

## RESEARCH ARTICLE

# The social-origin gap in university graduation by gender and immigrant status: a cohort analysis for Switzerland

Benita Combet, [benita.combet@uni-konstanz.de](mailto:benita.combet@uni-konstanz.de)

*University of Lausanne, Switzerland*

*LMU University of Munich and University of Konstanz, Germany*

Daniel Oesch, [daniel.oesch@unil.ch](mailto:daniel.oesch@unil.ch)

*University of Lausanne, Switzerland*

A large literature shows that families with more resources are able to provide better learning environments and make more ambitious educational choices for their children. At the end of compulsory education, the result is a social-origin gap in school-track attendance and learning outcomes. Our paper analyses whether this gap further widens thereafter for children with comparable school achievement, and whether the gap varies by gender and migrant status. We examine graduation rates from higher education by combining a cohort study from Switzerland with a reweighting method to match students on their school track, grades, reading literacy and place of residence at the end of compulsory school. The one observed feature that sets them apart is their parents' socio-economic status. When analysing their graduation rates 14 years later at the age of 30, we find a large social-origin gap. The rate of university completion at age 30 is 20 percentage points higher among students from the highest socio-economic status quartile than among students from the lowest quartile, even though their school abilities were comparable at age 16. This gap appears to be somewhat smaller among women than men, and among natives than migrants, but differences are not statistically significant. For men and women, migrants and natives alike, abundant parental resources strongly increase the likelihood of university graduation in Switzerland.

**Key words** social origin • cohort study • Education • gender • migrants • tertiary education

### Key messages

- A unique cohort study allows us to follow youth through education from ages 16 to 30.
- For youth with the same academic achievement at age 16, university graduation differs widely by class origin.
- At 30, the gap in university graduation is over 20 percentage points between the most and least advantaged youth.
- Yet there is no social-origin gap for completion of universities of applied sciences.

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## Introduction

Access to a privileged position in the labour market – in management or the professions – increasingly depends on higher education. Across Europe, a university degree has become the entry ticket to the upper-middle class and having higher-status parents greatly helps to obtain one (for example, [Breen and Jonsson, 2005](#); [Bernardi and Ballarino, 2016](#)).

Parents with more resources are able to provide more material support and create more favourable learning environments, thus enabling their children to acquire more skills at home ([Heckman, 2006](#)) and perform better in school ([Barone, 2006](#)). In addition, children from higher-status families tend to make more ambitious educational choices at the various transition points of the school system ([Breen and Jonsson, 2000](#); [Jackson, 2013](#)). At the end of compulsory education, these differences in educational performance and choice lead to a social-origin gap in school tracks attended and in learning outcomes. The question we raise is whether this social-origin gap widens further for university graduation of students who had showed comparable academic abilities at the end of compulsory education.

Two views challenge each other in responding to this question ([Triventi, 2011](#)). The first expects the effect of social origin to become weaker over the life course because, in systems with early tracking, social selection has already occurred in previous transitions and, with growing maturity, young people's educational trajectories become increasingly independent of their parents' social background ([Müller and Karle, 1993](#)). By contrast, the second view expects social origin to have an enduring effect. Striving to maintain their status, higher-status families are likely to choose long and prestigious educational options, whereas lower-status families may settle for shorter and less costly alternatives that are sufficient to maintain their status ([Breen and Goldthorpe, 1997](#)).

This social-origin gap may be particularly large if an attractive offer of vocational training diverts working-class students from the path to university ([Müller and Pollak, 2007](#); [Becker and Hecken, 2008](#)). At the same time, the recent expansion of universities of applied sciences may have contributed to closing the social-origin gap for younger cohorts. This is the case if universities of applied sciences provide an alternative path to higher education for 'diverted' students who had initially enrolled in vocational training.

Our article examines the argument that the effect of social origin on graduating from higher education is heterogeneous across population groups and varies by gender and migrant status ([Hadjar and Hupka-Brunner, 2013](#)). As we will argue, parental resources may be more decisive for boys than girls ([Legewie and DiPrete, 2012](#)), but less for migrants than natives ([Brinbaum and Cebolla-Boado, 2007](#)).

We analyse the effect of social origin on graduation from higher education for Switzerland. Besides having one of the largest proportions of students with migrant

backgrounds in Europe (OECD, 2017: 318), two additional features make Switzerland attractive for our analysis. Similar to Austria and Germany, it has a highly stratified educational system in which selection takes place early and which should leave less room for social origin to make a difference later on. Moreover, vocational education provides an attractive alternative, as 60% of a youth cohort begin an apprenticeship after the age of 16. If the diversion thesis applies anywhere, it should be in Switzerland.

Our analysis draws on a nationally representative panel data set called ‘Transitions from Education to Employment’ (TREE), which follows a cohort of young people from the age of 16 up to 30. We combine the longitudinal data with entropy balancing, a matching method that reweights students in their last year of compulsory schooling on the basis of the school track they attended, their grades, reading literacy and place of residence. This allows us to compare the graduation rates from higher education for individuals who, in their last year of compulsory schooling, showed the same level of academic achievement, but came from different class backgrounds.

Our paper makes three contributions. First, we provide an analysis of how social origin affects educational attainment by covering a time span of almost a decade and half, comparing students’ academic achievement at age 16 with their graduation rates at age 30. While a few cohort studies enquire into the social-origin gap in educational attainment for the UK (Schoon, 2010) and Sweden (Bukodi et al, 2014), we add a long-term analysis for a country with early tracking and a strong vocational system such as Austria, Germany or Switzerland. Second, we depart from the bulk of the literature that estimates homogeneous effects of social origin on educational attainment and examine whether these effects vary by gender and migrant status. Finally, we use a methodological innovation that allows us to set up the comparison between 16-year-old students with comparable academic achievement and then to estimate differences in their graduation rates by social origin over a decade later, when the same students were 30 years old.

We first discuss why social origin should affect educational outcomes beyond the end of compulsory schooling and then develop the hypotheses of heterogeneous social-origin effects by gender and migrant status. After discussing the country context, data and method, our results section shows the gap in university graduation between the top and bottom quartile of the social-status distribution. The conclusion outlines the broader implications of our findings.

## **An enduring effect of social origin on higher education**

There is little doubt that children’s school performance and choices are affected by their parents’ economic, cultural and social capital. Less straightforward is the question of whether the influence of parental resources reaches beyond the end of compulsory schooling, notably in educational systems where early selection has already filtered students from different class origins into different school tracks.

One argument expects that the die is already cast at the end of compulsory schooling. In psychology and economics, the idea has become influential that human abilities develop in a few formative periods, the most crucial one being early childhood (Heckman, 2006: 1900). Educational advantage and disadvantage should thus crystallise early in life and be a powerful predictor of later advantage and disadvantage. A less extreme version of the same argument is made by the life course approach, which expects youth to gradually emancipate from their families as they

move towards adulthood, becoming more autonomous from their social origin in their educational decisions (Müller and Karle, 1993). Relatedly, the effect of social origin may also become smaller because, at higher educational levels, students have already been selected into different tracks and levels.

Notably in countries with early tracking, entry into a given type of lower-secondary school may largely predict students' chances of graduating from higher education. Sorting children into different types of school sends these children a strong signal about their abilities and future place in society. This may restrict students' scope for agency to such an extent that social origin becomes largely irrelevant (Zimmermann, 2020: 69). Being in the lowest track at the age of 15 makes a university degree unlikely, whereas being in the highest track makes it probable – in Switzerland (Falter, 2012; Buchmann et al, 2016) as well as in Germany (Dustmann, 2004; Hillmert and Jacob, 2010).

A second argument expects the effect of social origin to extend beyond the end of compulsory schooling. In order to graduate from higher education, individuals need to navigate several educational transitions – and these transitions come with different relative costs and benefits for different social origins. According to the status-maintenance thesis, parents aspire for their children to have at least the same level of education as their own in order to avoid downward social mobility (Breen and Goldthorpe, 1997). As a result, even when accounting for children's cognitive ability and lower-secondary-school track, more affluent families will make more ambitious choices at the various transition points of post-compulsory education. For families with more resources, not only the relative costs of longer educational options are lower, but also the success probabilities and expected gains from additional education appear to be higher.

Empirical findings support the argument of an enduring effect of social origin on higher education. Even when cognitive ability in children's early life is taken into account, parental background remains a powerful predictor of educational attainment in Britain (Schoon, 2010), France (Ichou and Vallet, 2013), Germany (Neugebauer et al, 2013), Italy (Barone et al, 2018), the Netherlands (Need and De Jong, 2001), Sweden (Bukodi et al, 2014) and Switzerland (Becker, 2011; Sacchi et al, 2011; Combet, 2013; Buchmann et al, 2016). Less clear is whether this finding holds true for Swiss youth who showed the same academic achievement and faced the same educational options in their last year of compulsory schooling. Our hypothesis is that it does:

*Hypothesis 1: Even when we account for school track, school grades and reading literacy at the age of 16, youth from higher social origins will be more likely to have obtained a higher-education degree by the age of 30 than youth from lower social origins.*

## **The diversion thesis and universities of applied sciences**

The effect of social origin on higher education may be particularly strong in those European countries where vocational training provides an attractive alternative to university and diverts working-class children away from higher education – typically in Austria, Denmark, Germany, the Netherlands and Switzerland. While vocational training may offer lower financial returns than a university degree, it is also shorter, less costly and less risky and may thus be favoured as a safer choice by families with fewer resources (Müller and Pollak, 2007; Becker and Hecken, 2008). Combined with early tracking, this diversion explains why educational inequalities – the degree

to which parental education affects their children's education – are particularly large in Germany and Switzerland (for example, [Pfeffer, 2008](#); [Grätz and Pollak, 2016](#); [Laganà, 2016](#)). In Switzerland, these inequalities seem, moreover, surprisingly persistent over the 20th century ([Buchmann et al, 2007](#); [Jann and Combet, 2012](#)), with a weak downwards trend at best ([Hadjar and Berger, 2010](#)).

However, in the 21st century, universities of applied sciences have opened the path from vocational training to higher education. While the development of universities of applied sciences had already begun in the 1970s and 1980s in Germany and the Netherlands, their expansion began in earnest in Austria and Switzerland only after 2000 ([Müller et al, 2017](#): 313).<sup>1</sup> By 2010, Switzerland had caught up with Germany when one third of all higher-education students in both countries went to a university of applied sciences ([Lörz, 2013](#): 119; [BFS, 2019](#): 24). One policy goal of this expansion was to reduce the impact of upper-secondary school transitions on educational attainment and thus to attenuate the effect of social origin ([Falter, 2012](#)).

Recent research suggests indeed that the parental class bias is much smaller in universities of applied sciences than in traditional universities in Germany ([Lörz, 2013](#): 127; [Blossfeld et al, 2015](#): 144) or Switzerland ([Denzler, 2011](#): 80; [Schmid and Gonon, 2011](#): 11; [Schumann, 2011](#): 261). Moreover, while youth from parents with higher-education degrees are over-represented in all sectors of Switzerland's tertiary education, access to universities of applied science clearly appears to be less unequal than access to universities ([Buchmann et al, 2016](#)). If universities of applied sciences provide more equal access than traditional universities, their massive growth over the last few decades may have decreased the social-origin gap in higher education. This leads us to a second hypothesis:

*Hypothesis 2: When we account for school track, school grades and reading literacy at the age of 16, there should be no social-origin gap in graduation from universities of applied sciences.*

Of course, the diversion thesis may still apply if vertical differentiation between upper-secondary and tertiary education has been replaced by more fine-grained horizontal differentiation between universities of applied sciences and traditional universities ([Becker and Zangger, 2013](#): 444). Thus, the key question is whether a degree from a university of applied sciences offers inferior labour-market prospects to a university degree. For Switzerland's comparatively small – and therefore exclusive – higher-education sector, this does not seem to be the case. The Swiss Graduate Survey 2015 shows that one year after graduation, holders of a master's degree from a traditional university and holders of a bachelor's degree from a university of applied sciences received basically the same median earning within the same fields of study. While university graduates experienced somewhat stronger earnings growth in the following four years (yearly 4.4% as compared to 3.1% for applied universities), the median earnings of both groups exceeded the national median wage by more than 12% a mere five years after graduation ([BFS, 2017](#): 5–6).

## **Heterogeneous social-origin effects by gender and migrant status**

The effect of social origin on higher education may not be uniform for subgroups, but vary by gender and migrant status. Over the last two decades decades, the cohorts of young women have gradually surpassed young men in educational attainment in the Western world ([OECD, 2015](#)). [Buchmann and DiPrete \(2006: 515\)](#) explain this

growing gender gap in college completion by the increasing vulnerability of boys from families with low-educated or absent fathers. In their school trajectories, boys seem less resilient to an unfavourable social origin than girls, and in the US this gender-specific effect of family background on educational transitions holds when school performance is accounted for (Buchmann and DiPrete, 2006: 533). A similar result is reported for Germany where boys are found to be more sensitive than girls to the social-origin composition of their classrooms – and hence depend more on the resources available in their local environment (Legewie and DiPrete, 2012: 468).

Why should social origin be of greater relevance to boys' access to higher education than girls'? One argument points to differences in how adolescent peer groups view masculine and feminine identity. Showing diligence and working for academic achievement tends to be stigmatised by boys' peer groups, who label it as feminine. By contrast, girls typically view schoolwork as acceptable and do not consider disengagement from school as a core aspect of feminine identity (Hadjar et al, 2014: 119). The negative stance towards schools may be less prevalent among middle-class boys, whose parents counteract it by promoting a competitive school attitude that focuses on high educational performance (Legewie and DiPrete, 2012: 464). The 'problem with boys' may thus primarily refer to boys from a lower-class origin. While boys' lower engagement in school should already show in academic achievement at the age of 16, the school-performance gap is likely to widen more among boys than girls in the ensuing teenage years.

Moreover, in countries with a developed vocational education system, young men are more likely to embark on the vocational track and young women more likely to choose the general track in upper-secondary education (Glauser, 2015). One reason is that vocational training tends to reproduce occupational gender-segregation and thus offers better career prospects in apprenticeships of typically male than female occupations (Korber and Oesch, 2019). Another reason is that both boys and girls believe firm-based vocational training to correspond better to masculine needs, whereas general school-based education is seen as better meeting female needs (Imdorf et al, 2017). This implies that the diversion to the vocational track should be particularly strong among boys – and that they depend to a greater extent than girls on their parents to be guided towards general education and a university degree. This leads us to formulate our third hypothesis anticipates:

*Hypothesis 3: When we account for school track, school grades and reading literacy at the age of 16, the effect of social origin on graduating from higher education should be larger for men than women.*

We expect a second heterogeneous effect of social origin on higher education for migrants. While children with a migrant background tend to leave school earlier than natives, once differences in parental resources and school performance are taken into account, they are more likely to obtain higher levels of education than natives in England (Jackson et al, 2007), Finland (Kilpi-Jakonen, 2011), Sweden (Jonsson and Rudolphi, 2010) or Switzerland (Griga, 2014; Bauer and Riphahn, 2006a).

Several reasons possibly explain why migrants are less constrained by their class origin than natives when making their educational choices. Higher educational aspirations may be explained by a selection effect. This is the case if individuals who migrate have more drive and ability – or more optimism and a stronger desire for upward mobility (Salikutluk, 2016). Alternatively, higher aspirations could be due to the quest for status maintenance as migrant families may have belonged to

an educational elite in their country of origin – a fact that is hidden by the overall higher levels of education in the host society (Engzell and Ichou, 2019). Migrant families may also be less likely to be ‘diverted’ to vocational training if they expect greater benefits – and usefulness in their country of origin – from academic education (Jonsson and Rudolphi, 2010: 503) or, alternatively, if they anticipate discrimination in the apprenticeship market (Imdorf, 2017; Hupka-Brunner et al, 2010). These elements lead us to expect a weaker effect of parental background on the educational attainment of migrants:

*Hypothesis 4: When we account for school track, school grades and reading literacy at the age of 16, the effect of social origin on graduating from higher education should be smaller for youth with a migrant background than for youth from the majority population.*

## **Institutional context, data and method**

### *Institutional context*

Similar to Austria and Germany, Switzerland has a strongly stratified educational system where selection takes place early as students are separated into two to four performance tracks around the age of 12 in most cantons. This early tracking shapes schooling inequality in Switzerland, as the type of school attended in lower-secondary school conditions the choice of upper-secondary education (Bauer and Riphahn, 2006b; Samuel et al, 2014).

After 11 years of compulsory schooling, the Swiss educational system offers the choice between two main options: vocational education, mostly in the form of company-based apprenticeships, and general education, mainly consisting of baccalaureate schools (Gymnasiums), but also including specialised middle schools. One third of an age cohort remains in general education, whereas two thirds choose vocational education which prepares for both blue-collar and white-collar occupations, leads to nationally standardised skill certificates and enjoys broad support from employers (Fazekas and Field, 2013; Wolter et al, 2014).

Both the vocational and general tracks continue at the tertiary level. While a general baccalaureate gives access to traditional universities, the vocational baccalaureate – introduced in the 1990s and obtained by a fifth of all apprentices – entitles students to enter a university of applied sciences. These entry degrees are difficult to obtain, which explains why Switzerland’s system of higher education remains small and internally less differentiated than in other countries (Buchmann et al, 2007). Students who earn a degree from a baccalaureate school can choose basically any university and subject at the bachelor level. Likewise, vocational baccalaureates enable students to transfer to any university of applied sciences. Both types of universities follow the Bologna system of higher education.

The difficult access to universities is mirrored in the comparatively low proportion of residents in Switzerland with higher education. In 2016, only 28% of men and 26% of women aged 25–64 held either a university degree or a degree from a university of applied sciences. This proportion has grown over the past two decades and risen in the age group 25–34 to 35% among men and 39% among women (Federal Statistical Office Database, [www.bfs.admin.ch](http://www.bfs.admin.ch)). The low share of graduates – and hence their low supply in the labour market – leads to earnings and job prospects

that are substantially better for those who hold higher-education degrees than for those who hold only upper-secondary ones (Weber, 2014; Korber and Oesch, 2019).

### *Data and measures*

Our analysis uses the nationally representative panel dataset TREE (Gomensoro and Meyer, 2017). TREE follows a youth cohort that participated in the Programme for International Student Assessment (PISA) in 2000 when students were in their last year of compulsory schooling and thus around 16 years old. Our analysis examines the educational outcome of this youth cohort 14 years after the end of compulsory schooling, when respondents were 30 years old. We have complete information for 2,821 individuals: 1,665 women and 1,156 men. Over such a long period, panel attrition is inevitable. In the TREE survey, it is mostly respondents from lower social background and with lower educational degrees that drop out. We provide robustness checks that use the panel attrition weights.

Our dependent variable is the highest educational attainment at age 30 and distinguishes four categories: traditional university (obtained by 38% in our sample), university of applied sciences (6.5%), post-secondary vocational training (15%) and no more than upper-secondary education, including short vocational degrees (41%). This measure of education reflects to a large extent final attainment and is the result of diverse and often non-linear educational trajectories that include late entry, drop-out and multiple transitions (Hillmert and Jacob, 2010). One exception is the category of post-secondary vocational training (also called professional education and training) that corresponds more to further education than initial higher education, with the average age at enrolment being 30 years (Schmid and Gonon, 2011: 14).

Our key independent variable is students' social origin, which we measure with parents' social status. For each respondent, TREE provides parents' occupational status as measured by the ISEI (International Socio-economic Index of Occupational Status), which reflects the mean earnings and education in a given occupation (Ganzeboom and Treiman, 1996). We take the average of both parents' ISEI scores to allocate students into four equally large and hierarchically ordered quartiles of social status. As a robustness test, we replicate our analysis with two different indicators of parents' position in the social hierarchy: a categorical class variable that distinguishes the upper-middle class, lower-middle class and working class (Oesch, 2006) as well as a binary variable that captures parents' highest level of educational attainment, distinguishing whether at least one of them has tertiary education.

We analyse the gap in higher-education completion between youth from the bottom and top quartile with a reweighting method called entropy balancing (Hainmueller, 2012). In our case, we balance youth from different social origins on five variables. *Age in months* accounts for age-related differences in educational pathways and age maturity. *Canton of residence* allows us to control for regional, institutional and cultural differences across Switzerland's cantons in the availability and attractiveness of higher-education opportunities (Glaser and Becker, 2016).<sup>2</sup> *Educational track* controls for the channelling of pupils into different ability tracks in lower-secondary schools, the selection taking place between the ages of 11 to 14.<sup>3</sup> *School grades* provide a proxy for students' academic achievement, which consists of an index based on mathematics and the regionally predominant language. This ordinal scale tells us whether students are above, at or below the necessary mark to pass the school year. Finally, we use *reading*



*literacy test scores.* In their last year of compulsory school, students in our sample took the standardised PISA reading literacy test. This test requires students to seek, extract, interpret and assess information, thereby providing a proxy for their intellectual ability (Duckworth et al, 2012).<sup>4</sup>

We expect heterogeneous effects for two socio-demographic characteristics: gender (male versus female) and migrant background (native versus migrant). The latter dimension is measured with parents' country of birth. We consider students to have a migrant background if both of their parents were born somewhere other than in Switzerland. This is the case for 15% of the students in our sample. Table A.1 in the appendix provides the descriptive statistics for the variables used in our analysis.

### *Analytical approach*

Our goal is to balance students in the first wave, in the year 2000, based on their educational performance and then to compare their graduation rates from higher education 14 years later, in the year 2014, when they were 30. Therefore, we analyse our longitudinal data with multinomial logit models and combine it with a reweighting method called entropy balancing (Hainmueller, 2012). The logic behind the reweighting method is to create a counterfactual scenario in which the distribution of the covariates of one group corresponds to the other group.<sup>5</sup> We thus balance the covariates (age, canton, school track, grades and reading literacy, all measured at age 16) on the third moment of covariate distribution of the highest quartile by assigning scalar weights. Table W.1 in the web-appendix shows that the reweighting of the lower-status quartiles relative to the highest worked well.

We first estimate a multinomial logit model on educational attainment (without entropy balancing) and show predictive probabilities for all four educational outcomes. We then present discrete-change effects based on the multinomial logit model with reweighted pairs of status quartiles (Q1 to Q4, Q2 to Q4, and so on) for the two outcomes that we are interested in, namely graduation from either university or from university of applied sciences relative to the reference category of having no more than upper-secondary education. We then assess the existence of heterogeneous effects by gender and migrant background by running separate multinomial logit models with reweighting for the different subpopulations (men, women, Swiss and migrants). We calculate the standard errors for the differences between estimates by using a bootstrap procedure on the basis of 500 repetitions.

## **Results**

### *The overall social-origin gap*

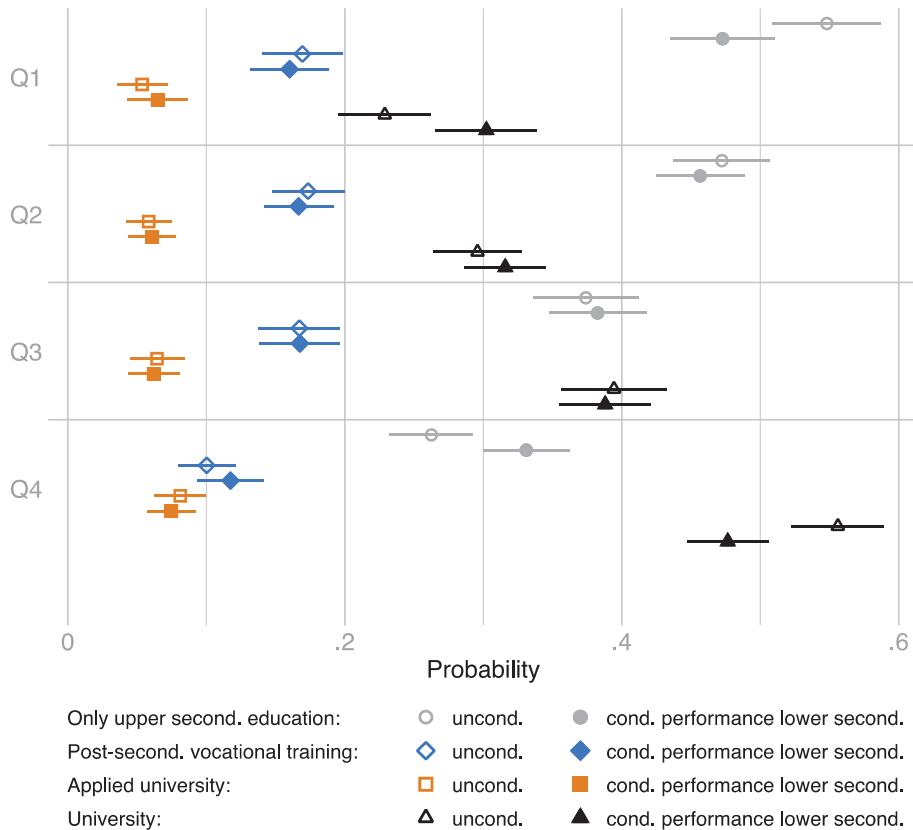
Table 1 shows descriptive evidence for how educational attainment varies by social origin. At the age of 30, 58% of respondents from the top social-origin quartile 4 (Q4) had obtained a university degree as compared to only 22% from the bottom quartile 1 (Q1). Social-origin differences are substantially smaller for graduation from universities of applied sciences, but the hierarchical pattern is still visible: 8% of respondents in the top quartile had earned such a degree versus 5% among those in the bottom quartile.

**Table 1:** Distribution of educational attainment by social-origin quartile (in percentages)

	No post-compulsory education	Upper-secondary (vocational or general)	Post-secondary vocational	University of applied sciences	University	Total
Q1 (bottom)	4	52	17	5	22	100%
Q2	3	45	18	6	29	100%
Q3	1	36	17	6	39	100%
Q4 (top)	2	23	9	8	58	100%
Total	3	38	15	6	38	100%

Note: N (observations): 2,821.

**Figure 1:** Predictive probabilities for different educational outcomes at age 30 by social origin, in percentages (Q1 is the bottom status quartile, Q4 the top status quartile).



Notes: coefficients are based on multinomial regressions on educational attainment at the age of 30 and shown as predicted probabilities. The unconditional models only control for respondent's age in months and their canton of residence at age 16. The conditional models additionally control for lower-secondary school track, school grades and reading literacy test score at age 16.

The higher graduation rates among children from advantageous social origins at the age of 30 may be explained by different school abilities at the age of 16. This argument is suggested by the fact that PISA reading literacy scores were, on average, higher in the top quartile, Q4 (563) than in Q3 (549), Q2 (535) or Q1 (510).

In order to identify a persistent social-origin effect, we thus present in [Figure 1](#) the predictive margins of the multinomial logit model (without entropy balancing). In a first model, we control for respondents' age and the canton of residence at age 16. In the second model, we control for lower-secondary school track attended, grades and reading literacy. The findings from the descriptive statistics already given are mirrored: the probability of obtaining a university degree varies dramatically by social-status quartiles. While around 50% of youths from the highest-status quartile attained a university degree by age 30, this is the case for less than a third among youth from the two lowest-status quartiles. However, unlike what earlier research suggested ([Buchmann et al, 2016](#)), respondents from higher social background are not over-represented in all sectors of tertiary education. Once school achievement at the age of 16 is taken into account, we do not observe any social-origin differences for applied university. Moreover, youth from the highest-status quartile even have a lower probability of attending post-secondary vocational training than the other three status quartiles.

[Figure 1](#) also shows that while school abilities at age 16 do not contribute much to explaining educational outcomes among young adults in the status quartiles Q2 and Q3, they play a role in accounting for the large proportion of university graduation in Q4 and the low proportion of university graduation in Q1.

Since school performance at the age of 16 has a non-negligible influence on both the highest- and lowest-status quartiles, we try to determine how educational inequality would change if the academic achievement of individuals in the lowest-status group were equal to that of the highest social-status group at age 16. For this purpose, we estimate multinomial logistic regressions on educational attainment and make the lowest-status group as comparable as possible to the highest-status group by reweighting their age, canton of residence, school track attended at lower-secondary level, school grades and PISA reading score. The results of these models are shown in [Table 2](#) for graduating from either a traditional university or a university of applied sciences. Coefficients are displayed as discrete-change effects, which can be interpreted as percentage-point differences.

When solely reweighting by age and canton, we observe the same gaps as in the descriptive analysis: among youth from the top status quartile, university graduation rates are 34 percentage points higher than among youth from the bottom status quartile. While differences in academic achievement explain some of this gap, they by no means do so completely. After additionally reweighting for school track, grades and reading literacy scores, there remains a massive social-origin gap in university graduation of 20 percentage points between the top and bottom quartiles. Interestingly, the difference in university graduation is comparable between quartiles Q4 and Q2 (20 points) and still sizeable between quartiles Q4 and Q3 (10 points). As expected in our first hypothesis, social origin appears to have a powerful effect on attaining a university degree for students who had lived in the same canton and shown comparable academic achievement at the end of their compulsory schooling.

With regard to graduating from universities of applied sciences, we do not find any social-origin gap – regardless of whether school ability at the end of compulsory schooling is controlled for or not. This finding is in line with previous research that reported smaller social background differences for applied universities in comparison to traditional universities ([Buchmann et al, 2016](#)), and it confirms our second hypothesis.

**Table 2:** The social-origin gap in graduation from higher education at age 30

	University		University of applied sciences	
	Balanced on ascriptives	Balanced on grades, literacy and lower sec. track attended	Balanced on ascriptives	Balanced on grades, literacy and lower sec. track attended
$\Delta$ Q4 – Q1	0.34*** (0.03)	0.20*** (0.03)	0.02* (0.02)	-0.01 (0.02)
$\Delta$ Q4 – Q2	0.26*** (0.03)	0.18*** (0.03)	0.02 (0.01)	0.01 (0.02)
$\Delta$ Q4 – Q3	0.17*** (0.03)	0.10** (0.03)	0.01 (0.02)	0.01 (0.02)

Notes:

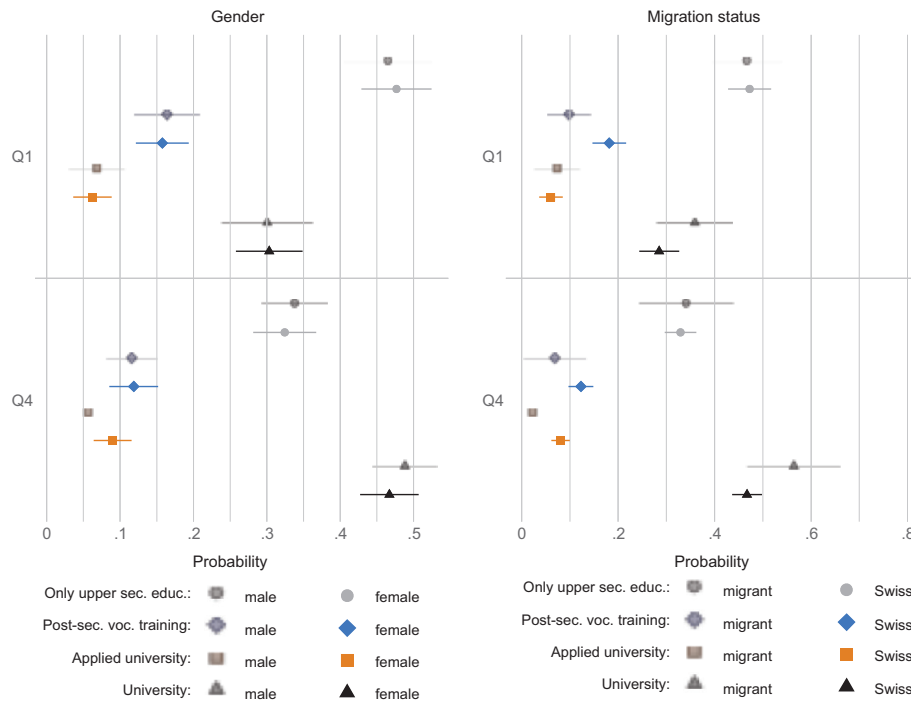
Coefficients are based on multinomial regressions on educational attainment for matched pairs of status quartiles and shown as discrete-change effects, which can be interpreted as percentage-point differences: 0.34 means that the rate of university graduation is 34 percentage points higher among youth in Q4 than Q1. Variables used for matching (that is, reweighting) at the age of 16 for ascriptive characteristics: age in months and canton of residence.

Additional variables used for (reweighting) for school ability: lower-secondary school track, school grades and reading literacy test score.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

N: 1,445 (pair Q4–Q1), 1,599 (pair Q4–Q2), 1,435 (pair Q4–Q3).

**Figure 2:** Predictive probabilities for different educational outcomes at age 30 by social origin and gender / by social origin and migrant status, in percentages.



Notes: coefficients are based on multinomial regressions on educational attainment at the age of 30 and shown as predicted probabilities. The unconditional models only control for respondent's age in months and their canton of residence at age 16. The conditional models additionally control for lower-secondary school track, school grades and reading literacy test score.

**Table 3:** The social-origin gap in graduation from higher education at age 30 (after matching for academic achievement at age 16)

	Gender		Migrant status	
	Men	Women	Migrants	Swiss
$\Delta$ Q4 – Q1	0.26***	0.18***	0.27**	0.20***
	(0.05)	(0.04)	(0.08)	(0.04)
$\Delta$ Q4 – Q2	0.20***	0.17***	0.31***	0.16***
	(0.04)	(0.04)	(0.08)	(0.03)
$\Delta$ Q4 – Q3	0.07	0.12**	0.11	0.10**
	(0.05)	(0.04)	(0.09)	(0.03)

Notes:

Variables used for reweighting: age in months, canton of residence, lower-secondary school track, school grades and reading literacy test scores.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

N: 1,156 (men), 1,665 (women); 413 (migrants), 2,408 (Swiss).

### *Results for a heterogeneous social-origin gap*

In a next step, we examine whether the effect of social origin varies by gender and migrant status. Since the social-origin gap in graduation from applied universities is negligible, we focus on degrees from a traditional university.

Larger social-origin gaps among men than women and among Swiss than migrants may either stem from particularly high graduation rates in Q4 or very low rates in Q1. [Figure 2](#) addresses this question by again estimating a multinomial logit model and plotting the predicted probabilities of attaining a given educational level for men and women, Swiss and migrants, whose families come from either the highest or lowest-status quartile. For gender, confidence intervals overlap and suggest that there is no significant difference between the educational outcomes by social origin for men and women. In contrast, we find that in the lowest-status quartile, Swiss respondents have a higher probability of attaining a post-secondary vocational degree than migrants, whereas in the highest-status quartile Swiss are more likely to graduate from applied university than their peers with an immigration background.

We further examine the social-origin gap in university completion by gender and migration status by reweighting the school ability of the lower-status groups to the highest-status group (see [Table 3](#)). For individuals with similar academic achievement, we find that the university graduation rate among men in the top quartile exceeds that of men coming from the bottom quartile by 26 percentage points, compared to a gap of only 18 points between women from the top and women from the bottom quartile. However, men's larger social-origin gaps turn out not to be statistically different from women's gap once we bootstrap the standard errors for the difference between the male status gap and the female status gap (see [Table A.2](#) in the appendix). The evidence for our third hypothesis turns out to be inconclusive.

Unlike for gender, the results for migrant status run counter to our expectations because the social-origin gap in university graduation is not smaller among migrants, but larger than among natives (27 as compared to 20 percentage points). However, the bootstrapping of the standard errors shows again, as for gender, that these differences are not statistically different from each other (see [Table A.2](#) in the appendix). Still, we need to reject our fourth hypothesis which expected a smaller social-origin gap among migrants than among Swiss.

### *Robustness tests*

As a first robustness test, we estimate a simple linear probability model on educational attainment (university degree versus no university degree) without reweighting. Instead of using entropy balancing, we enter the same variables as controls in a multivariate regression (see [Table W.2](#) in the web-appendix). The conclusions remain unchanged: university graduation rates among youth from higher-status families are 33 percentage points higher than those among youth from lower-status families. This social-origin gap falls to 17 percentage points after differences in school track, grades and reading literacy are accounted for. Again, the effect of social origin on university completion does not vary significantly by either gender or migrant status: all the interaction effects fail to reach statistical significance.

Some readers might be sceptical about the substantive meaning of status quartile. We therefore use another measure of social stratification, namely a collapsed class schema that differentiates three classes based on parents' occupation: the upper-middle, lower-middle and working class ([Oesch, 2006](#)). Additionally, we replicate our analysis with the highest parental education (tertiary education versus less than tertiary education). These analyses lead to the same conclusions. The disparity in university graduation is large between youth from the upper-middle class and youth from the working class: 33 percentage points before and 19 points after accounting for academic achievement.

Our binary indicator for parental education leads to somewhat smaller estimates and shows a gap in university graduation of 19 percentage points before and 12 points after controlling for school achievement between children from parents with and children from parents without tertiary education (see [Table A.3](#) in the appendix). Using social class or parental education also points to an absence of heterogeneous effects by gender and migrant status (see [Table W.3](#) in the web-appendix). The similarity in results when using status quartiles, social class or parental education is not surprising given the strong correlation between different measures of social stratification ([Bihagen and Lambert, 2018](#)).

Our models use an ability measure based on reading literacy. This possibly leads to a bias in our results because men and migrants have significantly lower PISA literacy test scores (18 points less for men than women, 53 points less for migrants than natives). We therefore replicate our analysis by replacing PISA literacy scores by PISA maths scores. However, all the results remain unchanged with this alternative indicator of skills (see [Tables A.3](#) in the appendix and [W.3](#) in the web-appendix).

Finally, our results could be affected by selective attrition from the TREE panel. We investigate this issue first by analysing the highest educational credential in wave 8 when respondents were aged 26 and second by using panel attrition weights. For both the main effect and heterogeneous effects of social origin on university graduation, these two specifications lead to the same results as our main model (see [Table A.3](#) in the appendix).

However, there is one interesting difference. When replicating our model with panel attrition weights, the likelihood of graduating from a university of applied science is 4 to 5 percentage points higher for youth coming from the top quartile than their peers from the lower three quartiles. When differences in school achievement at the age of 16 are controlled for, the difference falls to 2 to 3 percentage points and is no longer statistically significant. Still, these results suggest that there may be a (small) social-origin effect for graduating from universities of applied science.

## Conclusion

In 21st-century Europe, a degree in higher education is gradually becoming a prerequisite for access to the upper-middle class. This implies that key decisions about a society's distribution of future class positions are taken when individuals are still in their teens and make their educational choices. Our paper compared the likelihood that youth with the same level of academic achievement, but from different social origins obtain a higher-education degree. Three findings are noteworthy.

First, the influence of social origin on educational attainment does not dissipate over the teenage years. Although educational advantage and disadvantage may develop early in life, the die is by no means cast at the end of compulsory schooling. For the same level of academic achievement, privileged families choose more ambitious educational options and their children are more likely to graduate from university than children from lower-status families. This persistent effect of social origin is sizeable: university graduation among the highest-status quartile exceeds that of the lowest-status quartile by around 20 percentage points for students who had shown comparable school achievement at age 16.

Second, there does not seem to be any substantial social-origin gap in graduation from universities of applied sciences. This suggests that as a growing proportion of youth move on to study at the tertiary level after completing an apprenticeship, the diversion mechanism should have a lesser impact. Universities of applied sciences provide an alternative path to higher education that offers comparably favourable labour-market prospects in Switzerland. They are also the educational institution that has most strongly expanded over the last two decades. Growing numbers of graduations from universities of applied sciences may thus gradually reduce the large social-origin gap observed for traditional universities.

A third finding leads us to reject the hypothesis of a heterogeneous effect of social origin on university education. The social-origin gap is not substantially larger for men than for women. Although our data suggest that women from lower-status families do somewhat better than their male counterparts, the differences are not statistically significant. Likewise, the social-origin gap is not smaller for migrants than natives. If anything, the opposite is true and disparity in university graduation is larger between higher- and lower-class migrant families than between higher- and lower-class native families. One explanation is that migrants are a more diverse group and tend to be over-represented at both ends of Switzerland's class hierarchy as they include highly skilled Europeans who work in upper management and the professions as well as less skilled guest workers and refugees from outside Europe who are relegated to the lowest class positions (see [Murphy and Oesch, 2018](#)).

Our results of a large social-origin gap could be seen as a singularity of Switzerland's school system which combines early and pronounced tracking in lower-secondary education with an attractive offer of vocational training in upper-secondary education. However, a large social-origin gap has also been found for Germany's educational system ([Neugebauer et al, 2013](#)) and has been explained by the 'diversion' of working-class children away from the academic towards the vocational track ([Becker and Hecken, 2008](#)). Moreover, an Italian panel study suggests that the social-origin gap in access to university for a given level of school achievement is at least as large in Italy as in Switzerland ([Barone et al, 2018](#): 561). Hence, large social-origin gaps

in access to university seem to be the rule rather than the exception across Europe (see [Jackson, 2013](#)).

Moreover, our study probably underestimates the social-origin effect on university graduation because our analysis starts at the age of 16 when the selection into different tracks at the lower-secondary level has already taken place – and this earlier selection, which we do not observe in our data, is already decisively influenced by social origin ([Bauer and Riphahn, 2006b](#); [Felouzis and Charmillot, 2013](#)).

This leads us to outline two promising avenues for further research. The first is to enlarge the observation window in order to cover the period from age 10 to 30 and thus to disentangle the effects of social origin from school achievement before the first meaningful educational transition has taken place. The second avenue is to use data sets with much larger samples that allow for a more fine-grained analysis of heterogenous effects, notably with respect to immigrant origin. There are good chances that both avenues will prove feasible in the near future, notably with the construction of longitudinal register data sets that follow youth cohorts over their entire educational careers.<sup>6</sup>

Future research desiderata aside, we wish to conclude by noting that a degree in higher education has become a precondition for access to most positions of power in private companies and public organisations in Switzerland as elsewhere in Western Europe. For open societies, it is a severe problem that social origin decisively affects who will obtain higher education – and thus who will eventually join the country's economic and political elite.

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### Notes

<sup>1</sup> Note that the Swiss system of universities of applied sciences was not built *ex novo*. At the end of the 1990s, it integrated about half of the former 120 institutions of higher vocational learning ([Buchmann et al, 2007](#): 323; [Denzler, 2011](#)). However, the extent of expansion and, probably, educational advancement is undisputed. Between 2000 and 2017, the number of students in Switzerland's universities of applied sciences increased almost fourfold ([BFS, 2019](#)).

<sup>2</sup> Note that in Switzerland's federal system, education is a political prerogative of the cantons; 24 out of 26 cantons are represented in our data.

<sup>3</sup> The number of tracks varies by canton and we distinguish four tracks: the advanced track of lower-secondary education (*Progymnasium*), the track with extended academic requirements, the track with basic academic requirements, and no formal tracking.

<sup>4</sup> Reading literacy is available for all students in our data, whereas the mathematics test was only administered to a part of the sample in the PISA 2000 study. We use this later score as a robustness test.

<sup>5</sup> The advantage of entropy balancing over matching methods such as propensity score matching is that it adjusts the weights directly to the known sample moments and thus



does not require that the researchers reiterate between the propensity score modelling, the matching and the balance checking until a satisfactory solution is found (Hainmueller, 2012).

<sup>6</sup> For Switzerland, see in this respect the development of the register database LABB (*Längsschnittanalysen im Bildungsbereich*) by the Swiss Federal Office of Statistics (see: <https://www.bfs.admin.ch/bfs/de/home/statistiken/bildung-wissenschaft/erhebungen/labbb.html>).

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## Appendix

**Table A.1:** Descriptive statistics of the variables used

	min	max	mean	sd
Gender is female	0	1	0.59	
Age (wave 1)	13.8	18.8	15.5	0.6
Has no migrant background	0	1	0.85	
School grades	0	2	1.66	0.5
PISA reading literacy (wave 1)	272	884	541	78.3
PISA mathematical skills (wave 1)	249	816	565	82.9
Type of school track (wave 1)				
No (formal) tracking	0	1	0.06	
Basic academic requirements	0	1	0.17	
Extended requirements	0	1	0.32	
Pre-gymnasial track	0	1	0.45	
Educational degree (wave 9)				
No upper-secondary	0	1	0.03	
Upper-secondary	0	1	0.38	
Post-secondary VET	0	1	0.15	
University of applied sciences	0	1	0.06	
University	0	1	0.38	
Social-status quartile				
Quartile 1	0	1	0.22	
Quartile 2	0	1	0.27	
Quartile 3	0	1	0.22	
Quartile 4	0	1	0.29	
Social class				
Working class	0	1	0.39	
Lower-middle class	0	1	0.28	
Upper-middle class	0	1	0.32	
Highest parental education				
Less than tertiary education	0	1	0.59	
Tertiary education	0	1	0.41	

Notes:

N (observations): 2,821 (1,577 for sample with PISA test results for mathematics); 1,665 women, 1,156 men. Control variables are also used for cantons.

**Table A.2:** Difference in the social-origin gap of university completion by gender and migrant status

	<b>Difference between men and women</b>	<b>Difference between migrants and Swiss</b>
Q4 – Q1	0.076	0.070
	(0.068)	(0.082)
Q4 – Q2	0.035	0.144
	(0.056)	(0.092)
Q4 – Q3	–0.056	0.008
	(0.063)	(0.097)

Note: coefficients show the bootstrapped difference between the social-origin gaps (discrete-change effects) in [Table 3](#), in parentheses are the standard errors. 0.076 means that the social-origin gap in university completion between Q4 and Q1 is 7.6 percentage points larger among men than women.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Table A.3:** Predictive probabilities for educational outcomes at the age of 30 – robustness checks

		University		University of applied science	
		Matching on ascriptives	Matching on ability	Matching on ascriptives	Matching on ability
Parental social class	Δ Upper middle class – working class	0.326*** (0.022)	0.192*** (0.027)	0.029** (0.011)	0.016 (0.013)
	Δ Upper middle class – middle class	0.136*** (0.025)	0.098*** (0.025)	0.007 (0.013)	0.003 (0.013)
	Δ Tertiary degree – less than tertiary degree	0.190*** (0.019)	0.117*** (0.020)	0.003 (0.010)	-0.005 (0.010)
Reweighting on PISA mathematical ability	Δ Q4 – Q1	0.338*** (0.026)	0.219*** (0.045)	0.022 (0.015)	0.004 (0.025)
	Δ Q4 – Q2	0.262*** (0.025)	0.209*** (0.037)	0.021 (0.013)	0.005 (0.021)
	Δ Q4 – Q3	0.168*** (0.027)	0.134** (0.042)	0.011 (0.015)	0.037* (0.019)
With panel attrition weights	Δ Q4 – Q1	0.288*** (0.048)	0.148* (0.062)	0.048** (0.017)	0.025 (0.019)
	Δ Q4 – Q2	0.270*** (0.046)	0.193*** (0.050)	0.035* (0.018)	0.028 (0.018)
	Δ Q4 – Q3	0.159** (0.054)	0.068 (0.067)	0.036* (0.036)	0.030 (0.030)
Highest certificate at age 26	Δ Q4 – Q1	0.275*** (0.023)	0.150*** (0.033)	0.018 (0.014)	-0.015 (0.019)
	Δ Q4 – Q2	0.196*** (0.023)	0.126*** (0.026)	0.027* (0.012)	0.017 (0.014)
	Δ Q4 – Q3	0.121*** (0.026)	0.064* (0.028)	0.012 (0.014)	0.006 (0.015)

Notes:

Coefficients are based on multinomial regressions on educational attainment for matched pairs of status quartiles and shown as discrete-change effects, which can be interpreted as percentage-point differences: 0.326 means that the rate of university graduation is 32.6 percentage points higher.

Variables used for matching at the age of 16 are for ascriptive characteristics: age in months and canton of residence; additionally for school ability: lower-secondary school track, school grades and reading/math test score.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .



## Web-Appendix

**Table W.1:** Results of the entropy balancing for the reweighting weights, Wave 9 – ISEI class scheme

	Before reweighting				After reweighting				
	mean	var.	skewn.	mean	var.	skewn.	mean	var.	skewn.
	Quartile 4				Quartile 1				
PISA test score	563.96	5'045.01	-0.06	509.74	7'666.56	-0.09	563.96	5'045.01	-0.06
Grades extended	1.71	0.19	-1.43	1.61	0.23	-1.12	1.71	0.19	-1.43
basic	0.27	0.20	1.05	0.32	0.22	0.75	0.27	0.20	1.05
no tracking	0.08	0.07	3.21	0.30	0.21	0.87	0.08	0.07	3.21
age in months	0.05	0.05	4.05	0.07	0.06	3.43	0.05	0.05	4.05
	Quartile 4				Quartile 2				
PISA test score	184.86	54.47	0.84	187.31	55.10	0.53	184.86	54.47	0.84
PISA test score	563.96	5'045.01	-0.06	534.63	5'616.16	-0.14	563.96	5'045.01	-0.06
Grades extended	1.71	0.19	-1.43	1.65	0.22	-1.26	1.71	0.19	-1.43
basic	0.27	0.20	1.05	0.37	0.23	0.54	0.27	0.20	1.05
no tracking	0.08	0.07	3.21	0.19	0.15	1.59	0.08	0.07	3.21
age in months	0.05	0.05	4.05	0.07	0.06	3.49	0.05	0.05	4.05
	Quartile 4				Quartile 3				
PISA test score	184.86	54.47	0.84	186.02	51.90	0.49	184.86	54.47	0.84
PISA test score	563.96	5'045.01	-0.06	548.60	4'921.66	0.05	563.96	5'045.01	-0.06
Grades extended	1.71	0.19	-1.43	1.64	0.21	-1.09	1.71	0.19	-1.43
basic	0.27	0.20	1.05	0.31	0.21	0.83	0.27	0.20	1.05
no tracking	0.08	0.07	3.21	0.14	0.12	2.09	0.08	0.07	3.21
age in months	0.05	0.05	4.05	0.06	0.06	3.73	0.05	0.05	4.05
	Quartile 4				Quartile 3				
PISA test score	184.86	54.47	0.84	185.27	47.41	0.65	184.86	54.47	0.84

Notes:

The matching variables also include 24 cantons (not shown). Descriptive statistics of the matching weights: Q4 to Q1: mean = 1.287, std = 1.492, min = 0.004, max = 14.60  
 Q4 to Q2: mean = 1.102, std = 0.568, min = 0.014, max = 6.277  
 Q4 to Q3: mean = 1.156, std = 0.511, min = 0.163, max = 6.000

**Table W.2:** Linear regression on university graduation by social origin, gender and migrant status

	Model with social origin	Model with social origin and ability	Model with social origin, ability and gender	Model with social origin, ability and migrant status
Social origin: Lowest quartile 1 (ref.)				
Quartile 2	0.064** (0.023)	-0.005 (0.021)	0.008 (0.033)	-0.082+ (0.049)
Quartile 3	0.163*** (0.026)	0.066** (0.024)	0.095* (0.038)	0.095 (0.069)
Quartile 4	0.327*** (0.024)	0.173*** (0.024)	0.177*** (0.034)	0.206*** (0.051)
PISA reading score		0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Grades		0.126*** (0.018)	0.128*** (0.018)	0.128*** (0.018)
Tracking: Pregymasial (ref.)				
Extended requirements		-0.260*** (0.024)	-0.260*** (0.024)	-0.261*** (0.024)
Basic requirements		-0.364*** (0.029)	-0.363*** (0.029)	-0.370*** (0.029)
No (formal) tracking		-0.404*** (0.053)	-0.403*** (0.053)	-0.407*** (0.051)
Gender: Female (Ref: Male)			-0.007 (0.030)	
Quartile 2 * female			-0.021 (0.043)	

(Continued)

Table W.2: (Continued)

	Model with social origin	Model with social origin and ability	Model with social origin, ability and gender	Model with social origin, ability and migrant status
Quartile 3 * female			-0.047 (0.048)	
Quartile 4 * female			-0.009 (0.043)	
Migrant status: Swiss (Ref: migrant)				-0.080* (0.034)
Quartile 2 * Swiss				0.103 (0.055)
Quartile 3 * Swiss				-0.014 (0.074)
Quartile 4 * Swiss				-0.021 (0.055)
Constant	1.733*** (0.255)	0.591* (0.261)	0.610* (0.263)	0.705** (0.264)
N	2,821	2,821	2,821	2,821
R <sup>2</sup>	0.125	0.267	0.268	0.270

Notes:

Dependent variable: highest educational attainment (university versus no university). Standard errors in parentheses. Controls for age (in months) and canton of residence are not shown. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Table W.3:** Difference in the social-origin gap of university completion by gender and migrant status – robustness checks

		Difference between men and women	Difference between migrants and Swiss
Parental social class	△ Upper middle class – working class	0.050 (0.054)	0.066 (0.075)
	△ Upper middle class – middle class	0.030 (0.053)	0.105 (0.089)
	△ Tertiary degree – less than tertiary degree	-0.079 (0.042)	0.067 (0.060)
Reweighting on PISA mathematical ability	△ Q4 – Q1	0.025 (0.092)	0.022 (0.114)
	△ Q4 – Q2	0.053 (0.077)	0.075 (0.124)
	△ Q4 – Q3	0.104 (0.089)	0.108 (0.145)
With panel attrition weights	△ Q4 – Q1	0.047 (0.112)	0.233 (0.155)
	△ Q4 – Q2	0.034 (0.094)	0.044 (0.120)
	△ Q4 – Q3	0.086 (0.114)	0.163 (0.157)
Highest certificate at age 26	△ Q4 – Q1	0.046 (0.065)	0.128 (0.081)
	△ Q4 – Q2	0.018 (0.052)	0.139 (0.086)
	△ Q4 – Q3	0.057 (0.928)	-0.097 (0.517)

Notes: coefficients show the bootstrapped difference between the social-origin gaps (discrete-change effects, 500 replications). In parentheses are the standard errors.  
 \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .