Do more demanding lower secondary school certificates for minority students pay off? A comparison of VET access between Germany and German-speaking Switzerland

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Data Availability Statement

The datasets (DAB panel study and CILS4EU) for this study can be downloaded after signing a data usage contract.
CILS4EU: GESIS Data Archive, Cologne, ZA5656 Data file Version 3.3.0, doi:10.4232/cils4eu.5656.3.3.0.
DAB panel study: https://forsbase.unil.ch/project/study-public-overview/16347/2/.

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Abstract: This paper aims to compare ethnic disadvantages in the transition from school to vocational education and training (VET) between Germany and German-speaking Switzerland. These two countries are suitable for comparison because of their similar school systems, occupational structure and VET system. At the same time, they differ in terms of the societal prestige of their less demanding lower secondary school tracks.

I focus in particular on the extent to which these differences have an impact on the signaling value of the obtained certificates, and hence on the transition from school to VET. Furthermore, I consider the following theoretical approaches to explain ethnic differences: differences in human capital endowment, theories of discrimination and educational aspirations.

My analyses are based on two panel studies: the DAB panel study for German-speaking Switzerland and CILS4EU for Germany. To estimate VET success rates, I apply multilevel linear probability models (N = 1,682).

My results indicate that there are country differences regarding the premiums associated with holding more demanding lower secondary school leaving certificates. In Germany, natives benefit much more from having a certificate from a secondary school with extended requirements than minority students. In Switzerland, in contrast, no group differences regarding the premiums can be detected.

Keywords: Germany, Switzerland, VET, ethnic penalties, school certificates, school-to-VET transition, country comparison

Zusammenfassung: Dieser Beitrag vergleicht ethnische Nachteile beim Übergang von der Schule in die Berufsbildung zwischen Deutschland und der Deutschschweiz. Diese beiden Länder eignen sich aufgrund ihrer ähnlichen Schulsysteme, der Berufsstruktur und des Berufsbildungssystems für einen Vergleich. Zugleich unterscheiden sie sich bezüglich des gesellschaftlichen Ansehens der weniger anspruchsvolle Sekundarschulzweige.

Ich konzentriere mich insbesondere auf die Frage, inwieweit sich dieser Unterschied auf den Signalwert der erworbenen Abschlüsse und damit auf den Übergang von der Schule in die Berufsbildung auswirken. Darüber hinaus betrachte ich die folgenden theoretischen Ansätze zur Erklärung ethnischer Unterschiede: differenzielle Ausstattung mit Humankapital, Theorien zur Diskriminierung und Bildungsaspirationen.

Meine Analysen basieren auf zwei Panelstudien: der DAB-Panelstudie für die Deutschschweiz und CILS4EU für Deutschland. Zur Schätzung der Eintrittsquoten in die Berufsbildung berechne ich lineare Mehrebenen-Wahrscheinlichkeitsmodelle (N = 1.682).

Meine Ergebnisse deuten darauf hin, dass es länderspezifische Unterschiede bei den *premiums* für den Besitz anspruchsvollerer Schulabschlüsse der Sekundarstufe I gibt. In Deutschland profitieren Einheimische sehr viel stärker vom Besitz eines Sekundarschulabschlusses mit erweiterten Anforderungen als Schüler mit Migrationshintergrund, während in der Schweiz keine Gruppenunterschiede in den *premiums* feststellbar sind.

Schlagwörter: Deutschland, Schweiz, ethnische Nachteile, Berufsbildung, Schulzeugnisse, school-to-VET transition, Ländervergleich

1 Introduction

Access to the labor market plays a central role in the social integration of migrants (Wolbers 2007; Heath/Cheung 2007). In many European countries, this access is strongly structured by the education system and the certificates acquired within it (Allmendinger 1989; Gangl et al. 2003). Accordingly, disadvantages in the education system affect the transition from school to work, and—since this transition is crucial for a successful career—labor market outcomes in a broader sense (Müller/Shavit 1998). Without an upper secondary certificate, a person has almost no chance of entering the qualified labor market (Meyer 2008; Menze 2017). A strong vocational educational and training (VET) system fosters a smooth transition from school to work (Muja et al. 2019; Wolbers 2007). Furthermore, a VET certificate enables people to enter the qualified labor market, offers relatively high salaries to academically weaker juveniles and reduces the risk of unemployment among young people (Tjaden/Scharenberg 2017; Korber/Oesch 2019; SCCRE 2018; Menze 2017; Gangl et al. 2003; Breen 2005). Accordingly, entering VET could pave the way toward a stable career for socially disadvantaged groups (Shavit/Müller 2000). Nevertheless, ethnic disadvantages also exist in the transition from school to VET. As many studies have shown, minority students have lower chances of getting a VET place compared to natives (Tjaden/Hunkler 2017; Roth 2018; Dollmann 2017; Diehl et al. 2009; Glauser/Becker 2016; Imdorf 2017b; Kleinert/Jacob 2013; Seibert et al. 2009).

Minority students are overrepresented in less demanding lower secondary school tracks (Glauser 2015; Dollmann/Weißmann 2019; Seibert et al. 2009). We also know from previous research that less demanding school leaving certificates are associated with difficulties in school-to-VET transitions (Beicht/Walden 2017b; Meyer et al. 2003). Employers interpret the school certificate as a signal of performance and future trainability (Arrow 1973; Spence 1973). Different signaling values are therefore attached to different school certificates, and students with less demanding lower secondary qualifications face difficulties in transferring to VET (Buchholz et al. 2012; Kleinert/Jacob 2013; Beicht/Eberhard 2013; Sacchi/Meyer 2016). Based on the two aforementioned factors, it becomes apparent why migrants have lower chances of accessing VET than natives. However, little is known about whether there is an intersection between less demanding lower secondary qualifications and a migration background. On the one hand, it is conceivable that minority students might reduce their disadvantages compared to natives if they were more frequently to achieve more demanding lower secondary certificates (Kalter 2006). However, it is also possible that minority students may not benefit as much as native students from more demanding certificates, as they might face discrimination (Steinmann 2019). More education would therefore not pay off as much for minority students as for native students, and might lead to a decrease in school motivation (Kao/Tienda 1998; Siegert/Roth 2020) and to pronounced disadvantages on the labor

market for this group (Buchholz et al. 2012; Kleinert/Jacob 2013; Beicht/Eberhard 2013; Sacchi/Meyer 2016).

In this paper, I want to narrow this gap and investigate the relationship between lower secondary certificates and a migration background in terms of the VET access of school leavers from non-academic tracks. In doing so, I would like to answer the following research question: how do different lower secondary school certificates influence ethnic inequalities in the transition from school to VET? In other words: do certificates from more demanding lower secondary schools pay off for minority students in terms of access to VET?

To answer this question, I use data from Germany and Switzerland, adopting a most similar systems design. These countries are suitable for such an investigation because they have both a pronounced dual vocational training system (schooling and company-based training) and a high proportion of first- and second-generation migrants. They also have a similar occupational structure and a highly stratified and diversified education system (at the lower secondary school level, there are schools with basic requirements, schools with extended requirements and an academic track).

In addition to these similarities, however, there are also differences between the school-to-work systems of the two countries, and this offers us opportunities to obtain fruitful insights into ethnic inequalities in school-to-VET transitions. In Germany, the difference in signaling value between non-academic certificates is substantially greater than in Switzerland. In Germany, a strong stigma is attached to secondary schools with basic requirements (Trautwein et al. 2007; Bol et al. 2014), which is not the case in Switzerland (Buchholz et al. 2012). Accordingly, the type of secondary school qualification is more crucial to VET success in Germany than in Switzerland (Imdorf 2009). Hence, these countries should provide insights into the extent to which the signaling values of lower secondary qualifications contribute to ethnic inequalities in school-to-VET transitions.

The analysis in this paper is based on data from two panel studies. The first, which includes Germany, is “Children of Immigrants Longitudinal Survey in Four European Countries” (CILS4EU) (Kalter et al. 2017), and the second, which includes German-speaking Switzerland, is “Determinants of educational choices and vocational training opportunities” (Glauser 2015; Becker et al. 2019; Becker et al. 2020). In both panel studies, the pupils were surveyed for the first time at the end of compulsory schooling within their school classes, and were further surveyed at regular intervals after leaving the school system. Accordingly, both datasets allow for tracing transition pupils attending non-academic tracks from lower secondary school to vocational upper secondary education. As the central dependent variable is success on the VET market, I only consider pupils who are actually aiming for VET after the end of compulsory schooling, who hold

a non-academic lower secondary certificate and who do not continue their schooling (N = 1,682). To estimate the VET success rates, I apply multilevel linear probability models.

In the next section, I briefly introduce the country context. Thereafter, I present the theoretical considerations and the state of research. I then describe the data, the sample and the operationalization, before presenting the results. I conclude by summarizing and discussing the main findings.

2 The country context

Both Switzerland and Germany have a very stratified education system (Allmendinger 1989; Blossfeld et al. 2016; Buchmann et al. 2016; Buchholz et al. 2016). There is some variation in the specific design of the school systems between cantons and federal states, but at a national level both countries have three types of secondary school, each with different qualification levels and different certificates (schools with basic requirements; schools with extended requirements; and schools with an academic track, as well as secondary schools with no selection that combine one or more of these types of secondary school). In Germany, pupils are usually allocated to secondary schools after fourth grade (aged 10 or 11), while in Switzerland the allocation usually happens after sixth grade (aged 12 or 13) (for Germany, see: Tjaden/Hunkler 2017; for Switzerland, see: Hupka-Brunner et al. 2010). A later age of selection could decrease social inequality and thus reduce ethnic differences at these transitions. However, the state of research on this is mixed (Berger/Combet 2017; Dollmann 2016). In Switzerland, access to the academic track is considerably more selective than in Germany. In 2015, 25 percent of young adults in Switzerland had a university entrance degree (BfS 2018). In 2014, 41 percent of young adults in Germany had a university entrance degree (Malecki 2016).

In Germany, students usually graduate from lower secondary schools with basic requirements (*Hauptschule*) after ninth grade with a *Hauptschulabschluss* (in some federal states, it is called a *Berufsbildungsreife*). Lower secondary schools with extended requirements (*Realschule*) are completed after tenth grade with a *Realschulabschluss* (in some federal states, it is called a *Mittlerer Schulabschluss*).[1] In Switzerland, lower secondary schools with basic requirements (*Realschule*) and lower secondary schools

[1] At the time of the study, some federal states no longer had spatially separated *Hauptschulen* and *Realschulen* but schools that provide two or three different secondary school types (e.g. *Schulart mit zwei/drei Bildungsgängen*). However, the different certificates (*Hauptschul-* and *Realschulabschluss*) remained in place. Furthermore, in some federal states, students graduate from *Hauptschule* after tenth grade and they can obtain an *Realschulabschluss* (Schuchart 2007). For a concise presentation of the different organizational structures of secondary schools in the 16 federal states, see Autorengruppe Bildungsberichterstattung (2014: 70f.).

with extended requirements (*Sekundarschule*) are both completed after ninth grade, with a *Realschulzeugnis* and a *Sekundarschulzeugnis* respectively.[2]

A further difference between the countries is the fact that the transition to VET is much more prominent in Switzerland than in Germany. In Switzerland, about two-thirds of pupils in the school system enroll in a VET program after the end of compulsory schooling (SCCRE 2018). Company-based VET is the most common form of VET in both countries. However, it is significantly more common in German-speaking Switzerland (accounting for 90 percent of VET) than in Germany (70 percent) (Ludwig-Mayerhofer et al. 2019; SERI 2013).

In both countries, students who are unable to make the direct transition from school to VET have the opportunity to attend transition system institutions (Jacob/Solga 2015; Sacchi/Meyer 2016; Beicht/Eberhard 2013). This can take the form of an additional year of schooling or of special courses designed to increase a student's educational skills or prepare them for vocational training. Furthermore, there are other bridging opportunities, such as internships or employment as an au pair. About 30 percent of non-academic track school leavers in both countries use bridging opportunities or participate in a transition system institution (Sacchi/Meyer 2016; Beicht/Eberhard 2013). This system does ensure that lower-performing students can increase their chances of entering VET (Sacchi/Meyer 2016; Beicht/Eberhard 2013). Nevertheless, direct entry into VET represents a favorable transition (Lindemann/Gangl 2019), as staying in the transition system has negative consequences for later VET entry chances (Sacchi/Meyer 2016; Beicht/Eberhard 2013). In Germany, in the early 2000s, these transition systems often represented a dead end for students from lower secondary schools with basic requirements (Gaupp et al. 2008). More recent studies from Germany have also pointed to disadvantages for students who do not make the direct transition. Thus, even 12 months after leaving school, more than 50 percent of students who have accessed the transition system are not yet in VET (Beicht/Eberhard 2013). Furthermore, 40 percent of the students who attended transition system institutions did not enter an upper secondary educational program (Autorengruppe Bildungsberichterstattung 2018). In Switzerland, Sacchi and Meyer (2016) have shown that students who attended transition system institutions or used bridging opportunities were 12 percent to 56 percent less likely to have graduated from upper secondary education six years after leaving school compared to direct entrants.

Besides direct entry into VET or entry into a bridging program, there is the possibility of staying at school, e.g. by transferring to a *Gymnasium* (academic track) or

[2] In contrast to Germany, Switzerland does not have a certificate of graduation for the lower secondary level. However, the type of school attended by each child is shown on their diploma, which they then use to apply for VET positions. For the sake of comparability, the school-leaving qualification for Switzerland refers hereafter to the type of school attended (Seibert et al. 2009).

to a vocational *Gymnasium*. Students who choose this option are likely to represent a heterogeneous group in terms of their career aspirations (Lindemann/Gangl 2019). On the one hand, entry into the tertiary education system could be sought via this route (Murdoch et al. 2016); on the other, this could serve to access more prestigious VET positions (Lindemann/Gangl 2019; Wydra-Somaggio et al. 2010). Due to the heterogeneity of this group and because they do not seek entry into VET directly after the end of compulsory education, I do not consider this group of students in the remainder of the paper.

To compare the supply of VET places in the two countries, I calculated the ratio of school leavers from the two non-academic secondary school tracks to VET places. For Switzerland, this ratio was roughly 1:1.2 in 2014; for Germany, it was 1:1.03 in 2012 (SBFI 2017b; Babel et al. 2012; BMBF 2018). Consequently, there are proportionally more VET places available for school leavers in Switzerland than in Germany, and therefore the competition for VET places in Germany is higher than in Switzerland. It should also be mentioned that most VET places in Switzerland are offered by companies that are smaller than those offering places in Germany (Buchholz et al. 2012; Seibert et al. 2009).

Both countries experienced economic growth during the period under review (2010–2016) (Figure 1), with low unemployment figures. GDP per capita (in euros) is significantly higher in Switzerland than in Germany. Considering the economic situation of the two countries, a comparison of the different survey years of the data used (Germany: 2012, Switzerland: 2014) should be straightforward. Both countries were in a similar situation and there were no unusual developments in the above indicators before or after the surveys took place.

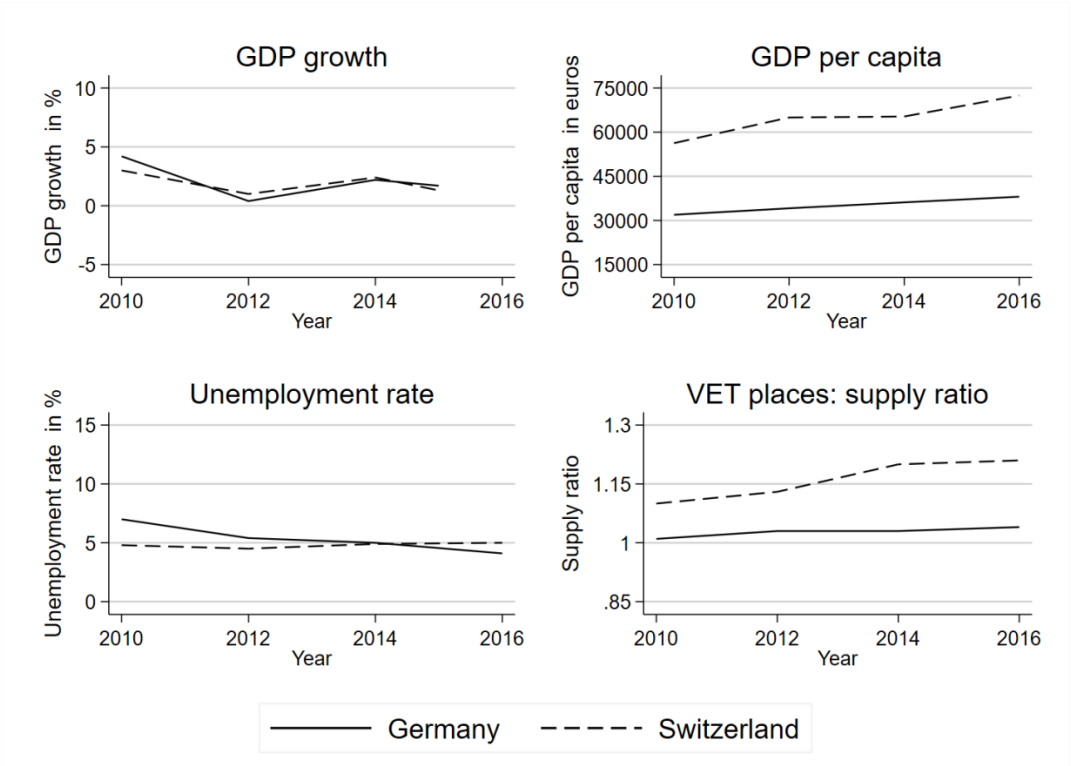

Figure 1: Economic indicators (GDP growth; GDP per capita; unemployment rate; and VET supply–demand ratio) in Germany and Switzerland between 2010 and 2016
Source: World Bank (2020); eurostat (2020a, b); SBFI (2017a, b); BMBF (2018); author's calculations.

3 Theoretical considerations and state of research

When it comes to explaining ethnic differences in the educational system, three approaches predominate: human capital theory, discrimination theories and, more recently, an approach focusing on migrants' higher educational aspirations (Becker 1973; Phelps 1972; Kao/Tienda 1995; Kalter 2006; Seibert/Solga 2006; Zschirnt 2019; Glauser/Becker 2016; Tjaden 2017; Dollmann 2017).

Human capital theory assumes that employers use the human capital of applicants as an indicator of their expected productivity (Becker 1964). The higher the expected productivity of an applicant, the more likely he or she is to be hired. In the context of educational research, school grades or certificates are often seen as indicators of human capital. In this regard, various studies have shown that better school grades and certificates from more demanding schools have a positive effect on transitions into VET and the labor market (Kalter 2006; Tjaden 2017; Roth 2018; Glauser/Becker 2016). According to human capital theory, ethnic differences in education between minority students and natives can be attributed to their differing human capital endowments (Kalter 2006). On average, minority students show poorer school performance and are overrepresented in less demanding school tracks (Glauser/Becker 2016; Dollmann 2017; Seibert et al. 2009). They should therefore have lower chances of achieving success on the VET market than natives.

If differences between natives and migrants in terms of their chances of success remain after taking human capital differences into account, this is referred to as an ethnic penalty (Heath/Cheung 2007). Many authors see discrimination as the cause of these penalties (Seibert/Solga 2006; Imdorf 2017a; Tjaden 2017). The two dominant theories of discrimination are statistical and taste-based discrimination (Baert/Pauw 2014). Statistical discrimination is based on the assumption that employers make a distorted assessment of the productivity of individual applicants based on their group membership (e.g. nationality) (Phelps 1972; Arrow 1973). It is often argued that employers' perceptions of the productivity of different groups disadvantages migrants. In contrast to statistical discrimination, taste-based discrimination is not due to a distorted assessment of expected productivity, but is based on the preference of employers for natives (Becker 1973). According to this approach, employers do not misjudge the productivity of migrants; rather, they make targeted decisions against them, even if this entails economic losses.

Both strands can help explain why ethnic differences in VET access remain even after different human capital endowments are taken into account. On the one hand, especially in studies based on survey data, one has to be careful when claiming discrimination as a cause of ethnic differences, as unobserved factors could also be the cause of these differences (Blank et al. 2004). On the other, a large number of

experimental studies have reliably documented the occurrence of discrimination against migrants in recruitment processes (Auer et al. 2019; Koopmans et al. 2018; Hunkler 2014).

In addition to discrimination, the educational aspirations of minority students may also provide an explanation for ethnic differences in the education system and in the transition from school to work. Numerous studies have shown that students with a migration background have higher educational aspirations than natives (Kao/Tienda 1995; Engzell 2019). Interestingly, minority students have these higher educational aspirations despite displaying a poorer academic performance compared to natives (Siegert/Roth 2020). These higher aspirations can affect educational decisions. Various studies have found positive ethnic choice effects (Tjaden/Scharenberg 2017; Dollmann 2017; Dollmann/Weißmann 2019; Tjaden/Hunkler 2017), meaning that, after controlling for differences in performance and social background, minority students aspire to more demanding educational programs than natives. Tjaden (2017) was able to indicate for Germany that these higher aspirations can — net of academic performance and social origin — partly explain the ethnic differences in school-to-VET transitions.

When applied to the VET market, I argue that these higher aspirations should result in minority students applying for more demanding and more prestigious training places. However, since there is greater competition for these training places, they have a smaller chance of actually being successful (Andriessen et al. 2012; Meyer et al. 2003). It could also be assumed that students with a migration background could select themselves away from VET, either to achieve higher (academic) educational qualifications or to avoid expected discrimination on the VET market (Heath/Brinbaum 2007; Tjaden 2017; Mentges 2019). This could result in migrants seeking VET being a negatively selected group compared to native VET seekers. The extent to which minority student VET seekers are actually a selective group (Tjaden 2017), and the question of whether minority students try to achieve their higher aspirations via VET, are debatable (Murdoch et al. 2016).

Previous studies have shown ethnic inequalities in both countries in terms of the transition from lower secondary to upper secondary education. For Switzerland, Imdorf (2017b) shows that pupils with a migration background are disadvantaged in accessing VET. Other studies from Switzerland have produced similar findings (Meyer et al. 2003; Tjaden/Scharenberg 2017; Glauser/Becker 2016; Buchholz et al. 2012; Scharenberg et al. 2017; Falter 2012; Laganà et al. 2013). Pupils from the Balkans and Turkey are particularly disadvantaged (Imdorf 2017b; Laganà et al. 2013; Tjaden/Scharenberg 2017). In Germany, too, a large number of studies have shown that students from immigrant backgrounds are less likely to access VET, with Turkish students in particular facing difficulties in this transition (Lindemann 2020; Ludwig-Mayerhofer et al. 2019; Roth 2018; Protsch/Solga 2017; Beicht/Walden 2017a; Protsch/Dieckhoff 2011;

Kleinert/Jacob 2013; Kleinert/Jacob 2019). It is evident that, for both countries, students with certificates from less demanding secondary schools have a lower chance of achieving success on the VET market (Beicht/Walden 2017b; Meyer et al. 2003).

The better the regional opportunity structure, the higher the VET transition rates (Lindemann/Gangl 2019; Muja et al. 2019; Glauser/Becker 2016; Kleinert/Jacob 2013; Seibert et al. 2009). Poorer economic conditions lead to higher competition for VET places and ethnic differences are more prevalent in competitive markets, since employers can better enforce their (potentially stereotyped) preferences (Tjaden 2017). Based on this argument, one could argue that ethnic differences should be greater in Germany than in Switzerland. However, based on the structure of the VET market, one could also argue that ethnic differences should be greater in Switzerland, because VET there is more often organized in smaller companies (Buchholz et al. 2012; Seibert et al. 2009). Smaller companies are more likely to use a less standardized procedure for selecting applicants, which could lead to a higher probability of discriminatory behavior in the selection process. Therefore, I expect that ethnic disadvantages in Switzerland will be greater than in Germany.

> H1: Ethnic differences in VET access are expected to be greater in Switzerland than in Germany.

Regarding the lower secondary degree, one can argue — in line with signal theory (Arrow 1973; Spence 1973) — that employers consider this degree as a signal for trainability and expected productivity. The more demanding the certificate and the better the grades, the better the trainability and the higher the expected productivity. Hence, pupils from the lowest track should face substantial problems entering VET. Various studies have been able to demonstrate this relationship (e.g. Buchholz et al. 2012; Beicht/Walden 2017b; Sacchi/Meyer 2016; Meyer et al. 2003).

In Germany, lower secondary schools with basic requirements carry a very strong stigma. They are sometimes referred to as a "waste bin for the untalented" (Bol et al. 2014: 1568) or described as problem schools (Trautwein et al. 2007). This stigma makes it more difficult for students with a leaving certificate from a secondary school with basic requirements to access the VET system (Beicht/Walden 2017b; Buchholz et al. 2012; Kleinert/Jacob 2013; Beicht/Eberhard 2013). In Switzerland, unlike in Germany, secondary schools with basic requirements do not carry a stigma as a "remainder" school (Buchholz et al. 2012: 704). Therefore, it can be assumed that the signaling value of the less demanding lower secondary school qualification in Switzerland is larger than it is in Germany. In other words, an extended requirement certificate is more important for VET success in Germany than in Switzerland (Imdorf 2009: 393).

Accordingly, it can be expected that the difference in the probability of success in VET access between students from secondary schools with basic requirements and

students from secondary schools with extended requirements is larger in Germany than in Switzerland. This leads to Hypothesis 2.

> H2: The premiums associated with a certificate from a secondary school with extended requirements (compared to those associated with a certificate from a school with basic requirements) are expected to be greater in Germany than in Switzerland.

As described above, little is known about whether there is an intersection between school leaving certificates and a migration background. One might expect that ethnic differences in VET access are lower at the level of secondary schools with extended requirements than at the level of secondary schools with basic requirements. Employers might consider migrants who have obtained a more demanding degree as a special group within the migrant population, given the overrepresentation of migrants in less demanding secondary schools (Glauser 2015; Dollmann/Weißmann 2019; Seibert et al. 2009). This should lead to less statistical discrimination at this level. It could also be argued that ethnic disadvantages in VET access are greater at the basic requirement level, where minority students face a double disadvantage. First, with this certificate, they might be exposed to a greater extent of statistical discrimination. Second, they are additionally affected by the negative image of schools with basic requirements.

Comparing countries, I assume that minority students in Germany benefit to a greater extent from a more demanding degree than they do in Switzerland. This might be valid because, first, previous research has shown that certificates are less significant for access to VET in Switzerland than they are in Germany (Imdorf 2009). Second, in Switzerland, there may not be such a strong double disadvantage affecting migrants coming from secondary schools with basic requirements. Therefore, Swiss minority students should not benefit as much from a more demanding degree as minority students in Germany. This leads to Hypothesis 3.

> H3: For minority students, the premiums associated with a certificate from a secondary school with extended requirements (compared to those associated with a certificate from a school with basic requirements) are expected to be greater in Germany than in Switzerland.

4 Data, sample and operationalization

4.1 Data

The analysis is based on data from two panel studies: first, data from the CILS4EU panel study (Kalter et al. 2017) for Germany; and, second, data from the DAB panel study (Becker et al. 2020; Becker et al. 2019; Glauser 2015) for German-speaking Switzerland. In both panel studies, the pupils were surveyed for the first time at the end of compulsory

schooling within their school classes, and were further surveyed at regular intervals after having left the school system. Accordingly, both datasets allow for tracing the transition pupils make from lower secondary school to upper secondary education.

The CILS4EU data include information on 3,366 students after the end of compulsory schooling (data collected between November 2012 and May 2013) (Kalter et al. 2019). Students were sampled using a stratified sampling approach (schools with ninth-graders, sampling with probability proportional to size, classes and students) to oversample minority students.

The DAB data contain information on 2,236 juveniles after leaving compulsory schooling (data collected in October and November 2014) (Becker et al. 2019; Becker et al. 2020). Students were sampled using a stratified sampling approach (10 percent random sample of all eighth-grade classes in each strata: nine distinct types of municipality) to oversample rural regions and lower secondary schools with basic requirements (Glauser 2015).[3]

4.2 Analytical sample

In line with my research question, I only consider those students who indicated in their last school year that they would like to start VET (company- or school-based) after completing school (in Germany, ninth or tenth grade; in Switzerland, ninth grade). I am aware this might be a selective group within the student body (Heath/Brinbaum 2007; Tjaden 2017; Murdoch et al. 2016). However, if the aim is to study the transition from school to VET, it is reasonable to apply this conditioning to data selection; otherwise, it will be impossible to know if the students even aspired to VET.[4] Of these pupils, 2,035 participated in the survey wave following the end of their last school year. Only for these pupils can I determine whether they entered VET or not. In the sample, I only retain students who have completed one of the two lower tracks of secondary school, since students on the academic track hardly ever seek VET after ninth or tenth grade. In addition, I exclude students from the sample who continued their schooling at the upper secondary education level (e.g. at a gymnasium or vocational gymnasium). For Switzerland, I additionally drop 13 cases with missing information on migration background. Thus, I am left with an analytical sample of 1,682 people (in Germany: 605; in Switzerland: 1,077).

[3] For a more detailed description of the study designs, the sampling process and the panel attrition, see Glauser (2015), Becker et al. (2019) and Kalter et al. (2019).

[4] Table S1 in the Supporting Online Material (SOM) shows the school-leaving qualifications, grades, competencies and occupational aspirations for natives and minority students, separated by VET aspirations. Comparing within groups (e.g. natives aspiring to VET versus natives not aspiring to VET; minority students aspiring to VET versus minority students not aspiring to VET), it is evident that migrants who aspire to VET do not represent a particularly negatively selected group.

4.3 Operationalization

I investigate the transition from one of the non-academic tracks into VET. Since direct entry into VET is the favorable outcome (Lindemann/Gangl 2019), students are considered to have been successful if they start VET the year after obtaining a lower secondary degree. Students starting a vocational preparation year or using a bridging opportunity, or students who are neither in education nor training (NEET), are classified as not successful. Later entry into VET (e.g. in the second or third year after obtaining a lower secondary degree) is possible. However, various studies indicate that students who do not enter VET directly after leaving school face considerable difficulties in entering VET at a later stage (Sacchi/Meyer 2016; Beicht/Eberhard 2013; Autorengruppe Bildungsberichterstattung 2018). Students are assigned a migration background if they themselves (or at least one of their parents) were born abroad. I did not further differentiate by generation status or by country of origin due to there being too few cases in the sample.

In terms of school leaving qualifications, I distinguish between certificates from schools with basic requirements and certificates from schools with extended requirements. The two countries have reverse evaluation patterns — Germany: 1 (best grade) to 6 (worst grade); Switzerland: 6 (best grade) to 1 (worst grade). Therefore, in order to harmonize the different scales, the mean grades in mathematics and German of the last two school years are aggregated on a five-level scale for all students in this study: very good (5), good (4), satisfactory (3), sufficient (2) and insufficient or worse (1). For the analyses, the grades are z-standardized.

For the students from Germany, standardized test results from the first survey wave are available for language competencies and cognitive competencies. The sum scores of these competency tests range from 0 to 27. For Switzerland, competency tests for reading and mathematics from eighth grade and/or ninth grade are only available for a portion of the sample (approximately 60 percent of the analytical sample). The sum scores of these competency tests range from 140 to 860. The school decides whether competency tests are administered. Since it is unlikely that students will choose their school based on whether they participate in these competency tests, it can be assumed that the missing value patterns of students are random. To be able to account for student competencies in the Swiss analyses as well, I create an additional subsample of students who attended schools where the competency tests were administered. For the Swiss subsample, I use the mean of the test scores from the eighth and ninth grades. All competency test scores were z-standardized for the analyses.

Social origin is measured by the highest International Socio-Economic Index of Occupational Status (HISEI) of the parents, ranging from 16 to 90 (Ganzeboom 2010). If information from a pupil's interview is not available, information from their parents' interview is used. The pupils' aspirations are operationalized based on what they indicated

as their desired future profession. These professions are classified according to the ISEI scale. For my analyses, I use the mean occupational aspirations from the eighth and ninth grades and divide the scale into three equally broad ranges. Because many young people did not yet have any concrete career aspirations, I have created four groups: "don't know", 16–41, 42–67 and 68–90.

To control for regional differences, for Switzerland, I use the logarithmized youth unemployment rate at an MS-region level (Switzerland is divided into 106 MS-regions in total). For Germany, unfortunately, there are no indicators for either the federal state or for the municipality in the datasets used. Therefore, I cannot control for youth unemployment rates in the models for Germany.

5 Method

I estimated random intercept multilevel models (Level 2: school classes; Level 1: pupils) to take the fact that the pupils were originally sampled in their school classes into account.[5] In Switzerland, 8 percent of the analytical sample (natives: 7.3; minority students: 11) have at least one missing value in the model variables. In Germany, the missing value share is 4 percent (natives: 2.05; minority students: 6.05). In both countries, the social origin and the school grades are responsible for most of the missing values (for the missing value patterns of all model variables, see Table S2 in the SOM). To handle missing data in the analytical sample, I multiple-imputed 100 datasets using chained equations (predictive mean matching using 10 nearest neighbors) (White et al. 2011).[6] The multilevel model estimates were based on these 100 multiple-imputed datasets (White et al. 2011).[7]

As I have a truly binary outcome variable (success on the VET market) and I am interested in group comparisons, I have followed the suggestions made by Breen et al. (2018) and estimated linear probability models instead of non-linear probability models. For data preparation and calculating the results, I have used Stata 16, including various ados (Jann 2007; Jann 2014; Klein 2014). For the descriptive results, the data were weighted to control for design and sampling differences. The code can be found in the additional online material.

[5] Because I cannot include any macro-structural control variables in the models for Germany, I estimated models where I included school fixed effects. The results are displayed in Table S4 in the SOM. The results are similar to the random intercept models shown below.

[6] Three different imputation models were calculated. Two imputation models were calculated separately for the two countries. A third imputation model was estimated based on data from the Swiss subsample. The imputation models contain all model variables, the weight quantiles (Rosenbaum/Rubin 1983), the survey strata and auxiliary variables (parents' university degree: yes/no). The interaction effects and the z-standardized variables were included in the imputation models using the "just another variable" approach.

[7] I have also estimated complete case analysis models. These are presented in Table S3 in the SOM. The results do not differ substantially from the results presented in this paper.

6 Results

6.1 Descriptive results

Students in Switzerland have a slightly higher probability of achieving VET success than those in Germany (see Table 1; 88 percent versus 83 percent). In both countries, native students have better chances of achieving success in VET than minority students. The difference between the two groups is slightly higher in Germany (13 percentage points versus 10 percentage points). Students in Switzerland have higher social backgrounds and more often aspire to professions that are more prestigious than students in Germany. In both countries, pupils with a migration background more often hold a certificate from a secondary school with basic requirements and have lower grades than natives. In our sample, minority students significantly more often follow the lowest track compared to native students, both in Germany (45 percent versus 12 percent) and in Switzerland (47 percent versus 32 percent). In both countries, minority students aspire to occupations in the low ISEI range less frequently than do native ones. In Germany, it is noticeable that minority students are much more likely to aspire to very prestigious occupations than native students. In both countries, minority students have lower competence test scores than their native counterparts. In Switzerland, minorities live in regions with higher youth unemployment rates than natives.

Figure 2 depicts the differences in VET success rates between minority students and natives with different lower secondary school certificates. In Germany, natives with a basic requirement certificate have a success rate of 61 percent, whereas minority students have a success rate of 64 percent. Natives with a certificate from schools with extended requirements have a considerably higher success rate (87 percent). Minority students benefit to a lesser extent from the higher level of qualification (78 percent). In Switzerland, a difference between native and minority students seems already to exist at the basic requirement certificate level (86 percent versus 70 percent). Both groups have higher VET success rates when they hold a certificate from a school with extended requirements, and the group differences become smaller (92 percent versus 86 percent). When comparing countries, pupils in Switzerland have noticeably higher success rates, and minority students in Switzerland can greatly improve their chances of being successful on the VET market by obtaining a certificate from a school with extended requirements.

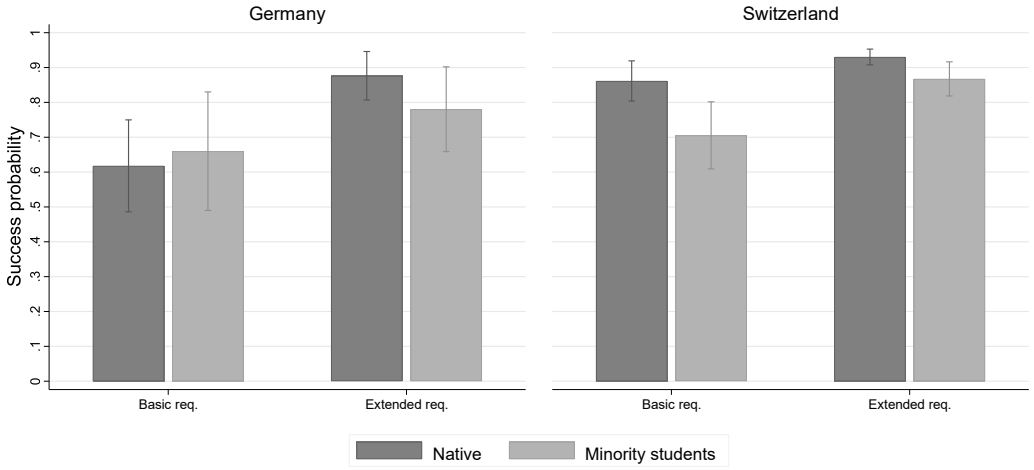

Figure 2: VET success probability with 95% CI separated by country, secondary school certificate and migration background
Source: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); weighted data, author's calculations.

Table 1: Descriptive statistics (mean (M) and standard deviation (SD)) of the model variables by country and migration background

	Germany					
	Total		Natives		Minority students	
	Mean	SD	Mean	SD	Mean	SD
VET success (0/1)	0.83	0.38	0.85	0.36	0.72	0.45
Secondary school certificate						
Basic req.	0.18	0.39	0.12	0.33	0.45	0.50
Extended req.	0.82	0.39	0.88	0.33	0.55	0.50
Grade German (std.)	0.11	0.85	0.12	0.84	0.02	0.91
Grade mathematics (std.)	0.11	0.86	0.19	0.81	-0.24	0.99
Social origin (HISEI)	45.94	17.88	47.42	17.58	38.88	17.65
Occupational aspirations						
Don't know	0.06	0.24	0.05	0.22	0.10	0.30
ISEI: 16–41	0.53	0.50	0.56	0.50	0.38	0.49
ISEI: 42–67	0.34	0.47	0.34	0.47	0.35	0.48
ISEI: 68–90	0.07	0.25	0.05	0.21	0.17	0.38
Women (0/1)	0.39	0.49	0.36	0.48	0.51	0.50
Language competence score (std.)	0.17	0.89	0.27	0.85	-0.33	0.93
Cognitive competence score (std.)	-0.10	0.95	-0.05	0.92	-0.38	1.05
	Switzerland					
	Total		Natives		Minority students	
	Mean	SD	Mean	SD	Mean	SD
VET success (0/1)	0.88	0.33	0.91	0.28	0.81	0.39
Secondary school certificate						
Basic req.	0.37	0.48	0.32	0.47	0.47	0.50
Extended req.	0.63	0.48	0.68	0.47	0.53	0.50
Grade German (std.)	0.01	0.88	0.15	0.69	-0.24	1.10
Grade mathematics (std.)	-0.00	0.99	0.11	0.91	-0.21	1.10
Social origin (HISEI)	50.96	20.28	53.44	19.50	46.37	20.92
Occupational aspirations						
Don't know	0.10	0.29	0.07	0.26	0.14	0.34
ISEI: 16–41	0.38	0.48	0.42	0.49	0.30	0.46
ISEI: 42–67	0.36	0.48	0.34	0.47	0.40	0.49
ISEI: 68–90	0.16	0.37	0.16	0.37	0.16	0.37
Women (0/1)	0.42	0.49	0.42	0.49	0.42	0.49
Youth unemp. rate in %	2.62	0.87	2.46	0.83	2.92	0.87
	Switzerland: subsample					
	Total		Natives		Minority students	
	Mean	SD	Mean	SD	Mean	SD
Reading competence score (std.)	0.08	0.94	0.29	0.83	-0.29	1.01
Mathematics competence score (std.)	0.09	0.96	0.25	0.89	-0.19	1.01

Source: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); weighted data, author's calculations.

6.2 Multilevel results

For each of the three samples, I calculate three distinct models. In the first, the total effects of migration background on VET success are estimated (M1). The control variables are then included to estimate the direct effect (M2). In the third model, I include an interaction between the migration background and the secondary school certificate to account for a potential intersection between the two (M3).

In both Germany and Switzerland, the total effect of the migration background on VET success is about 10 percentage points, and the effect is statistically significant. In contrast to Germany, I detect significant ethnic penalties after the inclusion of the control variables in Switzerland (7 percentage points), regardless of whether competences are controlled for. The direct effect of the migrant background is statistically not distinguishable from 0 in Germany, but it is in Switzerland. These results are in line with Hypothesis 1.

In both countries, students benefit from a more demanding degree (13 percentage points versus 11.5 percentage points). This indicates that, contrary to Hypothesis 2, the premiums associated with a more demanding certificate do not differ between countries. However, if we look at Model 3, we see that natives in Germany derive considerably more benefit from more demanding degrees than natives in Switzerland (21 percentage points versus 9 percentage points). The interaction between the school certificate and the migrant background is statistically significant only in the model for Germany. This negative interaction suggests that — contrary to Hypothesis 3 — migrants in Germany do not benefit from a more demanding school certificate, but German youths do. In Switzerland, both native and minority students benefit significantly from more demanding certificates.

To interpret the interactions better, I estimate the predictive margins (all control variables at the mean) for the variables involved in the interactions (Figure 3). Since the results of the two samples from Switzerland are very similar, I have only depicted the results of the total sample. The left panel of the figure illustrates that natives in Germany benefit more from a more demanding certificate than minority students. In Switzerland (right panel), the opposite effect is evident, with minority students deriving a slightly greater profit from more demanding certificates. The predictive margins support the earlier conclusions.

Table 2: Multilevel linear probability models predicting VET success in Germany and German-speaking Switzerland

	Germany			Switzerland			Switzerland: subsample		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Migration background (ref.: native)									
Minority student	-0.107***	0.001	0.116+	-0.100***	-0.069***	-0.108***	-0.114***	-0.080***	-0.089*
Secondary school certificate (ref.: basic req.)									
Extended req.		0.129***	0.213***		0.115***	0.091***		0.089***	0.084*
Grade: German (std.)		0.042+	0.042+		0.001	-0.000		-0.018	-0.018
Grade: mathematics (std.)		0.098***	0.096***		0.057***	0.058***		0.060***	0.060***
Competences: reading (std.)		0.015	0.014					0.046*	0.046*
Competences: cognitive/mathematics (std.)		0.001	0.003					-0.020	-0.019
Social origin (HISEI)		0.002*	0.002*		-0.001*	-0.001*		-0.002***	-0.002***
Occupational aspirations (ref.: don't know)									
ISEI: 16–41		0.134*	0.138*		0.097***	0.097***		0.082+	0.081+
ISEI: 42–67		0.010	0.018		0.027	0.027		0.004	0.004
ISEI: 68–90		-0.020	-0.024		0.082*	0.083*		0.078	0.078
Gender (ref.: men)									
Women		-0.045	-0.051		-0.077***	-0.076***		-0.094***	-0.094***
Extended req. x minority students			-0.196*			0.063			0.014
Youth unemp. rate (log)					0.010	0.009		0.025	0.025
Intercept	0.704***	0.443***	0.384***	0.905***	0.848***	0.865***	0.913***	0.913***	0.917***
SD (school)	0.16***	0.12***	0.11***	0.07***	0.05***	0.06***	0.07***	0.04***	0.05***
σ	0.43***	0.42***	0.42***	0.32***	0.31***	0.31***	0.32***	0.30***	0.30***
ICC	0.12	0.07	0.06	0.05	0.03	0.04	0.05	0.02	0.03
N	605	605	605	1077	1077	1077	706	706	706

Note: $^{+}p<0.1$, $^{*}p<0.05$, $^{***}p<0.01$. ref = reference category. Estimates based on 100 multiple-imputed datasets. ICC = intraclass correlation coefficient. *Source*: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); author's calculations.

By examining the variance parameters of the multilevel models, the following points are noticeable. First, the standard deviation at the school level differs statistically significantly from 0 in all models. This suggests that the regional opportunity structure has an impact on the probability of VET success. Second, the proportion of variance at the school level of the overall variance, and also the intraclass correlation coefficient (ICC), is larger in Germany than in Switzerland. This could have two explanations. On the one hand, the chances of success are generally higher in Switzerland than in Germany, which is why there is less variance to explain. On the other, this suggests that regional differences in access to VET are not as pronounced in Switzerland as they are in Germany. Thus, the ICC in the first models is 0.16 in Germany, while it is 0.07 in Switzerland.

Concerning the control variables, several effects are evident. In both countries, the grade in mathematics significantly increases the probability of entering VET. Also in both countries, students with low aspirations have a higher probability of entering VET than students who do not yet have clear career aspirations. Language skills only have a significant positive effect on VET success in Switzerland. In Germany, social origin has a positive effect on the probability of VET success, while this effect is negative in Switzerland. No gender differences were found for Germany. In Switzerland, men have an 8 percentage points higher probability of VET success than women.

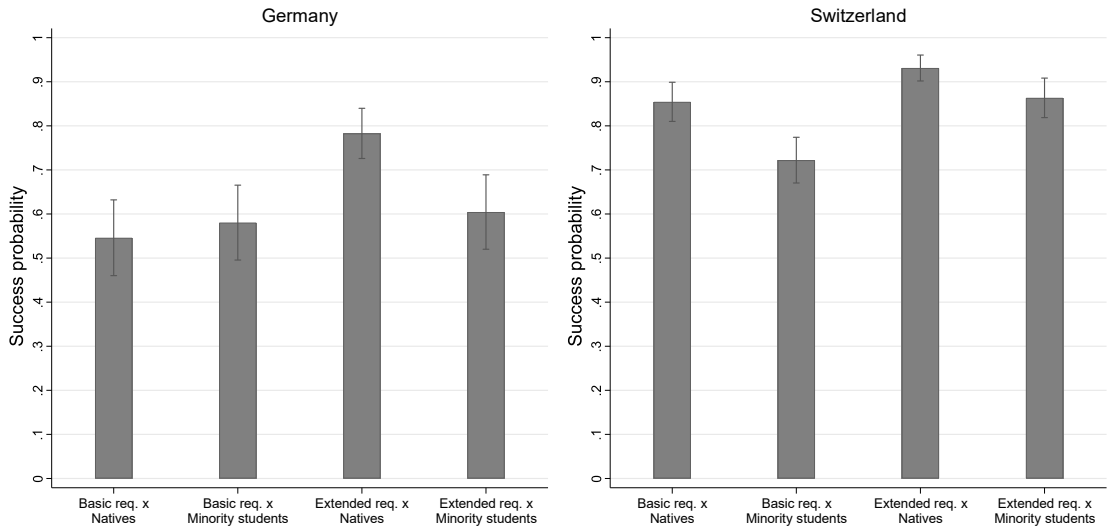

Figure 3: Illustration of the interaction between migration background and lower secondary school leaving certificate, by country
Note: Predicted based on the fixed parts of the M3 models in Table 2.
Source: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); author's calculations.

7 Discussion and conclusion

This paper has aimed at determining the extent to which the intersection between migration status and secondary school certificates have an influence on ethnic disadvantages in the transition from school to VET in Germany and German-speaking Switzerland. To answer this question, I have investigated the post-compulsory school transitions of 1,682 non-academic-track graduates who aspired to VET after completing compulsory schooling in Germany and German-speaking Switzerland.

In line with previous research (Tjaden/Hunkler 2017; Roth 2018; Dollmann 2017; Diehl et al. 2009; Glauser/Becker 2016; Imdorf 2017b), I have detected ethnic differences in access to VET for both Germany and German-speaking Switzerland. On average, minority students in both countries have a 10-percentage points lower probability of VET success than natives. In the case of Germany, interestingly, these disadvantages can be explained by taking aspirations and human capital endowment into account. This result is at odds with previous research findings (e.g. Tjaden 2017), which have detected ethnic penalties despite controlling for aspirations and human capital endowment, and have therefore assumed the possibility of discrimination in access to VET. For German-speaking Switzerland, ethnic penalties are still observed after controlling for aspirations and human capital endowment. In line with my first hypothesis, the results suggest that the ethnic differences in VET access in Switzerland are more persistent than in Germany, since ethnic penalties remain even after controlling for human capital and aspirations (Hypothesis 1).

The ethnic penalties for German-speaking Switzerland might occur because VET in Switzerland is more often offered by smaller companies (Buchholz et al. 2012; Seibert et al. 2009) and their selection procedures are less standardized than those of larger companies (relying less on the influence of grades and degrees), thus possibly leading to more discrimination. The ethnic penalties in the Swiss VET market are mainly driven by minority students who have attained certificates from schools with basic requirements and therefore have great difficulty in finding a VET place (Imdorf 2017b).

In Hypothesis 2, I assumed that the premiums associated with an extended requirement secondary degree (as opposed to a degree with basic requirements) should be larger in Germany than in Switzerland. I assumed this because schools with basic requirements carry a strong stigma in Germany (Bol et al. 2014; Buchholz et al. 2012; Trautwein et al. 2007), whereas this is not the case for Switzerland. Hence, the signaling value for the basic requirement certificate should have been lower in Germany than in Switzerland. Contrary to my expectations, however, both countries showed a similarly strong positive effect for a more demanding lower secondary school degree by about 12 percentage points. The premiums associated with a more demanding lower secondary degree on VET success did not differ between the two countries.

However, looking at the effect of the secondary school degree separately by migration background reveals interesting differences between the countries. In line with the assumption regarding the stigma attached to secondary schools with basic requirements in Germany, all students suffered from the low reputation of secondary schools with basic requirements (Buchholz et al. 2012; Bol et al. 2014; Seibert et al. 2009). The low signaling value of the basic requirement certificate resulted in low VET access chances regardless of migration status. Natives in Germany benefit more from a more demanding secondary degree (21 percentage points) than natives in Switzerland (9 percentage points). Surprisingly, minority students in Germany do not benefit significantly from more demanding certificates. In other words, for students with a migration background, a more demanding diploma is less rewarding in terms of VET success than it is for natives (Seibert/Solga 2006; Kalter 2006). This result is in line with previous research. Diehl et al. (2009: 60), for example, have shown — even though these effects were not statistically significant — that minority students in Germany profit to a lesser extent than native students from certificates issued by more demanding schools.

For Switzerland, there is an evident intersection between migration background and less demanding school certificates, to the disadvantage of minority students (Imdorf 2017b). In contrast to Germany, it turns out — as could theoretically be expected — that possessing a more demanding certificate tends to reduce ethnic differences in VET access. Hence, minority students in Switzerland do derive greater profit from more demanding certificates than minority students in Germany. This means that Hypothesis 2 is valid for native students, but not for minority students. Accordingly, Hypothesis 3 — that minority students in Germany derive a greater benefit from more demanding certificates than minority students in Switzerland — must be rejected.

A puzzling result is that higher degrees for minority students in Germany do not pay off in VET access. One explanation might be found in the German education system. In some federal states, more demanding lower secondary degrees (*Realschulabschlüsse*) can be obtained at schools with basic requirements (*Hauptschulen*) (Schuchart 2007). Employers may reward these degrees less than those earned at other types of schools because of the stigma of schools with basic requirements (Schuchart 2007, 2011). In the data used, it appears that minority students more often earned the more demanding lower secondary degree at schools with basic requirements. If one takes into account whether the lower secondary school degree was obtained at a school with basic requirements (see Table S5 in the SOM), this does not change the negative interaction between migration background and more demanding lower secondary degree. However, the probability of success is significantly lower for students who graduated from a school with basic requirements. Another possible explanation for this negative interaction effect could be that it might reveal processes of statistical discrimination (Hunkler 2016). Employers might assess the productivity of minority students and natives differently and to the disadvantage of minority students, even if they have the same qualifications. In cross-

country comparison, the question arises as to why this effect can only be observed for Germany. This could be due to structural differences between Switzerland and Germany. Competition for apprenticeships is higher in Germany than in Switzerland (there are fewer apprenticeships per applicant in Germany than in Switzerland, see Figure 1). Some scholars argue that employers can enforce discriminatory behavior against minorities better in markets with higher competition (e.g. Tjaden 2017). The more applicants there are the more likely vacant positions can be filled while excluding minority students. However, one has to be very cautious to conclude that there is discrimination based on observational data (e.g. endogeneity due to unobserved variables). Therefore, further research is needed to identify how the absence of premiums for higher secondary school leaving certificates for minority students occurs in Germany. For example, one could examine how ethnic penalties in VET access vary depending on regional opportunity structures (e.g. VET supply and competition for VET positions (Tjaden 2017)).

If minority students anticipate that investments in more demanding lower secondary certificates will not pay off in access to VET (e.g. due to discrimination), this could induce different effects. First, minority students could become demotivated (Kao/Tienda 1998) and as a result might not even pursue more demanding secondary certificates, thereby worsening their chances on the labor market (Buchholz et al. 2012; Kleinert/Jacob 2013; Beicht/Eberhard 2013; Sacchi/Meyer 2016). Second, minority students may try to escape this disadvantage by staying longer in the education system and pursuing an academic education. Several studies indicate that minority students are more likely to aspire to an academic education than to VET (e.g. Dollmann 2017; Tjaden/Hunkler 2017; Tjaden/Scharenberger 2017). However, academic education is associated with higher dropout risks at the individual level (Dollmann/Weißmann 2019). Therefore, Tjaden and Hunkler (2017) label this phenomenon of higher minority aspirations the “optimism trap”. Both effects could lead to problems integrating minority students into the school system and into the workforce (Steinmann 2019). At the societal level, this could have an impact on the shortage of skilled workers in the future, as the number of students with an immigrant background is increasing.

One limitation of this study is that I was unable to make a more detailed differentiation according to the migrants’ groups of origin or generational status, due to the low number of cases for which I had those data. Different effects could be expected for different migrant groups and generations (Spörlein/Kristen 2019; Spörlein et al. 2020). Some groups — for example, Turks in Germany or people from the Balkans in Switzerland — are likely to be more disadvantaged than the numbers presented here suggest (Seibert/Solga 2006; Zschirnt 2019). On the other hand, it is also likely that German or French people in Switzerland, for example, will face few disadvantages, and that Vietnamese in Germany will have an advantage over natives (Auer et al. 2019; Fibbi et al. 2006; Nauck/Schnoor 2015). Accordingly, the expected interactions between school qualifications and migration background could become more pronounced in the sense of

intersectionality, especially for the most disadvantaged groups (Andriessen et al. 2012; Imdorf 2017b). In terms of generational succession, it can be assumed that ethnic differences are reduced for second- and third-generation minority students (Kalter 2006; Diehl et al. 2009). A further limitation of this study is that I was only able to control for regional youth unemployment in Switzerland. I could not take other structural measures into account, such as the number of vacant VET places in the region. For Germany, I could not consider structural factors at all due to data constraints. Previous studies have shown that, for example, lower unemployment rates and higher VET supply–demand ratios are associated with higher VET success rates (Lindemann/Gangl 2019; Diehl et al. 2009; for an overview of the results of recent studies on access to VET in Germany, see: Hunkler 2016: 612-614). Furthermore, minority students more often live in regions with less favorable structural factors than natives (Massey/Denton 1985). Minority students are more likely to live in regions with higher youth unemployment rates, greater competition for apprenticeships, and lower chances of VET success (Beicht 2011; Beicht/Granato 2011; SBFI 2013; BfS 2014). Hence, the additional consideration of structural factors might contribute to the explanation of remaining ethnic differences.

For Germany, I was able to show that differences in human capital and higher aspirations can explain differences in VET success rates between natives and minority students. These results favor human capital theory and immigrant optimism theory. In Switzerland, however, ethnic penalties are obvious. This might indicate discrimination in access to VET in German-speaking Switzerland. However, when using observational data, one has to be careful about coming to such a conclusion (Blank et al. 2004). Secondary schools with extended requirements promise a higher chance of achieving VET success than secondary schools with basic requirements. Nevertheless, the premiums associated with obtaining a certificate from a more demanding secondary school are higher for minority students in Switzerland than in Germany. In Germany, only native students profit from higher certificates when accessing the VET market.

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Supplementary online material

Author: Do more demanding lower secondary school certificates for minority students pay off? A comparison of VET access between Germany and German-speaking Switzerland. *Soziale Welt* (*under review*)

Table S1: Descriptive statistics (mean (M) and standard deviation (SD)) of selected variables by country, migration background and VET aspiration

	Germany							
	Native				Minority student			
	want VET		don't want VET		want VET		don't want VET	
	M	SD	M	SD	M	SD	M	SD
Secondary school certificate								
Basic req.	0.14	0.35	0.28	0.45	0.48	0.50	0.59	0.49
Extended req.	0.86	0.35	0.72	0.45	0.52	0.50	0.41	0.49
Grade German (std.)	0.09	0.84	-0.01	0.86	0.07	0.91	0.01	0.90
Grade mathematics (std.)	0.22	0.79	-0.21	0.93	-0.21	0.99	-0.03	0.77
Social origin (HISEI)	47.89	17.58	47.47	16.70	39.40	17.85	32.87	14.53
Occupational aspirations								
don't know	0.05	0.23	0.13	0.34	0.08	0.27	0.08	0.27
ISEI: 16-41	0.58	0.49	0.38	0.49	0.41	0.49	0.35	0.48
ISEI: 42-67	0.33	0.47	0.31	0.47	0.33	0.47	0.49	0.50
ISEI: 68-90	0.03	0.18	0.17	0.38	0.18	0.38	0.08	0.28
Women	0.34	0.48	0.45	0.50	0.50	0.50	0.37	0.49
Competences: reading (std.)	0.28	0.84	0.25	0.87	-0.26	0.95	-0.50	0.70
Competences: cognitive (std.)	-0.03	0.92	-0.17	0.92	-0.38	1.04	-0.22	0.97
	Switzerland							
	Native				Minority student			
	want VET		don't want VET		want VET		don't want VET	
	M	SD	M	SD	M	SD	M	SD
Secondary school certificate								
Basic req.	0.32	0.47	0.39	0.49	0.47	0.50	0.55	0.50
Extended req.	0.68	0.47	0.61	0.49	0.53	0.50	0.45	0.50
Grade German (std.)	0.15	0.69	0.07	0.81	-0.24	1.10	-0.29	1.14
Grade mathematics (std.)	0.11	0.91	-0.00	0.91	-0.21	1.10	-0.28	1.07
Social origin (HISEI)	53.44	19.50	53.89	19.83	46.37	20.92	48.12	21.33
Occupational aspirations								
don't know	0.07	0.26	0.13	0.33	0.14	0.34	0.12	0.33
ISEI: 16-41	0.42	0.49	0.32	0.47	0.30	0.46	0.21	0.41
ISEI: 42-67	0.34	0.47	0.42	0.50	0.40	0.49	0.43	0.50
ISEI: 68-90	0.16	0.37	0.13	0.34	0.16	0.37	0.24	0.43
Women	0.42	0.49	0.59	0.49	0.42	0.49	0.61	0.49
Youth unemp. rate	2.46	0.83	2.58	0.82	2.92	0.87	2.93	0.85

Source: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); weighted data; author's calculations.

Table S2: Missing value patterns (in %) of the model variables in the analytical sample by country and migrant background

	Germany		Switzerland	
	Native	Minority student	Native	Minority student
Grade German	1.03	1.40	3.87	3.68
Grade mathematics	0	0	3.87	3.68
Social origin (HISEI)	0.77	4.19	3.04	7.65
Occupational aspirations (ISEI)	0	0.47	0	0
Competences: cognitive	0.26	0	x	x
Competences: reading	0.26	0	x	x
Youth unemp. rate	x	x	0.55	0
At least one missing value	2.05	6.05	7.32	11.05

Note: All model variables not depicted have no missing values. x = variable is not available in the data set.
Source: DAB panel study version 3.0.0 and CILS4EU (reduced version 3.3.0); author's calculations.

Table S3: Multilevel linear probability models predicting VET success in German-speaking Switzerland and Germany (complete case analysis)

	Germany			Switzerland			Switzerland: subsample		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Migration background (ref.: native)									
Minority student	-0.110***	-0.002	0.117+	-0.092***	-0.067***	-0.080*	-0.107***	-0.081***	-0.071+
Secondary school certificate (ref.: basic req.)									
Extended req.		0.126***	0.209***		0.097***	0.089***		0.074*	0.080*
Grade: German (std.)		0.039+	0.038+		0.005	0.005		-0.017	-0.016
Grade: mathematics (std.)		0.104***	0.102***		0.056***	0.057***		0.057***	0.057***
Competences: read (std.)		0.019	0.018					0.050*	0.050*
Competences: cognitive/math (std.)		0.004	0.006					-0.015	-0.015
Social origin (HISEI)		0.002*	0.002*		-0.001*	-0.001*		-0.002***	-0.002***
Occupational aspirations (ref.: don't know)									
ISEI: 16-41		0.109	0.111		0.095*	0.095*		0.097*	0.097*
ISEI: 42-67		-0.023	-0.017		0.043	0.043		0.027	0.027
ISEI: 68-90		-0.047	-0.050		0.109***	0.109***		0.094+	0.094+
Gender (ref.: men)									
Women		-0.042	-0.048		-0.086***	-0.085***		-0.094***	-0.094***
Extended req. x minority students			-0.200*			0.021			-0.016
Youth unemp. rate (log)					0.024	0.023		0.052	0.052
Intercept	0.712***	0.484***	0.426***	0.910***	0.849***	0.854***	0.916***	0.899***	0.895***
SD(school)	0.15***	0.11***	0.10***	0.07***	0.04***	0.04***	0.05***	0.02	0.02
σ	0.43***	0.42***	0.41***	0.31***	0.30***	0.30***	0.31***	0.30***	0.30***
ICC	0.11	0.06	0.06	0.04	0.02	0.02	0.03	0.01	0.01
N	584	584	584	985	985	985	629	629	629

Note: $^{+}$ $p < 0.1$, * $p < 0.05$, *** $p < 0.01$. ref = reference category. ICC = intraclass correlation coefficient.

Source: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); author's calculations.

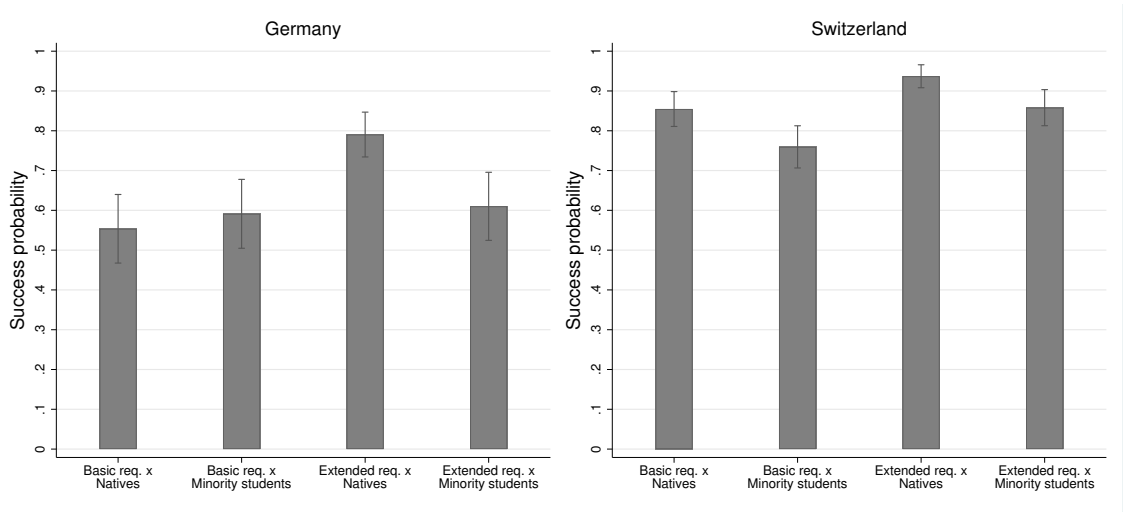

Figure S1: VET success probability with 95% CI separated by country, secondary school certificate and migration background (complete case analysis)
Notes: Predicted based on the fixed parts of the M3 models in Table S3. *Source*: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); weighted data; author's calculations.

Table S4: Multilevel linear probability models predicting VET success in German-speaking Switzerland and Germany

	Germany			Switzerland			Switzerland: subsample		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Migration background (ref.: native)									
Minority student	-0.065	0.025	0.123^{+}	-0.060***	-0.042^{+}	-0.098*	-0.095***	-0.073***	-0.104*
Secondary school certificate (ref.: basic req.)									
Extended req.		0.031	0.105^{+}		0.184*	0.149		0.142	0.121
Grade: German (std.)		0.053*	0.056*		0.016	0.016		0.002	0.003
Grade: mathematics (std.)		0.095***	0.093***		0.052***	0.052***		0.062***	0.061***
Competences: read (std.)		0.012	0.011					0.035^{+}	0.034^{+}
Competences: cognitive/mathematics (std.)		0.004	0.006					-0.047*	-0.046*
Social origin (HISEI)		0.001	0.001		-0.001***	-0.001***		-0.002***	-0.002***
Occupational aspirations (ref.: don't know)									
ISEI: 16-41		0.116^{+}	0.118^{+}		0.092***	0.092*		0.075^{+}	0.074^{+}
ISEI: 42-67		0.002	0.004		0.032	0.031		0.004	0.004
ISEI: 68-90		-0.055	-0.064		0.087*	0.087*		0.080^{+}	0.081^{+}
Gender (ref.: men)									
Women		-0.061	-0.066^{+}		-0.101***	-0.099***		-0.131***	-0.130***
Extended req. x minority students			-0.162*			0.082^{+}			0.049
Youth unemp. rate (log)					0.117	0.117		0.361	0.368
Intercept	0.408***	0.340*	0.292^{+}	1.012***	0.771	0.800	1.000***	0.696*	0.714*
σ	0.39***	0.37***	0.37***	0.29***	0.28***	0.28***	0.29***	0.27***	0.27***
N	605	605	605	1077	1077	1077	706	706	706

Note: $^{+}$ $p < 0.1$, * $p < 0.05$, *** $p < 0.01$. ref = reference category. Estimates based on 100 multiple-imputed datasets. School fixed-effects included.

DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); author's calculations.

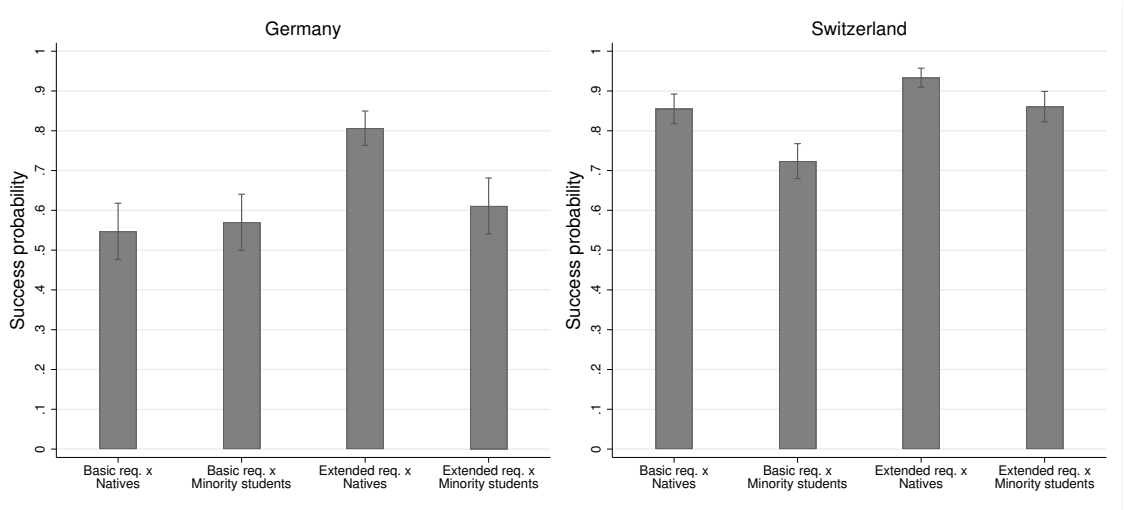

Figure S2: VET success probability with 95% CI separated by country, secondary school certificate and migration background

Notes: Predicted based on the fixed parts of the M3 models in Table S4. *Source*: DAB panel study (version 3.0.0); CILS4EU (reduced version 3.3.0); weighted data; author's calculations.

Table S5: Multilevel linear probability models predicting VET success in Germany (CCA and MI) controlling for secondary school type

	Germany	
	CCA	MI
Migration background (ref.: native)		
Minority student	0.119^{+}	0.120^{+}
Secondary school certificate (ref.: basic req.)		
Extended req	0.167^{***}	0.180^{***}
Grade: german (std)	0.040^{+}	0.044^{+}
Grade: math (std)	0.106^{***}	0.099^{***}
Competences: read (std)	0.017	0.013
Competences: cognitive (std)	0.005	0.002
Social Origin (HISEI)	0.002^{*}	0.002^{*}
Occupational aspirations (ref.: don't know)		
ISEI: 16-41	0.112	0.141^{*}
ISEI: 42-67	-0.022	0.015
ISEI: 68-90	-0.054	-0.026
Gender (ref.: men)		
Women	-0.050	-0.053
Extended req x minority students	-0.192^{*}	-0.191^{*}
Secondary school type (ref.: else)		
School with basic requirements	-0.098^{*}	-0.084^{+}
Intercept	0.499^{***}	0.442^{***}
Sd(school)	0.104^{***}	0.113^{***}
σ	0.412^{***}	0.414^{***}
ICC	0.06	0.06
N	584	605

Note: $^{+}$ $p < 0.1$, * $p < 0.05$, *** $p < 0.01$. ref = reference category. MI-Estimates based on 100 multiple-imputed datasets.

CILS4EU (reduced version 3.3.0); author's calculations.