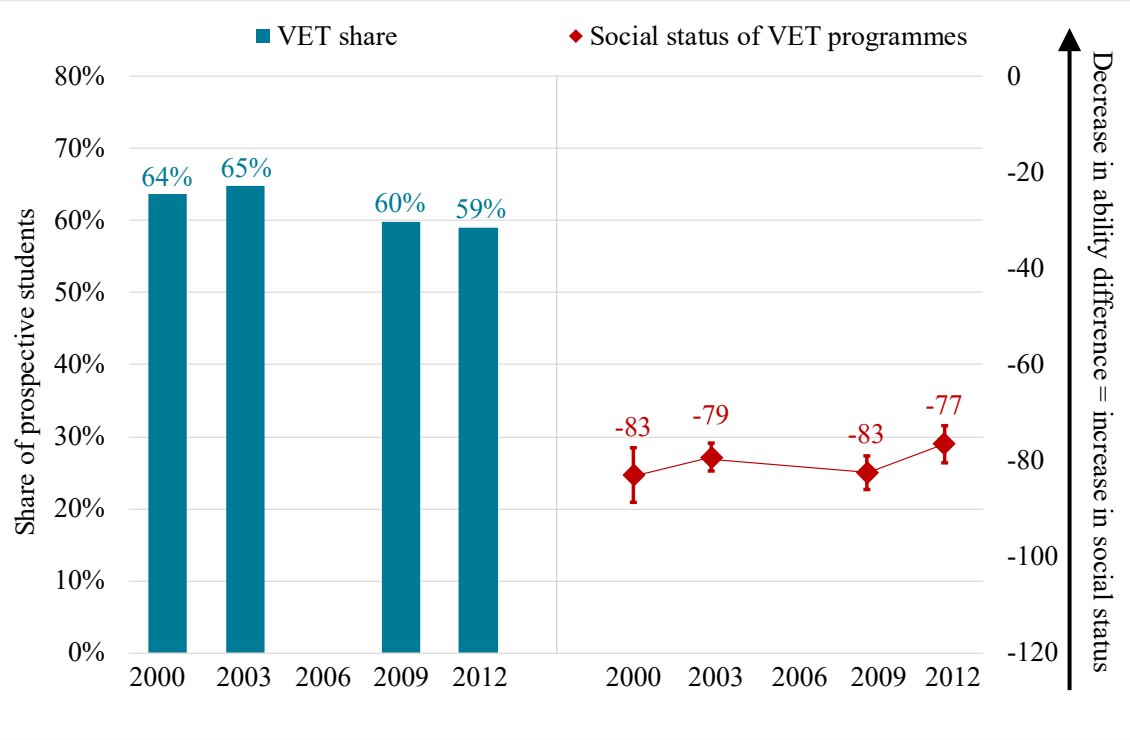
The figures in this section report descriptive statistics for each population group and time individually. We additionally show the results of the conditional estimations, in which we test whether our results are also robust when controlling for other relevant variables, in the appendix. Thus tables A3, A4, and A5 display the formal statistical tests of differences between years and population groups in terms of average PISA scores, PISA reading scores and PISA mathematics scores, respectively (based on equation 1). Table A7 presents the results for each quantile of the PISA distribution and Table A6 displays the estimation results analysing the development of the ability difference across groups over time (based on equation 2). As most of these changes over time remain insignificant, we only mention them when significant change happens.

Development over time

This section tests the hypothesis H1 that the social status of VET has decreased between 2000 and 2012. Figure 2 shows that the VET share has decreased from 64 per cent in the year 2000 to 59 per cent in the year 2012. However, the right hand panel shows that

the relative ability of prospective VET students has slightly increased from -83 in 2000 to -77 in 2012. Though the values vary across years, the trend suggests that the social status of VET has not decreased over time.

Figure 2. Change in social status of VET over time



Data source: PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

The formal estimations support this finding. The unconditional estimates suggest that the relative ability of prospective VET students has increased, but this increase remains insignificant. The conditional estimates, which account for changes in other observable characteristics such as the parent education, display a lower magnitude of the relative ability coefficients that remains statistically insignificant. This finding holds across all quantiles of the PISA distribution.

We conclude that the social status of VET has remained constant between 2000 and 2012 despite the growing discussion about academisation and globalization (e.g.

Feldges 2017; Schöchli 2015). A first factor that has likely increased the social status of VET has been the growing relevance of the Federal Vocational Baccalaureate. The introduction of this vocational baccalaureate has increased the permeability of the Swiss education system by allowing students to directly enter universities of applied sciences or even to transition to universities after passing the university aptitude test.

A second potential explanation for the relatively stable development over time of the social status of VET are the improvements in the marketing of VET that arose from a lack of apprenticeship supply in the early 2000s and a fear in the wake of the financial crises after 2008 (Schweizerische Eidgenossenschaft 2009). These measures to increase the publicity of VET on the firm side may also have affected the social status of VET among prospective students.

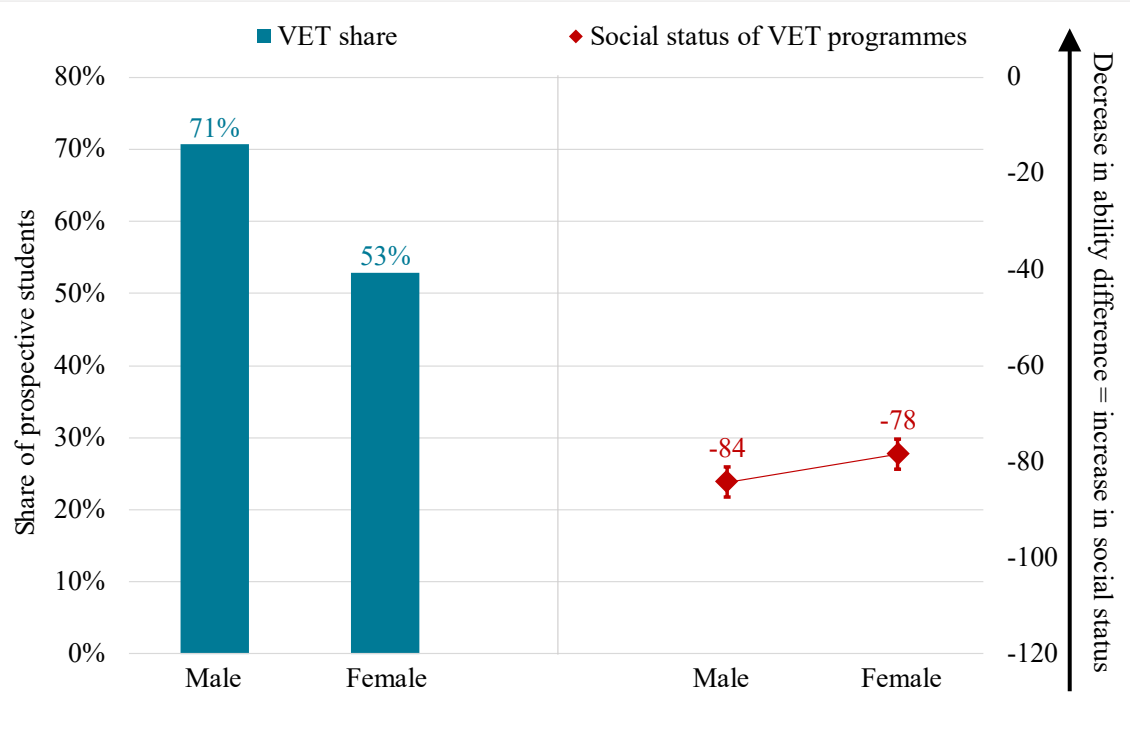
A third potential explanation affecting the time development of the social status of VET are changes in the academic baccalaureate. One example is the reform of the academic baccalaureate in the middle of the 1990s that might have had long-lasting effects (Eberle 2018). Another example are changes in the admission criteria of Swiss baccalaureate schools (Eberle 2018).

Gender

The left-hand panel of Figure 3 shows that the VET share is substantially higher among men (71%) than among women (53%). However, the right hand panel reveals that the relative ability of prospective VET students compared to baccalaureate students is actually lower for men (-84) than for women (-78). Formal statistical tests validate that this difference is statistically significant, remains significant in the conditional estimates and holds for both reading and mathematics separately. However, preliminary analyses of the social status of VET for school-based VET programmes and for dual VET

programmes reveal a significant difference only for school-based VET, whereas dual VET has about the same social status for both genders.[7]

Figure 3. Difference in the social status of VET by gender



Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

We conclude that the social status of VET is higher for women than for men and thus reject hypothesis H2. At first glance, this opposes the findings of Korber and Oesch (2016) suggesting that women profit more from an academic baccalaureate than men. However, the quantile regressions show that the higher social status of VET applies to lower levels of PISA scores, whereas the coefficients become insignificant for the two

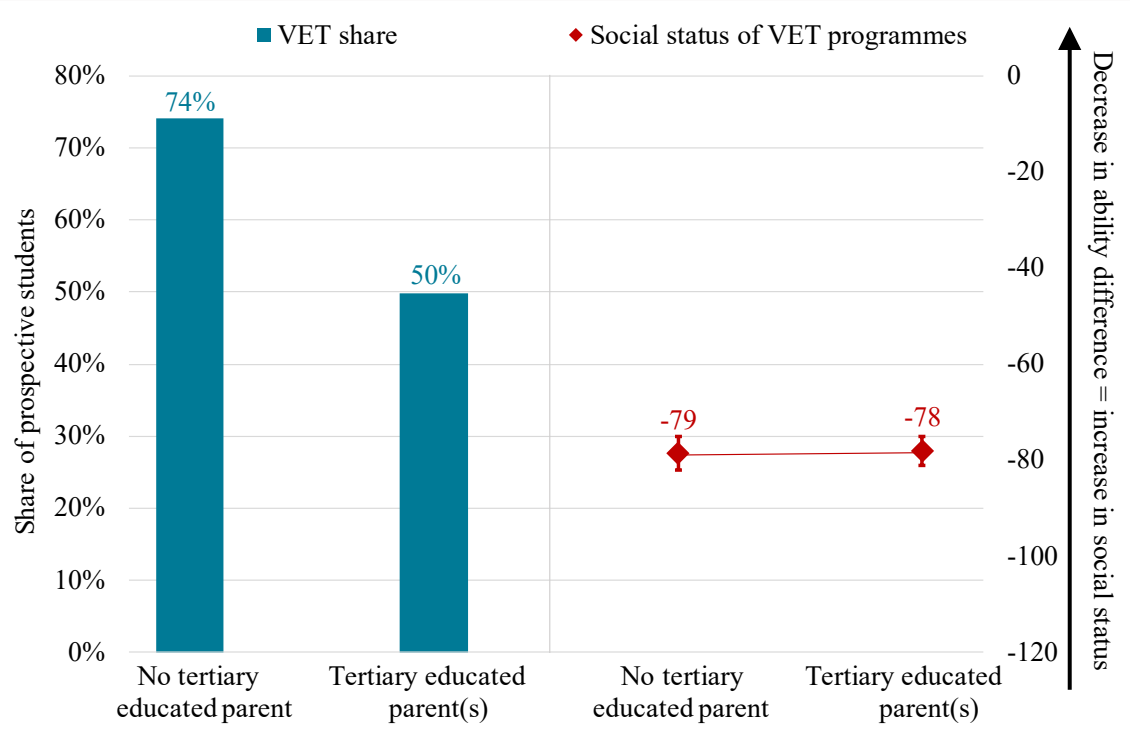
[7] These results are available from the authors upon request.

highest quantiles. To the extent that Korber and Oesch (2016) refer to the highest level of the ability distribution explains the disparity.

Parents' education

The left-hand panel of Figure 4 shows that the VET share is substantially higher if the parents have no tertiary education (74%) than if at least one parent has a tertiary education (50%). The right-hand panel of Figure 4 suggests that the relative abilities of prospective VET students are nearly the same in these two groups. Correspondingly, the formal statistical tests reveal no significant difference depending on the parents' education. Even though conditioning on other observables reduces the magnitude of the coefficients, they remain insignificant across all estimation models.

Figure 4. Difference in the social status of VET by parents' education



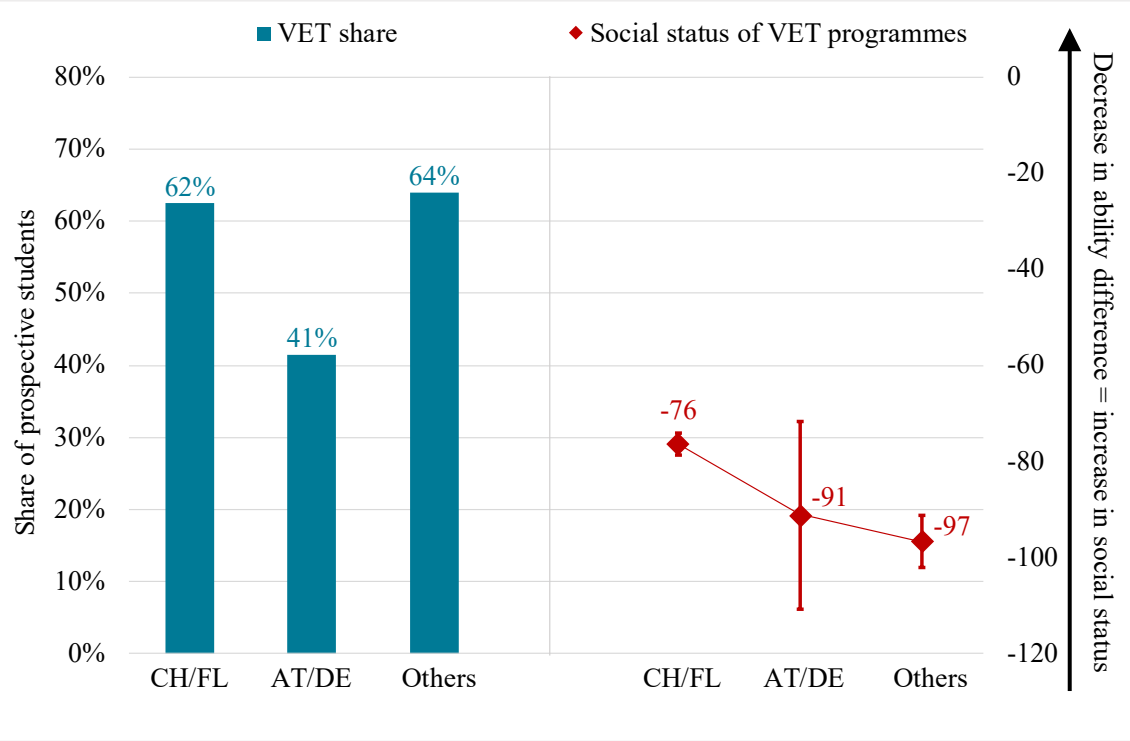
Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

Consequently, we reject hypothesis H3 as the social status of VET is undistinguishable between students whose parents have no tertiary education and those with at least one parent with a tertiary education. In contrast, Wolter and Zumbuehl (2017) find a higher probability of selecting a general education for students with a tertiary educated parent. However, for Switzerland, it is important to note that the tertiary education level (ISCED 5A/B and 6) covers a range of different education programmes and that professional education and training is a common tertiary qualification besides academic education. Cattaneo and Wolter (2016) provide evidence that the social status of VET is higher among respondents with a degree from a professional education and training programme or a university of applied sciences than amongst those with an academic tertiary degree. Unfortunately, the PISA data does not consider differences in the orientation of the tertiary education of parents.

Parents' country of origin

The left-hand panel of Figure 5 illustrates the heterogeneity of the VET share depending on the parents' birth country. The results show that the VET share is highest among students whose parents have not been born in Switzerland, Germany or Austria (64%). Students with at least one parent born in Switzerland have a similar VET share (62%). The VET share remains lowest among students who have at least one parent born in Germany or Austria but no parent born in Switzerland (41%).

Figure 5. Difference in the social status of VET by birth country of parents



Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

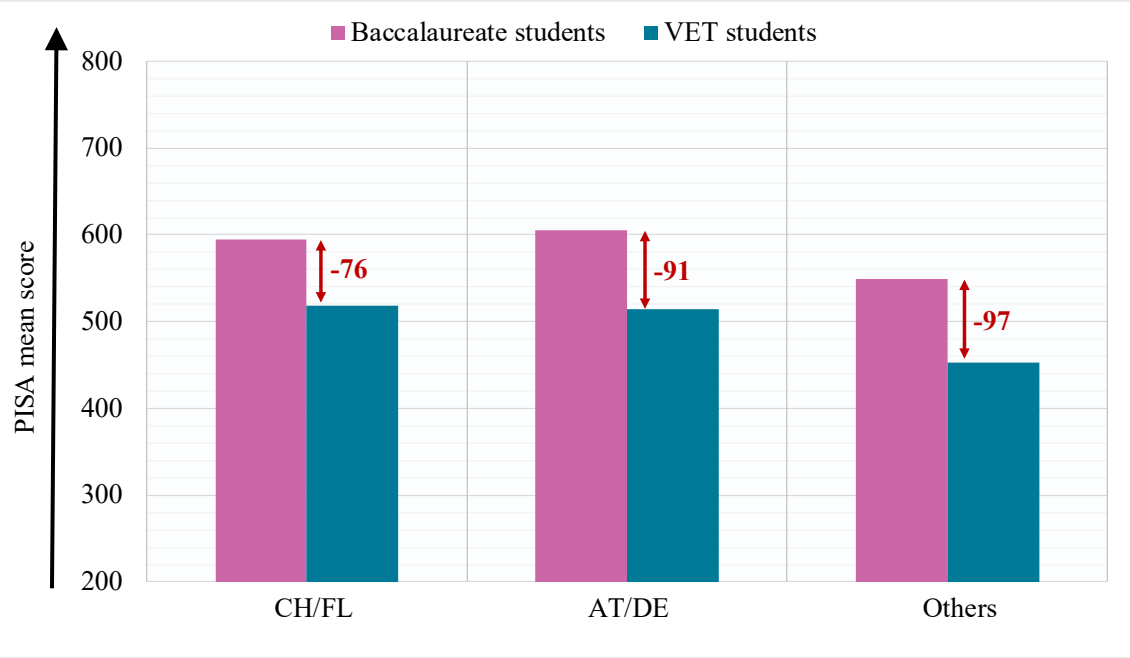
The descriptive evidence on the relative ability of prospective VET students in the right-hand panel of Figure 5 confirms the high social status of VET among students with a parent born in Switzerland (ability difference of -76). This finding is in line with Cattaneo and Wolter (2013) and Abrassart et al. (2017) who find that the social status of VET is higher among natives than among immigrants. Accordingly, Wolter and Zumbuehl (2017) provide evidence that students with migration background have a much higher probability of entering a general education than a VET program, especially when controlling for cognitive abilities.

However, the social status of VET also differs depending on the country in which immigrant parents are born. The ability difference is -91 for students with at least one parent born in Germany or Austria and no parent born in Switzerland, though the

relatively low number of observations renders the estimate relatively imprecise. In contrast, students whose parents have been born in other countries have a lower social status of VET (ability difference of -97). In line with that finding, Bolli and Rageth (2016) provide evidence that the social status of VET increases as immigrants live longer in Switzerland unless they are born in Austria or Germany.

Figure 6 examines our social status measure in detail by showing the average PISA scores of prospective baccalaureate students and VET students by birth country of parents.

Figure 6. Average PISA scores of prospective baccalaureate students and VET students by birth country of parents



Data source: PISA data 2000, 2003, 2009, and 2012 for Switzerland; ability measured by the average reading and math scores, own calculations with sample weighting (N=33,495).

The height of the blue bars shows that the average abilities of prospective VET students are slightly lower for students with at least one parent born in Austria or Germany but no parent born in Switzerland compared to those with at least one parent born in Switzerland. In contrast, prospective baccalaureate students (purple bars) with at least

one parent born in Austria or Germany but no parent born in Switzerland have slightly higher abilities. However, we find the lowest average PISA scores for both prospective baccalaureate and VET students for those without a parent born in Switzerland, Austria, or Germany. Moreover, this group of students exhibits the greatest ability difference between prospective baccalaureate and VET students, leading to the lowest social status of VET.

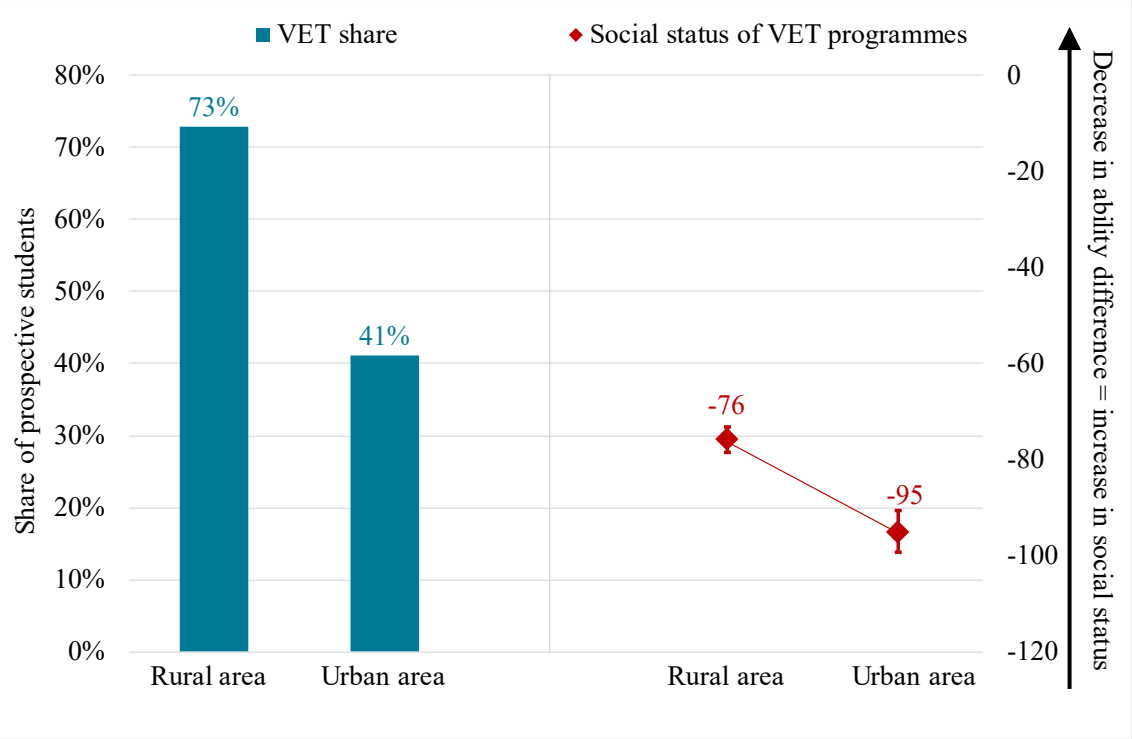
The formal statistical tests confirm the findings presented in Figure 5. All estimation models suggest that the social status of VET is significantly higher for students with a parent born in Switzerland compared to students with neither parent born in Switzerland, Austria or Germany. Furthermore, the social status of VET is statistically indistinguishable between students with Swiss parents and students with at least one parent born in Austria or Germany. The quantile regressions suggest that the social status of VET among students with a parent born in Austria or Germany increases with higher levels of the PISA distribution. Comparing students with foreign parents suggests that the social status of VET is significantly higher if a parent is born in Austria or Germany. The only exceptions are the estimations for math scores in which they are statistically undistinguishable. These findings contradict H4a and H4b and may suggest that knowledge about the education system increases the social status of VET (Cattaneo and Wolter 2016; Bolli and Rageth 2016).

The analysis of the development over time provides some evidence that the social status of VET increased slightly from 2000 to 2012 for students with both parents born in a non-German-speaking country. Thus over time, their views became more similar to the ones of students with a Swiss-born parent. However, these results are only consistently significant in the estimations using PISA reading scores but not for math scores.

Rural vs urban area

The left-hand panel of Figure 7 shows that the VET share is much higher in rural areas (73%) than in urban areas (41%). Correspondingly, the relative abilities of prospective VET students in the right hand panel suggests that the social status of VET is higher in rural areas (-76) than in urban areas (-95). This difference is statistically significant, holds for PISA reading and mathematics scores and in the conditional estimations, though accounting for other observable characteristics reduces the magnitude substantially. The results regarding urbanity support hypothesis H5. However, the quantile estimations reveal that the coefficients become insignificant for higher levels of PISA scores. Thus, the difference is driven by the low levels.

Figure 7. Difference in the social status of VET between rural and urban areas

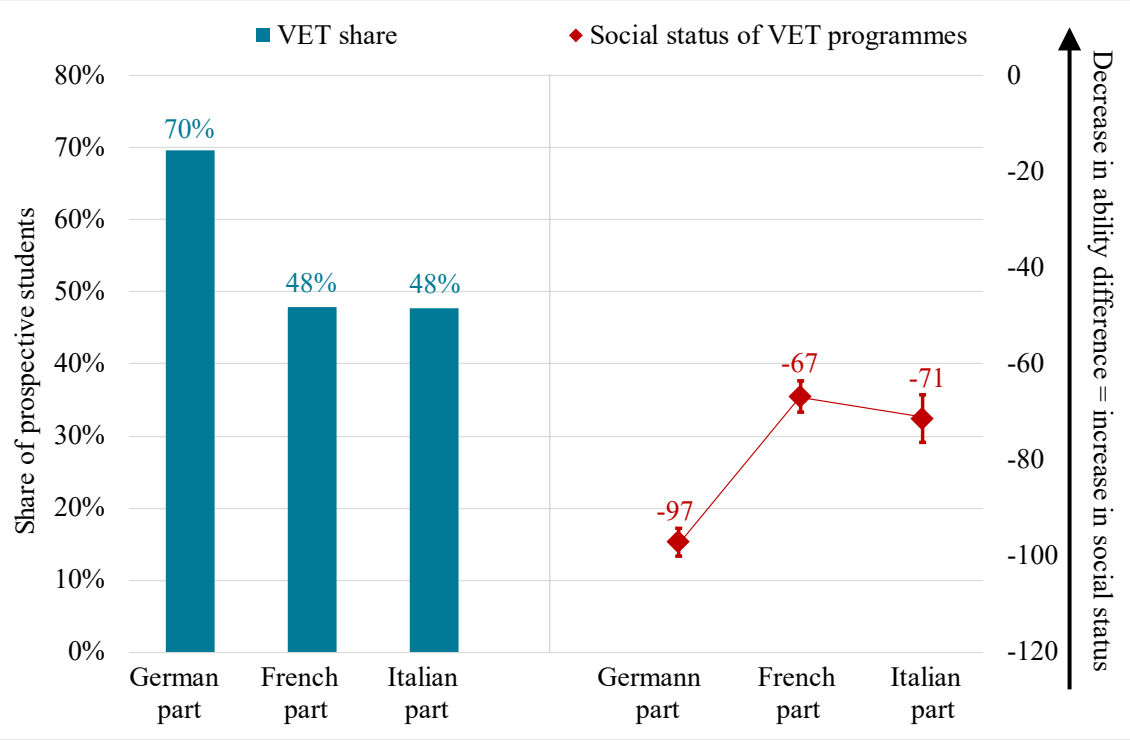


Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

Language region

The left-hand panel of Figure 8 shows that the VET share is higher in German-speaking Switzerland (70%) than in the French- and Italian-speaking parts (48%). However, the relative abilities of prospective VET students in the right hand panel show a different picture. The social status of VET is lowest in German-speaking Switzerland (ability difference of -97) compared to the French and Italian parts (ability differences of -67 and -71, respectively). We thus surprisingly reject hypothesis 6, although the French and Italian parts have lower VET shares and show stronger support for academic education (Cattaneo and Wolter 2016).

Figure 8. Difference in the social status of VET across language regions

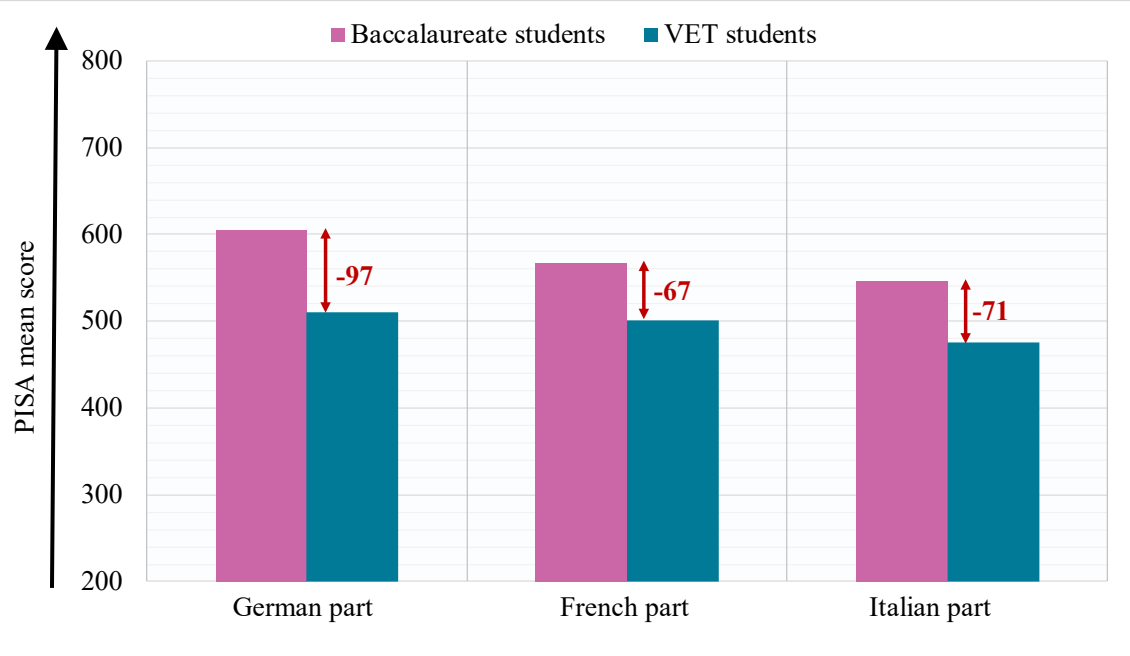


Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

To understand this unexpected result, Figure 9 presents the average PISA scores of prospective baccalaureate students and VET students in the different language

regions. Figure 9 suggests that prospective VET students (blue bars) have similar abilities in the German and French parts. In contrast, the abilities of prospective baccalaureate students (purple bars) are substantially higher in the German part compared to the French one. Hence, the variation in the social status between the German and French part stems from the difference in the abilities of prospective baccalaureate students. In the Italian part, prospective VET students have slightly lower abilities than prospective VET students have in the German or French part. Nevertheless, the variation in the social status mainly arises due to the substantially lower abilities of prospective baccalaureate students in the Italian part.

Figure 9. Average PISA scores of prospective baccalaureate students and VET students across language regions



Data source: Pooled PISA data 2000, 2003, 2009, and 2012 for Switzerland; PISA mean score measured by the average reading and math scores; own calculations with sample weighting (N=33'495); vertical parentheses around each point display the standard error of the mean.

A possible explanation for the surprising finding for the language regions refers to differences in the VET share. Concretely, a lower VET share suggests that people

with lower PISA scores have access to a baccalaureate, which reduces the ability difference mechanically. We test this explanation in two ways. First, including the cantonal shares of prospective baccalaureate students and the cantonal baccalaureate graduation rates in our estimations reduces the language region coefficients but the effects remain significant. The only exceptions are the estimates for the Italian-speaking part in the regressions controlling for the cantonal baccalaureate rate. In these regressions, the coefficients drop substantially, possibly due to multicollinearity. The second test uses quantile regressions. As the higher social status of VET in the French- and Italian-speaking parts holds across the distribution of PISA scores, the quantile regressions support the interpretation that the social status of VET is higher in the Italian and French parts than in the German one. Hence, the VET share is not causing the result directly.

However, an alternative explanation is that a higher VET share decreases the competence level of baccalaureates. While competence levels of the baccalaureate are a cantonal responsibility, competence levels of VET are regulated nationally. This difference might increase the social status of VET relative to the baccalaureate. Similarly, a larger VET share might decrease the social status of VET because it increases the scarcity of individuals with a baccalaureate degree on the labour market. Hence, our findings suggest that the social status of the baccalaureate might be lower in the French- and Italian-speaking part of Switzerland.

Conclusion

By applying a relative concept of social status, this paper analyses the social status of VET relative to baccalaureate programmes in Switzerland. Drawing on Bolli and Rageth (2016), we analyse the social status of VET across population groups and time

by comparing the difference in PISA competencies between prospective VET and baccalaureate students. Comparing this ability difference reveals whether students with relatively higher cognitive abilities select into VET over time or in certain population groups. Assuming that everything else is equal, we interpret such differences in the relative ability as differences in the social status of VET.

In contrast to the public discussion (e.g. Schöchli 2015; Feldges 2017; Pfister 2017), we find no evidence that the social status of VET has decreased over time. The results further suggest that the social status of VET is higher among women than among men and that it is higher in urban than in rural areas. Moreover, we find that the social status of VET remains independent of the parents' education, while having at least one parent born in Switzerland increases the social status of VET compared to students whose parents are born in a country without a similar VET system. Finally, we find that the social status of VET is higher in French- and Italian-speaking Switzerland than in German-speaking Switzerland. While prospective baccalaureate students have higher abilities in German-speaking Switzerland compared to the other language regions, the abilities of prospective VET students are similar in the German and French parts.

The new measurement concept yields different results than a simple comparison of the VET share across time and population groups (as applied by Lasonen and Gordon (2009) and Cedefop (2014)) would suggest. These differences highlight the relevance of analysing the social status of VET with a measurement that accounts for not only enrolment patterns but also the selection into the different programmes that is the ability distribution of the students attracted by these programmes.

However, the results also raise questions that remain beyond the scope of this paper. This limitation particularly includes an explanation of how the social status of VET is determined. Studying this question in future research represents the key to

advice policy makers and VET professionals on how to raise or maintain the social status of VET.

Future analyses on the determinants of the relative abilities of students in different education programmes is also important as the relatively simple measurement approach raises some questions regarding the comparability of the measure across population groups. This paper addresses the most pressing concern by providing results for different parts of the ability distribution. Nevertheless, future research should analyse in more detail whether the results hold in a more rigorous empirical setting.

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Appendix

Table A1. Overview on previous measures on the social status of VET

Author(s)	Data	Terminology	Measure
Cedefop (2017)	Survey in 28 EU member states	Attractiveness of VET	- Absolute/relative image of VET in the country - Perceptions of VET (e.g. easier to get qualification in VET) - Labour market benefits of VET (e.g. skills needed, allows to find a job quickly, well-paid jobs) - Priorities for national investment in VET
Abrassart et al. (2017); Cattaneo and Wolter (2013, 2016)	Survey in CH	Preferences and attitudes towards VET	- Desired education for own children after compulsory education - Relative qualification and social status of people with VET
Bolli and Rageth (2016)	PISA data for CH	Social status of VET	- Relative ability of prospective VET students
Howard and Rimini (2016)	Survey in AT, FR, DE, IT, ES, UK	Perception of VET	- Prestige/relevance/practicality/future employment of VET - Whether career routes/education choices were seen as equal - Whether VET was seen as a second option
Cedefop (2014)	Data for 27 EU Member States, AU, IS, NO, KR, and CH	Attractiveness of VET	- Relative enrolment in VET in comparison to general education - Entry-level employment rates and earnings for VET graduates compared to other graduates - Survey question on image of VET - Survey question on recommendation for a young person after compulsory education
Mourshed, Patel, and Suder (2014)	Survey in FR, DE, GR, IT, PT, ES, SE, UK	Image of VET	- Whether VET is the most valued by society - Whether one would personally prefer to pursue VET - Whether VET is most helpful for getting a job
Lavrijsen, Nicaise, and Poesen-Vandeputte (2014); TNS Opinion and Social (2011)	Survey in 27 EU Member States	Attitudes towards VET	- Image of VET - Perceptions of VET quality and skills provision (e.g. skills match, start-up, team-work) - Perceptions of vocational occupations (e.g. salaries, societal appreciation, career perspectives) - Perceptions of the impact of VET (e.g. economy/entrepreneurship/service quality/environment) - Factors for choosing VET (e.g. future opportunities, image of school, accessibility)
Lasonen and Gordon (2009)	Data for 27 EU Member States, IS, FL, and NO	Attractiveness of VET	- Relative enrolment in VET in comparison to general education - Employment rates by educational attainment - Relative income from employment by educational attainment
Siikaniemi (2005)	Data for the Lahti Region in FI	Attractiveness of VET	- Survey questions on elements and factors of attractiveness - Attractiveness index as ratio between primary applicants and available seats in a programme
Haney (2002)	Survey in the US	Image of VET	- Image of VET based on factor analysis of questions on perception of VET
Forrer (1998)	Survey in CH	Social prestige/valuation/ esteem of VET	- Relative future position (e.g. social prestige/influence) and intelligence of a person with VET - Relative personal value of VET

Table A2. Summary statistics

VARIABLE	MEAN	STD	MIN	MAX
Cognitive abilities				
PISA reading scores	520	81	165	755
PISA mathematics scores	555	82	180	811
Average PISA scores in reading and mathematics	537	78	173	757
Prospective upper-secondary education programme				
VET programme	0.624	-	0	1
Grouping variables				
Years				
PISA wave 2000	0.322	-	0	1
PISA wave 2003	0.290	-	0	1
PISA wave 2009	0.218	-	0	1
PISA wave 2012	0.170	-	0	1
Gender				
Male	0.534			
Female	0.466	-	0	1
Urbanity				
School located in rural area (less than 15'000 inhabitants)	0.669		0	1
School located in urban area (more than 15'000 inhabitants)	0.331	-	0	1
Parent education				
No parent with tertiary education (ISCED 5A/B, 6)	0.518		0	1
At least one parent with tertiary education (ISCED 5A/B, 6)	0.482	-	0	1
Birth country of parents[1]				
At least one parent born in Switzerland (CH)[1]	0.817	-	0	1
At least one parent born in Austria (AT) / Germany (DE) and no parent born in Switzerland	0.014	-	0	1
Both parents born in another country	0.170	-	0	1
Language region of residence				
German-speaking Switzerland	0.666	-	0	1
French-speaking Switzerland	0.287	-	0	1
Italian-speaking Switzerland	0.047	-	0	1
Control variables				
Exam for admission to baccalaureate school	0.425	-	0	1
Cantonal share of prospective baccalaureate students	0.401	0.134	0.000	0.900
Cantonal baccalaureate graduation rate[2]	0.331	0.529	0.236	0.446

Data source: PISA data 2000, 2003, 2009, and 2012 for Switzerland with sample weighting; N=33,495; [1]Also includes parents who were born in the Principality of Liechtenstein; [2]Average of yearly cantonal graduation rates 2000-2012 according to the SFO (2017)

Table A3. Unconditional and conditional estimations on PISA average scores in reading and mathematics

	Unconditional Estimations						Conditional Estimations		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
Prospective upper-secondary education: VET programme	-84.176***	-75.797***	-78.637***	-76.400***	-97.130***	-82.119	-92.029***	-94.704***	-142.646***
	(1.614)	(1.366)	(1.774)	(1.146)	(1.489)	(2.052)	(2.569)	(5.464)	(14.297)
Female	-6.313***						-6.171***	-6.354***	-6.231***
	(1.536)						(1.386)	(1.384)	(1.372)
VET * female	5.816**						7.545***	7.477***	7.403***
	(2.265)						(2.062)	(2.063)	(2.054)
Urban arena		2.427					-0.038	2.336	3.621
		(1.510)					(1.407)	(1.436)	(1.430)
VET * urban area		-19.190***					-6.388***	-7.473***	-8.896***
		(2.585)					(2.404)	(2.476)	(2.458)
Tertiary educated parent			8.797***				4.912***	4.857***	4.966***
			(1.653)				(1.513)	(1.515)	(1.500)
VET * tertiary educated parent			0.537				-1.100	-0.997	-1.087
			(2.344)				(2.211)	(2.212)	(2.198)
At least one parent born in CH				Ref.			Ref.	Ref.	Ref.
At least one parent born in AT/ DE and no parent born in CH				9.938***			0.073	1.889	1.331
				(3.813)			(3.689)	(3.667)	(3.711)
Both parents born in another country				-46.137***			-37.517***	-36.096***	-37.201***
				(2.057)			(1.989)	(2.004)	(1.961)
VET * DE/AT-born parent				-14.824			-6.026	-9.066	-8.750
				(9.930)			(9.842)	(9.864)	(9.886)
VET * both parent born in another country				-20.215***			-26.047***	-27.118***	-26.687***
				(2.965)			(2.967)	(3.006)	(2.965)
German part					Ref.		Ref.	Ref.	Ref.
French part					-39.643***		-35.460***	-23.712***	-21.297***
					(1.513)		(1.447)	(2.339)	(2.222)

	Unconditional Estimations						Conditional Estimations		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
Italian part					-61.211***		-59.182***	-47.521***	-18.196***
					(1.974)		(1.986)	(2.652)	(4.408)
VET * French part					30.289***		31.619***	29.919***	25.071***
					(2.215)		(2.119)	(3.352)	(3.177)
VET * Italian part					25.780***		31.680***	31.445***	8.158
					(2.948)		(2.978)	(4.090)	(6.558)
PISA wave						0.084	0.661***	0.498***	0.569***
						(0.174)	(0.161)	(0.160)	(0.160)
VET * PISA wave						0.307	-0.123	0.055	-0.055
						(0.255)	(0.238)	(0.236)	(0.236)
Exam for admission to baccalaureate school								4.722**	0.872
								(2.241)	(2.396)
VET * exam for admission to baccalaureate school								-0.229	3.362
								(3.192)	(3.435)
Cantonal share of prospective baccalaureate students								-44.405***	
								(7.546)	
VET * cantonal share of prospective baccalaureate students								3.812	
								(12.610)	
Cantonal baccalaureate rate									-262.261***
									(28.818)
VET * cantonal baccalaureate rate									166.999***
									(43.596)
Constant	591.378***	586.446***	582.044***	594.988***	607.464***	587.265*	608.800***	620.689***	684.316***
	(1.182)	(1.019)	(1.401)	(0.788)	(1.059)	(1.408)	(1.921)	(3.502)	(9.326)
Observations (N)	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495
Diff DE/AT vs. other country				0.598			0.049	0.076	0.079
Diff French vs. Italian part					0.136		0.984	0.619	0.002

Notes: The table displays coefficients of weighted OLS estimations and standard errors in parentheses. *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Diff refers to a p-value testing whether the two corresponding interaction terms are significantly different.

Table A4. Unconditional and conditional estimations on PISA reading scores

	Unconditional estimations						Conditional estimations		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
Prospective upper-secondary education: VET programme	-85.116***	-81.585***	-83.406***	-81.099***	-100.038***	-86.900***	-91.324***	-93.240***	-143.616***
	(1.712)	(1.437)	(1.888)	(1.210)	(1.575)	(2.194)	(2.753)	(5.799)	(15.111)
Female	17.741***						17.839***	17.718***	17.791***
	(1.616)						(1.474)	(1.472)	(1.463)
VET * female	7.488***						9.174***	9.086***	9.052***
	(2.366)						(2.169)	(2.170)	(2.163)
Urban arena		1.804					0.193	1.775	3.910**
		(1.586)					(1.487)	(1.527)	(1.520)
VET * urban area		-15.467***					-4.407*	-5.086**	-6.916***
		(2.692)					(2.484)	(2.564)	(2.544)
Tertiary educated parent			8.203***				5.102***	5.073***	5.248***
			(1.753)				(1.610)	(1.609)	(1.596)
VET * tertiary educated parent			0.080				-1.419	-1.359	-1.491
			(2.484)				(2.337)	(2.335)	(2.323)
At least one parent born in CH				Ref.			Ref.	Ref.	Ref.
At least one parent born in AT/ DE and no parent born in CH				10.378***			1.690	2.907	3.071
				(3.849)			(3.676)	(3.740)	(3.762)
Both parents born in another country				-43.356***			-35.692***	-34.739***	-35.292***
				(2.265)			(2.120)	(2.120)	(2.083)
VET * DE/AT-born parent				-12.542			-3.415	-5.676	-6.080
				(9.596)			(9.450)	(9.503)	(9.519)
VET * both parent born in another country				-21.020***			-27.753***	-28.517***	-28.397***
				(3.235)			(3.144)	(3.171)	(3.139)
German part					Ref.		Ref.	Ref.	Ref.
French part					-34.279***		-30.794***	-23.120***	-18.390***
					(1.600)		(1.503)	(2.441)	(2.326)
Italian part					-57.116***		-55.026***	-47.407***	-15.423***
					(2.095)		(2.098)	(2.806)	(4.629)
VET * French part					26.993***		28.375***	28.548***	22.953***
					(2.352)		(2.208)	(3.513)	(3.335)

	Unconditional estimations						Conditional estimations		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
VET * Italian part					23.392***		29.528***	30.743***	6.930
					(3.125)		(3.129)	(4.324)	(6.919)
PISA wave						0.380**	0.847***	0.740***	0.769***
						(0.185)	(0.170)	(0.168)	(0.168)
VET * PISA wave						0.331	-0.067	0.048	-0.010
						(0.270)	(0.250)	(0.248)	(0.249)
Exam for admission to baccalaureate school								2.891	2.408
								(2.405)	(2.565)
VET * exam for admission to baccalaureate school								1.214	5.596
								(3.374)	(3.629)
Cantonal share of prospective baccalaureate students								-29.574***	
								(8.031)	
VET * cantonal share of prospective baccalaureate students								0.212	
								(13.464)	
Cantonal baccalaureate rate									-265.709***
									(30.401)
VET * cantonal baccalaureate rate									168.920***
									(46.016)
Constant	563.063***	572.469***	568.126***	580.227***	590.765***	571.430***	576.847***	584.901***	655.124***
	(1.263)	(1.058)	(1.498)	(0.824)	(1.123)	(1.512)	(2.065)	(3.775)	(9.931)
Observations (N)	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495
Diff DE/AT vs. other country				0.396			0.013	0.021	0.024
Diff French vs. Italian part					0.263		0.718	0.497	0.005

Notes: The table displays coefficients of weighted OLS estimations and standard errors in parentheses. *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Diff refers to a p-value testing whether the two corresponding interaction terms are significantly different.

Table A5. Unconditional and conditional estimations on PISA mathematics scores

	Unconditional estimation						Conditional estimation		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
Prospective upper-secondary education: VET programme	-83.236***	-70.008***	-73.868***	-71.700***	-94.222***	-77.339***	-92.734***	-96.168***	-141.677***
	(1.700)	(1.504)	(1.912)	(1.262)	(1.631)	(2.184)	(2.780)	(5.858)	(15.284)
Female	-30.367***						-30.180***	-30.425***	-30.253***
	(1.657)						(1.520)	(1.518)	(1.506)
VET * female	4.145*						5.916***	5.868***	5.754***
	(2.407)						(2.222)	(2.221)	(2.211)
Urban arena		3.050*					-0.269	2.897*	2.332**
		(1.680)					(1.552)	(1.565)	(1.559)
VET * urban area		-22.913***					-8.369***	-9.859***	-10.876***
		(2.784)					(2.594)	(2.656)	(2.638)
Tertiary educated parent			9.390***				4.721***	4.642***	4.684***
			(1.823)				(1.654)	(1.657)	(1.641)
VET * tertiary educated parent			0.993				-0.781	-0.635	-0.683
			(2.530)				(2.371)	(2.374)	(2.358)
At least one parent born in CH				Ref.			Ref.	Ref.	Ref.
At least one parent born in AT/ DE and no parent born in CH				9.497**			-1.544	0.870	0.409
				(4.737)			(4.632)	(4.485)	(4.558)
Both parents born in another country				-48.919***			-39.342***	-37.453***	-39.109***
				(2.224)			(2.157)	(2.197)	(2.142)
VET * DE/AT-born parent				-17.105			-8.637	-12.456	-11.419
				(11.389)			(11.195)	(11.172)	(11.193)
VET * both parent born in another country				-19.410***			-24.342***	-25.720***	-24.977***
				(3.130)			(3.122)	(3.179)	(3.124)
German part					Ref.		Ref.	Ref.	Ref.
French part					-45.006***		-40.125***	-24.304***	-24.204***
					(1.689)		(1.604)	(2.616)	(2.474)
Italian part					-65.306***		-63.339***	-47.634***	-20.969***
					(2.218)		(2.199)	(2.955)	(4.888)
VET * French part					33.586***		34.862***	31.289***	27.190***
					(2.404)		(2.288)	(3.627)	(3.437)

	Unconditional estimation						Conditional estimation		
	Gender	**Urbanity**	**Parent education**	**Parent birth country**	**Language region**	**PISA wave**	**Model 1**	**Model 2**	**Model 3**
VET * Italian part					28.168***		33.832***	32.148***	9.387
					(3.255)		(3.236)	(4.414)	(7.076)
PISA wave						-0.213	0.475***	0.256	0.369**
						(0.190)	(0.175)	(0.174)	(0.173)
VET * PISA wave						0.283	-0.179	0.061	-0.100
						(0.272)	(0.253)	(0.251)	(0.251)
Exam for admission to baccalaureate school								6.553***	4.153
								(2.447)	(2.611)
VET * exam for admission to baccalaureate school								-1.671	1.128
								(3.433)	(3.690)
Cantonal share of prospective baccalaureate students								-59.235***	
								(8.235)	
VET * cantonal share of prospective baccalaureate students								7.413	
								(13.346)	
Cantonal baccalaureate rate									-258.812***
									(31.573)
VET * cantonal baccalaureate rate									165.078***
									(46.680)
Constant	619.692***	600.424***	595.961***	609.749***	624.164***	603.101***	640.753***	656.476***	713.508***
	(1.259)	(1.160)	(1.529)	(0.892)	(1.199)	(1.532)	(2.133)	(3.820)	(10.174)
Observations (N)	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495
Diff DE/AT vs. other country				0.843			0.173	0.249	0.239
Diff French vs. Italian part					0.103		0.753	0.795	0.002

Notes: The table displays coefficients of weighted OLS estimations and standard errors in parentheses. *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Diff refers to a p-value testing whether the two corresponding interaction terms are significantly different.

Table A6. Trend estimations on PISA average, reading, and math scores

	Mean scores			Reading scores			Math scores		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Prospective upper-secondary education: VET programme	-95.257***	-102.941***	-150.070***	-96.698***	-105.889***	-155.228***	-93.816***	-99.994***	-144.912***
	(3.759)	(8.409)	(24.356)	(4.047)	(9.085)	(26.109)	(4.076)	(8.913)	(25.741)
PISA wave	-10.103***	-10.481***	-10.361***	13.402***	13.132***	13.182***	-33.608***	-34.094***	-33.904***
	(2.547)	(2.545)	(2.524)	(2.754)	(2.750)	(2.733)	(2.757)	(2.753)	(2.732)
VET * PISA wave	9.480**	9.476**	9.364**	10.304***	10.189**	10.151**	8.656**	8.762**	8.578**
	(3.736)	(3.730)	(3.713)	(3.981)	(3.975)	(3.962)	(3.985)	(3.977)	(3.958)
Female	-0.504	0.754	-0.713	-1.238***	-0.545	-1.556	0.230	2.054***	0.130
	(0.402)	(0.715)	(2.137)	(0.426)	(0.772)	(2.267)	(0.441)	(0.761)	(2.296)
Female * VET	0.536	2.146**	2.291	1.064**	3.016***	3.861	0.008	1.275	0.721
	(0.511)	(1.082)	(3.212)	(0.542)	(1.156)	(3.403)	(0.550)	(1.143)	(3.402)
Female * PISA wave	0.766**	0.825***	0.816**	0.884***	0.928***	0.929***	0.648*	0.722**	0.704**
	(0.322)	(0.319)	(0.317)	(0.341)	(0.339)	(0.337)	(0.347)	(0.344)	(0.343)
Female * VET * PISA wave	-0.344	-0.369	-0.342	-0.159	-0.158	-0.144	-0.528	-0.581	-0.541
	(0.469)	(0.467)	(0.466)	(0.492)	(0.491)	(0.490)	(0.500)	(0.497)	(0.497)
Urban arena	-0.061	1.864	4.560*	-1.276	-0.042	3.282	1.153	3.770	5.837**
	(2.591)	(2.695)	(2.643)	(2.773)	(2.920)	(2.854)	(2.822)	(2.886)	(2.843)
Urban area * VET	-8.049*	-9.388**	-11.486***	-5.964	-6.950	-9.388**	-10.135**	-11.826**	-13.583***
	(4.228)	(4.360)	(4.327)	(4.404)	(4.563)	(4.521)	(4.529)	(4.637)	(4.611)
Urban area * PISA wave	0.012	0.069	-0.186	0.336	0.390	0.148	-0.312	-0.252	-0.520
	(0.323)	(0.331)	(0.324)	(0.340)	(0.352)	(0.343)	(0.351)	(0.355)	(0.349)
Urban area * VET * PISA wave	0.382	0.512	0.594	0.337	0.446	0.571	0.426	0.578	0.617
	(0.531)	(0.544)	(0.536)	(0.548)	(0.564)	(0.555)	(0.571)	(0.581)	(0.574)
Tertiary educated parent	3.136	2.822	3.451	2.476	2.305	2.956	3.797	3.339	3.945
	(2.607)	(2.611)	(2.587)	(2.823)	(2.816)	(2.794)	(2.802)	(2.815)	(2.791)
Tertiary educated parent * VET	-0.423	0.274	-0.312	-0.786	-0.276	-0.838	-0.061	0.824	0.214
	(3.956)	(3.941)	(3.917)	(4.243)	(4.220)	(4.200)	(4.180)	(4.174)	(4.148)
Tertiary educated parent * PISA wave	0.391	0.454	0.340	0.543	0.581	0.475	0.239	0.328	0.205
	(0.344)	(0.343)	(0.341)	(0.364)	(0.362)	(0.360)	(0.371)	(0.369)	(0.368)
Tertiary educated parent *VET * PISA wave	-0.095	-0.185	-0.071	-0.078	-0.132	-0.028	-0.112	-0.237	-0.114
	(0.501)	(0.498)	(0.496)	(0.529)	(0.526)	(0.524)	(0.531)	(0.528)	(0.527)
At least one parent born in CH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Mean scores			Reading scores			Math scores		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
At least one parent born in AT/ DE and no parent born in CH	-5.003	-2.750	-3.288	-1.877	-0.368	-0.271	-8.129	-5.133	-6.304
	(6.226)	(6.284)	(6.549)	(6.008)	(6.182)	(6.471)	(8.519)	(8.384)	(8.581)
Both parents born in another country	-45.124***	-44.237***	-44.748***	-43.431***	-42.786***	-42.982***	-46.817***	-45.688***	-46.514***
	(3.732)	(3.759)	(3.677)	(4.039)	(4.038)	(3.966)	(4.024)	(4.091)	(3.998)
DE/AT-born parent * VET	1.930	-3.217	-2.714	11.433	7.177	6.990	-7.574	-13.610	-12.419
	(22.420)	(22.343)	(22.445)	(21.353)	(21.309)	(21.418)	(24.671)	(24.551)	(24.632)
Both parent born in another country * VET	-30.258***	-31.410***	-31.155***	-33.745***	-34.853***	-34.691***	-26.771***	-27.966***	-27.619***
	(5.467)	(5.508)	(5.430)	(5.863)	(5.877)	(5.817)	(5.710)	(5.785)	(5.690)
DE/AT-born parent * PISA wave	0.960	0.802	0.825	0.814	0.697	0.706	1.106	0.906	0.944
	(0.864)	(0.858)	(0.881)	(0.818)	(0.829)	(0.849)	(1.119)	(1.090)	(1.113)
Both parent born in another country * PISA wave	1.403***	1.540***	1.383***	1.415***	1.502***	1.392***	1.391***	1.577***	1.374***
	(0.459)	(0.461)	(0.451)	(0.486)	(0.486)	(0.477)	(0.494)	(0.497)	(0.488)
DE/AT-born parent * VET * PISA wave	-1.378	-0.854	-0.932	-2.488	-1.998	-2.046	-0.267	0.289	0.182
	(2.504)	(2.492)	(2.504)	(2.339)	(2.331)	(2.341)	(2.830)	(2.811)	(2.824)
Both parent born in another country * VET * PISA wave	1.047	1.075	1.140*	1.413**	1.496**	1.526**	0.680	0.653	0.753
	(0.669)	(0.673)	(0.663)	(0.705)	(0.707)	(0.699)	(0.704)	(0.709)	(0.699)
German part	Ref.	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
French part	-37.347***	-31.458***	-24.953***	-39.432***	-36.112***	-28.771***	-35.263***	-26.803***	-21.134***
	(2.651)	(3.570)	(3.714)	(2.796)	(3.794)	(3.909)	(2.906)	(3.943)	(4.111)
Italian part	-59.905***	-54.104***	-21.222***	-55.390***	-52.136***	-18.360**	-64.420***	-56.072***	-24.084***
	(3.531)	(4.220)	(7.791)	(3.803)	(4.557)	(8.267)	(3.983)	(4.729)	(8.603)
French part * VET	39.005***	44.496***	38.190***	39.274***	45.943***	39.860***	38.736***	43.049***	36.520***
	(3.853)	(5.404)	(5.344)	(4.076)	(5.729)	(5.672)	(4.110)	(5.776)	(5.724)
Italian part * VET	36.199***	41.738***	18.447	36.711***	43.200***	19.594	35.687***	40.277***	17.301
	(5.664)	(6.970)	(11.425)	(5.910)	(7.364)	(12.181)	(6.341)	(7.646)	(12.311)
French part * PISA wave	0.379	2.055***	0.832*	1.682***	3.043***	2.169***	-0.923**	1.067**	-0.506
	(0.338)	(0.489)	(0.501)	(0.351)	(0.509)	(0.518)	(0.369)	(0.533)	(0.548)
Italian part * PISA wave	0.186	1.838***	0.727	0.321	1.668***	0.870	0.050	2.008***	0.584
	(0.467)	(0.580)	(1.022)	(0.494)	(0.612)	(1.069)	(0.515)	(0.635)	(1.115)
French part * VET * PISA wave	-1.533***	-3.491***	-2.917***	-2.219***	-4.094***	-3.693***	-0.847	-2.889***	-2.141***
	(0.486)	(0.699)	(0.704)	(0.508)	(0.732)	(0.737)	(0.519)	(0.745)	(0.751)
Italian part * VET * PISA wave	-0.925	-2.539***	-2.152	-1.479**	-3.073***	-2.497	-0.372	-2.004**	-1.806
	(0.714)	(0.898)	(1.507)	(0.745)	(0.944)	(1.592)	(0.779)	(0.967)	(1.612)

	Mean scores			Reading scores			Math scores		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Exam for admission to baccalaureate school		3.350	-1.775		0.835	-5.086		5.865	1.537
		(3.872)	(4.163)		(4.264)	(4.530)		(4.127)	(4.462)
Exam for admission to baccalaureate school * VET		8.566	12.779**		11.319*	16.136***		5.812	9.422
		(5.397)	(5.774)		(5.808)	(6.181)		(5.724)	(6.138)
Exam for admission to baccalaureate school * PISA wave		0.460	0.659		0.664	0.797		0.256	0.521
		(0.517)	(0.567)		(0.550)	(0.598)		(0.556)	(0.610)
Exam for admission to baccalaureate school * VET * PISA wave		-2.286***	-2.325***		-2.609***	-2.749***		-1.964***	-1.901**
		(0.715)	(0.789)		(0.752)	(0.829)		(0.761)	(0.843)
Cantonal share of prospective baccalaureate students		-23.556**			-16.233			-30.879**	
		(11.687)			(12.772)			(12.484)	
Cantonal share of prospective baccalaureate students * VET		2.958			4.368			1.548	
		(19.486)			(21.038)			(20.453)	
Cantonal share of prospective baccalaureate students * PISA wave		-5.739***			-4.023**			-7.455***	
		(1.479)			(1.590)			(1.572)	
Cantonal share of prospective bacc. students * VET * PISA wave		0.214			-0.578			1.006	
		(2.472)			(2.645)			(2.587)	
Cantonal baccalaureate rate			-259.737***			-260.073***			-259.401***
			(52.329)			(55.926)			(56.589)
Cantonal baccalaureate rate * VET			163.758**			170.861**			156.654*
			(75.786)			(81.093)			(80.253)
Cantonal baccalaureate rate * PISA wave			-0.560			-0.322			-0.797
			(6.692)			(7.051)			(7.217)
Cantonal baccalaureate rate * VET * PISA wave			-1.250			-4.111			1.611
			(9.994)			(10.572)			(10.599)
Constant	614.269***	620.485***	689.977***	586.491***	591.535***	663.954***	642.047***	649.436***	716.001***
	(2.915)	(5.590)	(16.712)	(3.142)	(6.164)	(18.002)	(3.253)	(5.970)	(17.983)
Observations (N)	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495

Notes: The table displays coefficients of weighted OLS estimations and standard errors in parentheses. *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Diff refers to a p-value testing whether the two corresponding interaction terms are significantly different.

Table A7. Quantile estimations on PISA average scores in reading and mathematics

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Prospective upper-secondary education: VET programme	-113.062***	-108.530***	-104.258***	-99.553***	-93.217***	-88.713***	-82.252***	-75.490***	-68.703***
	(4.664)	(3.920)	(3.543)	(3.165)	(3.034)	(3.211)	(3.325)	(3.156)	(3.152)
Female	-2.908	-3.404	-6.616***	-7.880***	-6.211***	-6.303***	-6.723***	-6.224***	-6.817***
	(2.320)	(2.072)	(1.790)	(1.674)	(1.522)	(1.574)	(1.787)	(1.670)	(1.890)
VET * female	9.679***	11.049***	12.549***	12.410***	10.024***	7.646***	4.482*	1.044	-1.308
	(3.482)	(2.940)	(2.723)	(2.554)	(2.315)	(2.497)	(2.574)	(2.528)	(2.704)
Urban arena	0.881	1.543	0.262	1.231	1.024	0.938	0.288	-0.597	-1.683
	(2.393)	(1.996)	(1.743)	(1.686)	(1.568)	(1.571)	(1.852)	(1.729)	(1.923)
VET * urban area	-11.111***	-13.043***	-10.703***	-7.586**	-4.216	-3.783	-1.785	-1.587	-1.188
	(3.738)	(3.290)	(3.335)	(3.101)	(2.862)	(2.876)	(2.762)	(3.091)	(2.976)
Tertiary educated parent	8.390***	4.962**	4.632**	3.433*	3.386*	2.783	3.593*	5.744***	4.788**
	(3.000)	(2.216)	(2.027)	(1.854)	(1.815)	(1.718)	(1.972)	(1.795)	(2.072)
VET * tertiary educated parent	-6.792*	-3.572	-1.822	-0.982	0.464	1.871	2.935	1.535	2.570
	(4.047)	(3.074)	(2.946)	(2.725)	(2.611)	(2.660)	(2.725)	(2.638)	(2.981)
At least one parent born in CH				Ref.			Ref.	Ref.	Ref.
At least one parent born in AT/ DE and no parent born in CH	5.352**	3.524	-1.802	1.875	-2.127	-1.929	-6.929**	-5.948	-10.632***
	(2.236)	(5.416)	(4.383)	(8.366)	(1.536)	(4.592)	(3.394)	(4.803)	(2.520)
Both parents born in another country	-42.207***	-39.300***	-38.759***	-40.378***	-41.734***	-39.666***	-39.273***	-37.735***	-30.263***
	(4.821)	(3.017)	(2.303)	(2.081)	(2.107)	(2.655)	(2.422)	(2.954)	(3.813)
VET * DE/AT-born parent	-1.571	-14.977**	-10.473	-7.484	4.496	-2.483	-2.628	2.701	8.110**
	(11.615)	(6.837)	(17.757)	(18.375)	(5.289)	(7.370)	(6.835)	(21.550)	(3.389)
VET * both parent born in another country	-24.004***	-26.849***	-27.195***	-28.612***	-26.413***	-22.750***	-20.904***	-17.181***	-21.737***
	(5.688)	(4.228)	(3.456)	(3.413)	(3.335)	(3.924)	(3.624)	(4.193)	(4.714)
German part					Ref.		Ref.	Ref.	Ref.
French part	-40.194***	-41.258***	-39.668***	-38.947***	-37.588***	-34.791***	-33.120***	-31.295***	-28.732***
	(2.663)	(2.014)	(1.795)	(1.728)	(1.705)	(1.619)	(1.926)	(1.790)	(2.041)

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Italian part	-66.785***	-63.655***	-62.564***	-62.809***	-62.802***	-57.354***	-55.233***	-53.389***	-50.554***
	(2.898)	(3.030)	(2.096)	(2.348)	(2.304)	(2.625)	(2.409)	(2.413)	(3.103)
VET * French part	44.103***	42.545***	38.703***	35.730***	31.727***	27.089***	22.105***	19.337***	16.624***
	(3.639)	(2.932)	(2.699)	(2.615)	(2.385)	(2.612)	(2.604)	(2.651)	(2.865)
VET * Italian part	42.000***	38.729***	35.211***	33.516***	33.069***	26.275***	23.352***	17.811***	15.708***
	(3.815)	(4.425)	(3.487)	(3.714)	(3.724)	(3.523)	(3.584)	(3.401)	(5.563)
PISA wave	0.721***	0.717***	0.547***	0.732***	0.801***	0.602***	0.498**	0.545***	0.412*
	(0.267)	(0.222)	(0.188)	(0.186)	(0.174)	(0.176)	(0.203)	(0.193)	(0.214)
VET * PISA wave	0.219	0.191	0.123	0.005	-0.331	-0.252	-0.261	-0.290	-0.165
	(0.387)	(0.321)	(0.295)	(0.284)	(0.261)	(0.281)	(0.287)	(0.287)	(0.303)
Constant	539.102***	565.123***	585.626***	600.547***	612.439***	625.555***	638.962***	652.029***	672.734***
	(3.629)	(3.106)	(2.689)	(2.366)	(2.298)	(2.232)	(2.612)	(2.285)	(2.507)
Observations (N)	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495	33,495
Diff DE/AT	0.585	0.394	0.320	0.563	0.720	0.825	0.730	0.665	0.872
Diff French Italian	0.078	0.128	0.353	0.256	0.000	0.013	0.015	0.364	0.000

Notes: The table displays the regression coefficients of weighted quantile estimations and standard errors in parentheses; *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Diff refers to a p-value testing whether the two corresponding interaction terms are significantly different.