



## Overeducation among graduates from universities of applied sciences: Determinants and consequences

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### ABSTRACT

This paper investigates the phenomenon of qualification mismatch (overeducation) among graduates from universities of applied sciences. Using data from the Swiss graduate surveys, it analyses the incidence of mismatch, determinants, and the connections with earnings and job satisfaction. Analyses show that a year after graduating around one sixth of those employed (17%) are in a job which does not match, or only partially matches, the qualifications they have acquired, and that this proportion is not diminishing significantly in the medium term. The risk of mismatch varies considerably, however, by subject area and final grade. In addition, the results indicate that employment below the level of qualification on entering professional life significantly raises the probability of mismatch in the following years too. Analyses of the impacts suggest that employment poorly matched to education and training is associated with an income penalty of around 5% in the short to medium term. Graduates in a mismatch situation also demonstrate less job satisfaction than those in a position matched to their qualification.

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### 1.0 Introduction

In the course of the global trend to widen access to higher education, the share of individuals with tertiary education has strongly increased, i.e. for OECD countries from 20% to 38% between 1995 and 2012 (tertiary-type 5A programmes, OECD, 2014: 83). Alike in Switzerland, the tertiary-type 5A graduation rate has sharply increased, from 9% to 32%. This significant increase has been achieved partly due to the creation of a new type of university, the *universities of applied sciences (UAS)*. They have been created from the former colleges of professional education and training in the 1990s in an effort to revitalise the economy and to create an access to higher education even for those from the vocational education and training system. The primary task of the UAS is to offer higher education programmes providing a professional qualification geared to the labour market. University of applied sciences degree programmes are therefore more closely aligned on labour market requirements than those at traditional universities, where the focus lies more on theory and research, and the teaching of general academic skills. From human capital perspective, we would therefore expect that the integration of graduates from universities of applied sciences into the labour market is comparably easy. However, for instance, findings of Barone and Ortiz (2011) suggest that in binary university systems the probability of finding a job matching the qualifications acquired is lower for graduates from recently upgraded institutions than for graduates from traditional universities. An explanation for this finding is the lower status and prestige of recently upgraded institutions compared to traditional universities. In consequence, their graduates enjoy less attraction on job market. Similarly, findings of a study among German graduates (Klein,

2010) show a higher risk of employment below the level of qualification for graduates from universities of applied sciences compared to degree holders of traditional universities.

In Europe, the share of individuals employed below the level of qualification amounts around 30% on average (Leuven and Oosterbeek, 2012), against 15% in Switzerland (Frei and Sousa-Poza, 2012). Specific analyses for recent graduates from Swiss universities (Diem and Wolter, 2014) give shares of 15% (one year after graduation) and 9% (five years after graduation). Yet, for graduates of Swiss universities of applied sciences, just one out of three employed graduates perform a job which does not require a university degree (34% one year and 28% five years after obtaining the Bachelor degree; 2013 surveys, BFS, 2014). Findings from Germany, however, suggest some lower incidence rates, with one out of five graduates of universities of applied sciences being in a qualification mismatch<sup>1</sup> in the first few years after graduation (Fehse and Kerst, 2007). Further estimations based on micro census data present shares of 10 to 20% among UAS degree holders (Plicht et al., 1994). The cited figures need, however, to be interpreted with care, as the incidence of qualification mismatch significantly depends on the measurement method applied (Groot and Maassen van den Brink, 2000; Leuven and Oosterbeek, 2012; Verhaest and Omey, 2012), which hampers a simple comparison between studies. Moreover, it makes a difference whether one measures qualification mismatch by terms of formal qualification or by terms of skills, as their connection is not very close (Allen and van der Velden, 2001; Green and McIntosh, 2007). Chevalier (2003) thus suggests a differentiated measure, based on the satisfaction with the match. According to him, workers are *apparently* overeducated for a job, if they have more qualifications than required but are satisfied with the match, and *genuinely* overeducated if they are overeducated for the job and dissatisfied with the match. Pecoraro (2013) applies a differentiated measure as well, but based on skill match rather than on satisfaction with the match. The findings for Switzerland show that a considerable proportion of workers employed below the level of qualification is only apparently mismatched, i.e. mismatched only in terms of formal qualification but not in terms of skills. Similarly, Diem and Wolter (2014) draw on information from both formal and professional qualification match to define the measure of qualification mismatch among Swiss university graduates. They define a graduate to be in a mismatch situation if their job does not require a university degree and, at the same time, the professional qualification match is only low to medium, and all other graduates to be in a job matching their qualification.

An employment below the level of qualification is associated with various kinds of negative consequences. Research indicates that earned income for employees who are overeducated for the job they perform, i.e. have more qualifications than needed for the job, is generally lower than for people with the same education whose job matches their education (Groot and Maassen van den Brink, 2000; Leuven and Oosterbeek, 2012; Rubb, 2003). Several studies confirm this connection for university graduates, too (e.g., Carroll and Tani, 2013; Cuttillo and Di Pietro, 2006; Frenette, 2004; McGuinness and Sloane, 2011), including graduates from Swiss universities (Diem and Wolter, 2014; Pecoraro, 2014). Moreover, graduates in a mismatch situation (overeducation) show less job satisfaction than those with the same level of education who are employed in a position matching their qualification (Allen and van der Velden, 2001; Verhaest and Omey, 2006; Vieira, 2005).

However, according to the knowledge of the author, no study has so far examined the possible consequences of qualification mismatch among graduates from UAS on earned income and job satisfaction. Such results would, however, be interesting with regard to the practical and labour market oriented profile of the UAS which distinguishes them from traditional universities. Moreover, findings would be informative from policy perspective in view of the potential negative costs of qualification mismatch.

The particular aim of this study is to learn more about the phenomenon of employment below the level of qualification among graduates from Swiss universities of applied sciences. Using data from the Swiss graduate surveys carried out by the Swiss Federal Statistical Office (2004 to 2010 graduation years), I first estimate the incidence of qualification mismatch using the indicators applied by Diem and Wolter (2014). Second, I investigate which factors facilitate a qualification match, or promote the probability of a mismatch. Third, I analyse the extent to which qualification mismatch impacts on earnings and job satisfaction.

The findings of the present study indicate that in the short to medium term, one out of six UAS graduates is in a job which does not match, or only partially matches the qualifications they have acquired. Consistent with previous findings, employment poorly matched to education and training is associated with an income penalty and with less job satisfaction. The phenomenon of overeducation among graduates from UAS is thus likely to involve considerable expense not only for the individual but also for the state. Due to the largely public financing

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<sup>1</sup> "Qualification mismatch" describes a discrepancy between the employee's qualifications and the job requirements. The term covers both jobs in which employees are overqualified, and jobs in which employees are underqualified (i.e. have fewer qualifications than required). As the empirical analyses in this study are limited to the phenomenon of overeducation, however, in this paper "qualification mismatch" generally refers to "too much" education and training.

of the universities of applied sciences and the tax revenue foregone (due to lower earnings), macro-economic costs are to be expected. With regard to policy, this raises the question of how these economic costs can be legitimized and what could be done to reduce the proportion of qualification mismatch.

The structure of the remaining paper is as follows: section 2 provides an overview of possible theoretical explanations and the current state of research. Section 3 explains the data base and the estimation models. Section 4 presents the empirical findings on mismatch. Conclusions and policy implications are presented in section 5.

## 2.0 Theoretical background and current state of research

### 2.01 Possible theoretical explanations

There is as yet no consistent theoretical framework to explain the phenomenon of overeducation and of the individual consequences on labour market outcomes (Hartog, 2000). Instead different, to some extent contradictory, approaches from the field of labour market theories are used in explanation. A central approach is the *human capital theory* (Becker, 1964) and, developed on its basis, the Mincer (1974) earnings function. According to this model, earnings depend only on the individual productivity of the workforce, i.e. the accumulated human capital of formal education (school education), work experience, and continuing education and training, but not on job characteristics. According to this, individuals with identical productivity always earn exactly the same. Thus, the empirically observed phenomenon of qualification mismatch, and with it the lower earnings in such employment, is due to unobserved individual heterogeneity, i.e. differences in individual abilities.

An adaptation of the human capital model is the *theory of career mobility* (Sicherman and Galor, 1990). This model is based on the assumption that accepting employment below the level of qualification is a voluntary, rational decision which is taken in anticipation that a qualification mismatch will produce better chances of advancement, i.e. will pay off in future thanks to better promotion prospects. The phenomenon of employment below the level of qualification is, according to this approach, therefore, regarded as transitional. Accordingly, we can expect that income will be lower only in the short term, and later will approach or even exceed the income of those who have been in a well-matched job from the beginning. A theory test carried out in Germany, however, throws doubt on the explanatory power of the model (Büchel and Mertens, 2004). Similarly, results from Switzerland (Pecoraro, 2014) suggest that university graduates who are mismatched in both education and skills (i.e. genuinely overeducated) do not have higher promotion opportunities (unlike the apparently overeducated).

Quite unlike this model, in demand-driven approaches such as the *job competition model* (Thurow, 1975) the authors assume that earnings predominantly depend on workplace characteristics. The level of education and training is, however, important in filling positions as it is assumed that the on-the-job training period is shorter for more highly qualified people than for the less qualified. A mismatch between educational qualifications and job requirements therefore represents a (structural) imbalance between qualifications on offer and those required, and can be persistent. Since earnings are determined by productivity in the job, people who are overeducated for the activity carried out earn less than those with the same qualifications in a well-matched post. The *assignment model* (Sattinger, 1993) takes a middle position. In this model, both individual qualifications and the requirements of the job determine productivity, and thus earnings. Thus both sides, the individual and the job, are limiting factors for productivity.

In an empirical investigation of the different theoretical approaches there is most support for the assignment model (Dolton and Vignoles, 2000; McGuinness, 2006). There are, however, also studies showing that the relationship between overeducation and earnings can also be put down to unobserved individual heterogeneity, i.e. differences in individual abilities (Mavromaras et al., 2013; Tsai, 2010), which supports the human capital theory.

As to the link between qualification mismatch and job satisfaction, most of the explanatory approaches expect a negative correlation. According to the *rational benefit theory* approach, individual benefit depends on the *absolute* monetary and non-monetary returns, which means that in jobs with lower requirements the level of benefit is lower due to the lower returns (earnings, prestige etc.). Unlike this model, according to the *theory of relative deprivation* the *relative* circumstances are crucial (see Crosby, 1976). The core assumption is that individuals compare their own situation with a reference value (e.g. the situation of other graduates), whereby a discrepancy between the expected income and achieved income leads to a feeling of disadvantage.

## 2.02 Current state of research

As regards the persistence of qualification mismatch, various studies indicate that workers who are overeducated are more likely to remain mismatched in the following years (Andersson et al., 2014; Carroll and Tani, 2013; Frenette, 2004; McGuinness and Wooden, 2009). The degree of persistence, however, varies depending on study. Findings for the Swiss population indicate that half of all individuals with employment below the level of qualification manage to change to a well-matched job within one year (Frei and Sousa-Poza, 2012). In contrast, for graduates of traditional universities the situation proves to be more persistent: of those in a mismatch situation one year after graduation, four years later one in four is still working in a position below the level of qualification (Diem and Wolter, 2014). From the graduates who are mismatched for the job both in terms of education and skills (Pecoraro, 2014), one of seven is still in such a mismatch situation four years later, and another quarter changes to a job which does again not match the formal qualifications but the skills.

The probability of an employment below the level of qualification significantly depends on individual performance factors such as (final) grades (Chevalier, 2003; Diem and Wolter, 2014; Fehse and Kerst, 2007; García-Espejo and Ibáñez, 2006; Verhaest and Omey, 2010), but also on professional and international experience (related to study) (Diem and Wolter, 2014; Fehse and Kerst, 2007). For university-level education, the chosen subject area also proves a key determinant (Carroll and Tani, 2013; Chevalier, 2003; Dolton and Silles, 2008; Frenette, 2004). The risk of not finding a well-matched job also varies partly according to socio-demographic characteristics. The worker's age generally reduces the probability of a qualification mismatch (Andersson et al., 2014; Green and McIntosh, 2007; Mavromaras et al., 2009). However, studies based on graduate data (Diem and Wolter, 2014; Cuttillo and Di Pietro, 2006) show no evidence for such correlation. A migrant as well as a lower social background tend to increase the risk of an employment below the level of qualification (Andersson Joonas et al., 2014; Cuttillo and Di Pietro, 2006; Mavromaras et al., 2009; Verhaest and Omey, 2010). Yet research findings for Switzerland suggest no differences (Diem and Wolter, 2014; Wirz and Atukeren, 2005). According to most research findings including investigations for Switzerland, gender does not tend to influence the risk of qualification mismatch (Diem and Wolter, 2014; Green and McIntosh, 2007; Groot and Maassen van den Brink, 2000; Mavromaras et al., 2009; Wirz and Atukeren, 2005).

As regards the possible effects of qualification mismatch, results of meta-studies (Groot and Maassen van den Brink, 2000; Leuven and Oosterbeek, 2012; McGuinness, 2006; Rubb, 2003) show that people who are overqualified for the job they perform earn less than those with the same education and a well-matched job. Studies examining the correlation among university graduates confirm the lower earnings of graduates employed below the level of qualification compared to graduates in a well-matched job (e.g., Carroll and Tani, 2013; Cuttillo and Di Pietro, 2006; Frenette, 2004; McGuinness and Sloane, 2011). This pattern is also evident in Switzerland (Diem and Wolter, 2014; Pecoraro, 2014). Estimations of the income penalty due to qualification mismatch range from 4 to 11% in short to medium term, depending on the model (Diem and Wolter, 2014; Pecoraro, 2014). However, as regards the relationship between qualification mismatch and earnings, various studies indicate that this is overestimated (see for instance Carroll and Tani, 2013; Mavromaras et al., 2013; Tsai, 2010), as non-observed factors such as individual skills are not (cannot be) factored in in the analyses.<sup>2</sup> In other words, the problem arises from the fact that the lower salary of workers in employment below the level of qualification does not (only) reflect the lower job requirements, but also the lower skills and abilities of these individuals – factors which cannot be observed. A couple of studies address this problem of unobserved individual heterogeneity by using panel data to estimate fixed or random effects models (Carroll and Tani, 2013; Frenette, 2004; Mavromaras et al., 2013) or to apply instrumental variable methods (Dolton and Silles, 2008; Verhaest and Omey, 2012). According to findings from Swiss graduates based on OLS and fixed effects models (Diem and Wolter, 2014; Pecoraro, 2014), unobserved ability explains around half of the wage loss. Few studies (Chevalier, 2003; Chevalier and Lindley, 2009; Mavromaras et al., 2013; Pecoraro 2013, 2014) make further use of a differentiation of the overeducation measure to account for workers heterogeneity. Chevalier (2003) and Chevalier and Lindley (2009) distinguish between apparently and genuinely overeducated workers, based on the criteria whether the overeducated worker is satisfied with the match or not. Mavromaras et al., (2013) and Pecoraro (2013, 2014) follow the idea of Chevalier (2003), but make the distinction based on the skill mismatch. The impacts on earnings suggest that only genuinely overeducated workers suffer from significant pay penalties, unlike the apparently overeducated (Chevalier, 2003; Chevalier and Lindley, 2009; Pecoraro, 2013, 2014).

People with employment below the level of qualification also demonstrate less job satisfaction than those with the same level of education employed in a well-matched position (Allen and van der Velden, 2001; McGuinness and Sloane, 2011; Sánchez-Sánchez and McGuinness, 2013; Verhaest and Omey, 2006; Vieira, 2005). The connection becomes, however, manifest mainly in a mismatch of skills, rather than in a mismatch in formal

<sup>2</sup> However, there are also studies (Dolton and Silles, 2008; Verhaest and Omey, 2012) which classify the distortion as low since the distortion arising from the error in measuring the overeducation variable compensates the overestimation of the effect.

qualifications (Allen and van der Velden, 2001; Mavromaras et al., 2013; McGuinness and Sloane, 2011). Though the strongest correlation is found among workers who are mismatched both in terms of formal education and skills (Green and Zhu, 2010; Mavromaras et al., 2013). Yet, as with income, the relationship between qualification mismatch and job satisfaction is likely to be overestimated by unobserved heterogeneity (Mavromaras et al., 2013).

Based on findings from literature, the present study aims to investigate the incidence, determinants and possible impacts of employment below the level of qualification on earnings and job satisfaction among graduates of universities of applied sciences. Due to the potential selectivity problem, this article does, however, not claim to yield causal statements as to the potential consequences of qualification mismatch. The following section describes the data and methods applied in this study.

### 3.0 Materials and methods

#### 3.01 Data base and central variables

This study analyses data from the Swiss Federal Statistical Office's (BFS) graduate survey. The survey is designed in the form of a census and is carried out every two years, with graduates interviewed twice, i.e. one year and five years after graduation. The basic population of this study consists of UAS graduates who successfully graduated in the years 2004, 2006, 2008 or 2010. The analyses rely on data of the first-wave surveys (carried out in the years 2005, 2007, 2009 and 2011) as well as on the second-wave surveys (carried out in the years 2009 and 2011). The analyses only include graduates with a standard qualification, i.e. a Bachelor's degree or a *Diploma*. In music alone, however, where the Master's degree has been deemed the standard qualification, graduates of the Master's study course are considered (and graduates of Bachelor's courses are excluded). Table 01 provides an overview of the different surveys and the number of observations.

Table 01: Overview of surveys and number of observations

	First-wave survey: 1 year after graduation	Second-wave survey: 5 years after graduation
2004 graduation cohort	3580	2455
2006 graduation cohort	4278	2832
2008 graduation cohort	4620	
2010 graduation cohort	5408	
Pooled sample	17,886	5287
Pooled sample: economically active	14,860	5015

Qualification mismatch is the key variable of interest and is measured by a subjective approach. Following on from Chevalier (2003), and in line with the study of Diem and Wolter (2014), the measure of qualification mismatch is based not only on the formal requirement of a university degree, but also includes the match expressed between the qualifications acquired during study and those required in the workplace.

The construction of the mismatch variable is based on the graduate's answers to the following questions: a) "Did your employer ask for a university degree for your current main job (for the self-employed: Do you need a university degree to do your current job)?", and b) "In your opinion, how well does your current job match your education in terms of the professional qualifications you acquired during your studies?" The answer categories for the second question are based on a scale of 1 "not at all" to 5 "to a great extent". Based on these two answers, an individual is defined as being in a mismatch situation if the job does not require a university degree and, at the same time, the professional qualification match is only low to medium (answers 1 to 3). The definition of the qualification mismatch is therefore close to the definition of the "genuinely overeducated" by Pecoraro (2014).<sup>3</sup>

The *income* variable describes the contractually fixed annual gross salary for the main job (including 13<sup>th</sup> month salary) in full-time equivalents, or the gross income from self-employment.<sup>4</sup> *Job satisfaction* reflect a construct variable formed through a factor analysis (one factor solution). The group of questions underlying the constructed variable are: "Are you satisfied with your current job? In terms of...". Respondents have to rate 14 different aspects on a scale of 1 "not at all satisfied" to 5 "very satisfied".

<sup>3</sup> According to the study of Pecoraro (2014), an individual is genuinely overeducated, if no university degree is required and the answer of the question about skill match is 1 or 2 (out of 5).

<sup>4</sup> Outliers are excluded from the analyses. This applies to incomes below CHF 36,000 and salaries above CHF 180,000 (first-wave survey) or CHF 250,000 (second-wave survey).

### 3.02 Estimation models

Estimation of the factors explaining qualification mismatch takes account of the fact that the probability of working in a mismatched job also depends on actually finding a job and accepting it (see Di Pietro and Urwin, 2006). The determinants of qualification mismatch are therefore estimated using a multinomial logistic regression model in which the dependent variable has three categories ( $j$ ): qualification match, qualification mismatch and economic inactivity. The probability  $P$  of the employment situation  $Y$  of the individual  $i$  is described as

$$P(Y_i = j | x_i) = \frac{\exp(x_i' \beta_j)}{\sum_{j=1}^3 \exp(x_i' \beta_j)} \quad j = 1, 2, 3 \quad \text{Eq. (01)}$$

where  $x_i$  is a vector of individual and institutional characteristics. This considers variables which approximately measure the academic abilities, subject-specific skills and motivation of the individuals, namely the *final grade* or *employment* before or during study, distinguishing between jobs related to the subject of study and unrelated jobs, and *exchange semester(s) at another institution*. Moreover, the analyses also incorporate the central socio-demographic characteristics (gender, age, social background, nationality) and institutional characteristics (subject area, university of applied sciences, graduation year). The appendix (Tables A.1 and A.2) shows a compilation of the variables used.

The connection between qualification mismatch and earned income is estimated primarily using OLS models with the following equation:

$$\ln Y_{it} = \alpha_0 + \alpha_1 QM_{it} + \alpha_2 X_{it} + \varepsilon_{it} \quad \text{Eq. (02)}$$

Where  $\ln Y_{it}$  describes the natural logarithm of annual income in full-time equivalents of an individual  $i$  in year  $t$ ;  $QM_{it}$  is a binary variable which takes the value 1 if a person's job situation is characterised by a qualification mismatch, and otherwise 0;  $\varepsilon_{it}$  is the error term.  $X_{it}$  represents a vector of different explanatory variables, which include individual, institutional and professional characteristics. The professional characteristics contain information on professional status, potential fixed term of the employment, part-time employment, self-employment, tenure and company size, on the sector (private versus public) and on the work region. Analyses of those surveyed five years after graduation additionally use estimation models which also consider the employment and earnings situation on entering the labour market (one year after graduation). Since, in Eq. (02) (OLS model), unobserved heterogeneity may distort the estimated relationship between qualification mismatch and earnings, I additionally calculate a fixed effects model alongside the OLS models. This model takes advantage of the panel structure of the data by estimating the impact of a change in employment status (between the points in time at which the two surveys are carried out) on the change in earnings, net of group selectivity.

For the estimation of job satisfaction I calculate an OLS model analogous to the earnings estimation. For data reasons the analyses are limited to the first-wave surveys carried out in 2009 and 2011 and the second-wave survey in 2011. Panel analyses, which would allow broad-based analyses of the causal relations, are therefore not possible. In order to estimate job satisfaction independent of earnings level, I additionally introduce earnings into the equation model. Other professional characteristics are not taken into account.

All the analyses are conducted using Stata statistical software (Version 12.1) for both survey times, one year and five years after graduation. The analyses have been weighted using the weighting variable available in the data set. Test statistics are carried out with robust standard errors.

## 4.0 Empirical findings

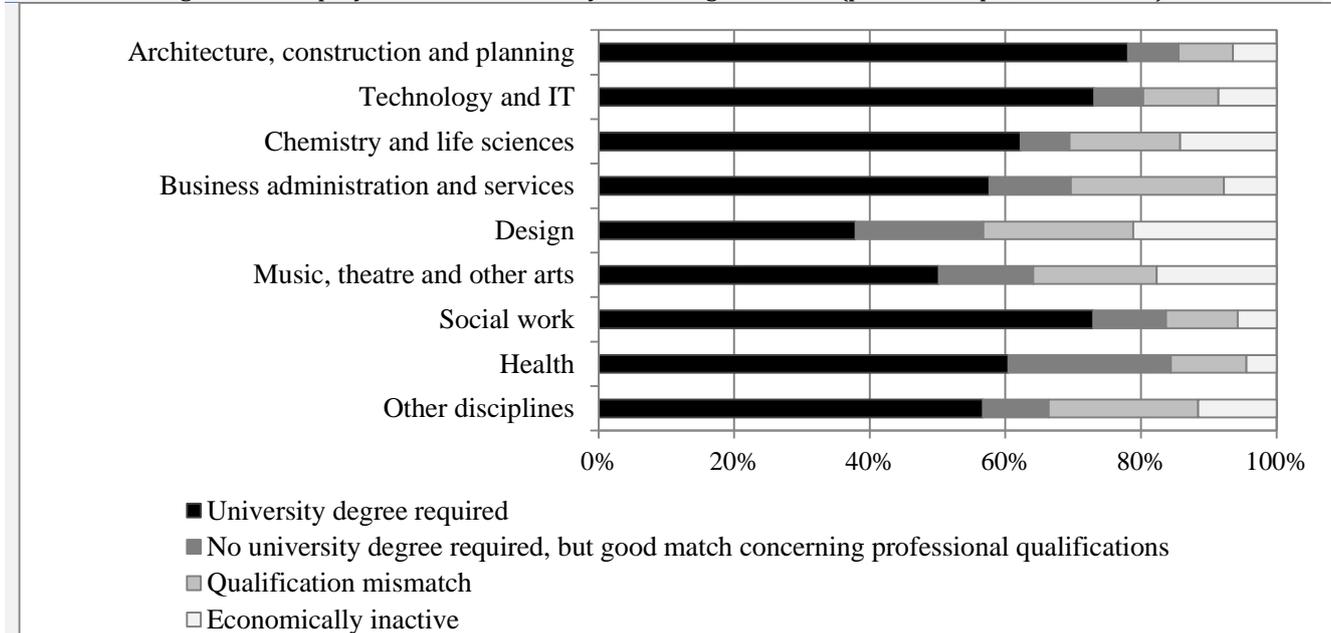
### 4.01 Descriptive findings

One year after graduation 90% of UAS graduates are in employment. Almost two out of three people (63%) are in a job that indeed requires a university degree. Another 12% of the graduates report that their job matches the professional qualifications acquired through study, although their job does not require a university degree. This brings the share of those in a well-matched job to approximately three quarters (74%), while 16% of graduates are in a mismatch situation. There are, however, considerable differences between individual subject areas (see Figure 1).

The degree of qualification mismatch tends to be low in the fields of architecture, construction and planning, technology and IT, social work and health. Arts and the field of business administration and services, however, show greater incidences of mismatch.

The share of those in qualification mismatch only changes a little in the first few years of work. In terms of all employed graduates, the share of those in a job matching their qualifications increases in the following four years by only 3 to 4 percentage points on average (from 83% to 86%), which indicates that the mismatch phenomenon is not confined to the career entry phase. Compared to university graduates, the share of those with employment below the level of qualification on entering professional life, i.e. one year after graduation, is at a similar level (universities of applied sciences: 17%, traditional universities: 15%). By contrast the proportional value five years after graduation for UAS graduates is much higher (14% versus 8.5%). UAS degrees therefore appear, despite their greater practical orientation, less useable on the labour market in the medium term than those of the traditional universities.

Figure 01: Employment situation one year after graduation (pooled sample, N = 15,935)



An explanation for the lower match rates for universities of applied sciences may lie in the fact that some jobs can be filled just as well by people with tertiary level B professional education and training (colleges of professional education and training etc.) or continuing education and training certificates (Master of Advanced Studies (MAS) etc.). The subject area of health, as an example, provides support for this conjecture. While tertiary care training courses in the French-speaking part of Switzerland are offered exclusively at universities of applied sciences (tertiary level A), in the German-speaking part of Switzerland courses are also provided at colleges of professional education and training (tertiary level B). The expressed job requirements reflect the differences in the institutional structure between the two language regions. Thus, 80% of graduates working in the French-speaking part of Switzerland need a university degree for their job, but only 30% of those working in the German-speaking part of Switzerland. These differences are only partly offset if those who regard their job as well-matched concerning the professional qualifications acquired in study are also included as matched (French-speaking Switzerland: 96%, German-speaking Switzerland: 75%).

#### 4.02 Determinants of the employment situation: in qualification match versus in qualification mismatch versus economically inactive

Table 02 presents the results of the factors explaining the employment situation one year after graduation. People who complete their studies with good grades are more often in a well-matched job than those with poorer final grades. Below-average grades increase the risk of a mismatch and of economic inactivity. The probability of carrying out a job which does not require university-specific qualifications is around 51%<sup>5</sup> higher for people with grades ranking in the bottom quintile compared to people with grades ranking in the top quintile. Working while studying in a job, which is related to the study course, increases the likelihood of finding a well-matched position or reduces the risk of economic inactivity. By contrast working while studying in a job which is not related to the study course, working before studying, and completing one or more exchange

<sup>5</sup> This figure is obtained by dividing the predictive margin of the top quintile by the predictive margin of the bottom quintile. Stata software is used for calculation. An approximate value can be calculated using the figures from table 02 as follows:  $(0.160+0.049) / (0.160-0.022) = 1.51$  (displaying a 51% increase in the probability of mismatch).

semesters at another higher education institution do not have any significant impact on the employment situation.

Table 02: Determinants of the employment situation one year after graduation (pooled sample)

	Qualification match	Qualification mismatch	Economically inactive
Grade: middle quintile	Ref.	Ref.	Ref.
Grade: bottom quintile	-0.068** (0.013)	0.049** (0.011)	0.019* (0.009)
Grade: second-lowest quintile	-0.042** (0.012)	0.032** (0.010)	0.010 (0.008)
Grade: second-highest quintile	0.023* (0.011)	-0.005 (0.010)	-0.018* (0.007)
Grade: top quintile	0.031** (0.012)	-0.022* (0.010)	-0.008 (0.008)
Working while studying in a job related to studies	0.033** (0.009)	0.012 (0.008)	-0.045** (0.006)
Working while studying in a job not related to studies	0.009 (0.009)	0.002 (0.008)	-0.011+ (0.006)
Working before studying in a job related to studies	0.011 (0.010)	0.001 (0.008)	-0.012+ (0.006)
Working before studying in a job not related to studies	-0.004 (0.009)	0.004 (0.008)	0.000 (0.006)
Exchange semester at another institution	0.001 (0.013)	-0.007 (0.011)	0.007 (0.008)
Gender: female	-0.013 (0.009)	0.017* (0.008)	-0.004 (0.006)
Age at first-wave survey	-0.003* (0.001)	0.009** (0.001)	-0.005** (0.001)
Mother with tertiary degree	-0.034** (0.010)	0.020* (0.008)	0.014* (0.006)
Father with tertiary degree	0.024** (0.009)	-0.030** (0.008)	0.006 (0.006)
Swiss nationals	Ref.	Ref.	Ref.
Foreigner educated in Switzerland	-0.035+ (0.019)	0.003 (0.015)	0.032* (0.014)
Foreigner educated abroad	-0.009 (0.017)	-0.024 (0.014)	0.033** (0.012)
<i>Fixed effects</i>			
Subject areas		X	
University of applied sciences		X	
Year of graduation		X	
Pseudo R <sup>2</sup> (McFadden)		0.062	
N		12092	
<b>Notes:</b> Multinomial logistic regression: Average marginal effects, standard error in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01			
Category percentages: qualification match: 74.9%, qualification mismatch: 16.0%, economically inactive: 9.1%.			

The employment situation also varies with socio-demographic characteristics. Women have a greater probability of being in a mismatch situation than men. Likewise, older people more frequently than younger are in employment not matched to their qualification, which may explain why they more frequently avoid (have to avoid) economic inactivity. The impact of parental education is ambivalent. While a father who has completed tertiary education has a positive impact on the employment situation (greater probability of a qualification match), a mother who has completed tertiary education shows the inverse. As to nationality, Swiss nationals have a lower risk of being economically inactive than non-Swiss nationals.

For the employment situation five years after graduation (see Table A.3 in the Appendix) the previous employment status (one year after graduation) proves a strong influencing factor – all other variables remaining constant. People who in the first-wave survey are in a mismatch situation are 3.6 times as likely to be mismatched five years after studying as people who are previously in a well-matched job. For those who are economically inactive originally, the risk increases around twofold. Both groups also demonstrate a greater probability of being economically inactive five years after graduation than those who are originally in matched position (previously mismatched: +30%, previously economically inactive: +280%). The estimation results therefore lead to the finding that the employment situation has a strong path dependency.

The final grade has, even five years after graduation, a significant impact on the employment situation, which suggests that the signal value of the grades is also important in later changes of job. All other individual factors, by contrast, do not have any significant impact on the risk of qualification mismatch.

#### 4.03 Correlation between qualification mismatch and earnings

Table 03 summarises the regression results on the correlation between qualification mismatch and earnings. One year after graduation, UAS graduates who are in a mismatch situation earn almost 4% less than those in well-matched positions (Model 1). The earnings differences subsist independently from varying performance characteristics, socio-demographic or professional characteristics (Model 2). Instead, the earnings penalty increases slightly to 5% when these variables are taken into account. The change in the coefficient is mainly to be put down to the inclusion of age, i.e. the fact that older people are more frequently in mismatched positions, but at the same time have a higher income than younger people. By contrast, there are no signs that earnings differences between those with and those without qualification match are to be attributed to systematic differences in other earnings-compensating employment characteristics. However, further analyses show that, over a longer period of employment, i.e. from around five years of work, qualification mismatch has almost no negative impact on income. Likewise, the earnings difference between those in a qualification match and those in a qualification mismatch situation vary by subject area.

Five years after graduation the earnings differences between those with qualification match and those with qualification mismatch are at a similar level as on entering professional life (Model 3). If we look at the context of interest in more detail by including the employment situation four years earlier, i.e. one year after graduation, in the analyses (Model 4), we obtain the following results: people who have moved from qualification mismatch to qualification match earn at the time of the second-wave survey the same as those who are well-matched at both points. People who change from originally match to mismatch earn about 3% less than those who are always in a well-matched job; however, the difference is not statistically significant. Earnings for those who are mismatched at both points are significantly lower (–5%). The largest earnings penalties, however, are for those who are economically inactive in the first-wave survey. In comparison to those who are well-matched at both points, the earnings of those who are originally economically inactive are 7 to 15% lower depending on whether or not they are well-matched by the time of the second-wave survey. An explanation for the much lower earnings is probably the fact that those who are originally economically inactive are able to accumulate less human capital as they have less professional experience overall.

Table 03: Correlation between qualification mismatch and earnings

	Earnings 1 year after graduation		Earnings 5 years after graduation		Change in earnings between 1 <sup>st</sup> and 2 <sup>nd</sup> survey
	Model 1	Model 2	Model 3	Model 4	Model 5
Qualification mismatch	-0.037** (0.007)	-0.050** (0.006)	-0.045** (0.014)		-0.040** (0.011)
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : match				Ref.	
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : mismatch				-0.004 (0.012)	
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : economically inactive				-0.069** (0.021)	
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : match				-0.031 (0.020)	
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : mismatch				-0.053* (0.022)	
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : econ. inactive				-0.146** (0.032)	
<i>Control variables</i>					
Subject areas, university of applied sciences, year of graduation	x	x	x	x	
Proxies for abilities and motivation		x	x	x	
Socio-demographic characteristics		x	x	x	
Characteristics of employment		x	x	x	x
Adj. R <sup>2</sup>	0.170	0.373	0.361	0.368	0.563
N	8688	8688	3494	3494	5658 (2829)
<b>Notes:</b> OLS regression coefficients (Models 1 to 4) and fixed effects regression (Model 5), robust standard error in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01. 1 <sup>sts</sup> : first-wave survey, 2 <sup>nds</sup> : second-wave survey					

To support the estimation results with respect to the potential causal effect of employment below the level of qualification on earnings more widely, a fixed effects model (Model 5) has also been calculated. The results show

that a change from qualification match to qualification mismatch is connected with a 4% decrease in income. Thus, the findings suggest that the higher earnings in jobs that are matched to education and training are mainly due to the different requirement profile and only to a lesser extent to the varying individual abilities/performance potentials.

#### 4.04 Correlation between qualification mismatch and job satisfaction

UAS graduates in a mismatch situation demonstrate less job satisfaction than people in a job matched to their studies (Table 04, Model 1). Satisfaction is around three quarters of a standard deviation below the value of those with qualification match. To estimate the context of interest independently of income, Model 2 also includes income which, as expected, correlates positively with job satisfaction. Maintaining earnings constant does not, however, lead to any noticeable change in the correlation measured between qualification mismatch and job satisfaction, which is consistent with the relative deprivation theory. However, further analyses identify heterogeneous effects: qualification mismatch at higher income has a less negative effect on job satisfaction than at lower income.

Table 04: Correlation between qualifications mismatches and job satisfaction (first-wave surveys 2009, 2011; second-wave survey 2011)

	Job satisfaction 1 year after graduation		Job satisfaction 5 years after graduation		
	Model 1	Model 2	Model 3	Model 4	Model 5
Qualification mismatch	-0.719** (0.035)	-0.698** (0.035)	-0.562** (0.069)	-0.557** (0.069)	
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : match					Ref.
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : mismatch					-0.039 (0.081)
2 <sup>nds</sup> : match / 1 <sup>sts</sup> : economically inactive					-0.173+ (0.096)
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : match					-0.474** (0.090)
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : mismatch					-0.641** (0.105)
2 <sup>nds</sup> : mismatch / 1 <sup>sts</sup> : economically inactive					-0.848** (0.231)
Income/10,000		0.074** (0.009)		0.031** (0.012)	0.029* (0.012)
Control variables	x	x	x	x	x
Adj. R <sup>2</sup>	0.114	0.128	0.098	0.102	0.104
N	5271	5271	1921	1921	1921

**Notes:** OLS regression coefficients, robust standard error in parentheses. +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ . 1<sup>sts</sup>: first-wave survey, 2<sup>nds</sup>: second-wave survey

The correlation between qualification mismatch and job satisfaction is statistically still significant five years after graduation (Model 3), whereby the correlation is somewhat lower (around three fifths of a standard deviation). Again, the coefficient remains stable when we include earnings in the model (Model 4). As with the earnings estimation, the effects on job satisfaction can also be considered differentiated by employment situation during the two survey dates (Model 5). People who, five years after graduation, are in a job which is matched to their qualification, but who are in a mismatched position on entering professional life, are not less satisfied than people who are well-matched at both points. People who originally are economically inactive tend to have slightly lower job satisfaction. Employees who are mismatched for their current jobs, but are well-matched one year after graduation, are much less satisfied than those who at both points are in a well-matched job. Those with qualification mismatch who are economically inactive right after graduation demonstrate the lowest job satisfaction (–1 standard deviation). For people with qualification mismatch at both points, the level of satisfaction lies between that of the latter two groups. The overall results of job satisfaction are largely consistent with the findings of the earnings regressions.

## 5.0 Conclusion and policy implications

Around 20 years after the establishment of the Swiss universities of applied sciences (UAS), and with them university-level education and training courses “qualifying for a profession” and “geared to the labour market”, this study delivers the first detailed analyses of the phenomenon of qualification mismatch (overeducation) among university of applied sciences graduates in the first years after graduation.

The study shows that 17% (14%) of UAS graduates who are in employment one year (five years) after graduation are in a job which does not require a university degree and is not to a great extent matched to the professional qualifications acquired. Qualification mismatch is therefore, in the medium term at least, present on a larger scale than among Swiss university graduates, of whom 9% are overqualified five years after graduation (Diem and Wolter, 2014). Employment below the level of qualification is also characterised by great persistence.

In line with the research literature, good final grades reduce the probability of qualification mismatch. However, working while studying or working before starting study scarcely protects from employment below the level of qualification. Contrary to the majority of the research findings, the risk of qualification mismatch for UAS graduates after the first years of employment scarcely varies in terms of socio-demographic characteristics such as age, gender or nationality.

Analyses of the impacts suggest that employment which is poorly matched to the level of education and training is associated with an income penalty of around 5% in the short to medium term. The earnings penalty is comparable with that of traditional university graduates (Diem and Wolter, 2014). As expected, there is also a significant negative correlation with regard to the subjective degree of job satisfaction. Due to a lack of panel data this relationship is, however, less assured.

In total the results provide strong indications that employment below the level of qualification is linked to disadvantages for the individuals concerned. Due to the largely public financing of the universities of applied sciences and the tax revenue foregone (due to lower earnings), macro-economic costs are also to be expected. In view of the substantial share of those in a qualification mismatch situation, therefore, the challenge arises of ensuring the success of the universities of applied sciences in the future.

While the study provides key findings on the incidence, risk factors and potential impacts, we still know very little about the precise reasons for the substantial shares of qualification mismatch. Given the lower satisfaction among those with employment below the level of qualification, based on the evidence, I can largely rule out that jobs with lower requirements are freely chosen, i.e. represent a preferred option. Moreover, the lower earnings for those in mismatch situation counter the thesis that employment below the level of qualification is merely a statistical artefact. However, findings from the field of health in which training courses are also offered at the level ISCED 5B, limit this view somewhat. This should lead to the measured proportion of the overeducated being somewhat overestimated.

The fact that regional differences in the education and training systems may be reflected in the measured labour market opportunities is from a methodological viewpoint also important for comparative international studies and studies of nationals and non-nationals. For if some countries provide training courses at a higher education level than other countries (e.g. the nurse/carer professions at university level rather than at upper secondary level), in studies indicating differences between persons with and without a migrant background this may lead to the erroneous conclusion that non-nationals are more often employed below the level of qualification, and have lower returns from education, etc. There is also the danger that the estimation results may be distorted in international comparative studies. The problem could be countered by operationalizing educational requirements not on the basis of the highest educational achievement but on the basis of competences or skills.

The next research steps on qualification mismatch could investigate more closely the interaction between the demand and supply of UAS graduates, it being of particular interest whether the content and competences taught match the needs of the labour market.

With regard to policy, the question arises, how the economic costs which occur due to the considerable share of UAS graduates in employment below the level of qualification can be legitimized. Policy makers need to reflect whether the economy in today's world of shortage of skilled labour and scarce of financial resources can still afford the current system or if adjustments of the education system are to be pursued. Shall the UAS training programs be better aligned to the needs of the labour market? Shall the strong growth of the UAS be reduced in future? Shall policy makers take steps to enhance the quality of the UAS graduates, for example by a broader use of aptitude tests, stronger selection during the first semesters or by the incentive of higher federal subsidies if the overeducation rate is low?

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## Appendix

Table A.1: Description of variables

Table A.1: Description of variables	
<i>Key variables</i>	
Employment situation	The employment situation variable has three categories: qualification match, qualification mismatch and economic inactivity.
Qualification mismatch	The dummy variable has the value 1 if no university degree is needed for the job and at the same time the match between the job and the professional qualifications acquired in the studies is low to average (values 1 to 3 on a scale of 1 “not at all” to 5 “to a great extent”).
Income	The variable describes the natural logarithm of the contractually fixed annual gross salary for the main job (including 13th month wage) in full-time equivalents or the gross income from self-employment.
Job satisfaction	The variable describes a construct of 14 items relating to job satisfaction, which was extracted through a factor analysis.

<i>Individual characteristics</i>	
Final grade	Five dummy variables, which are formed on the basis of the quintile values of the final grades for each subject area, university of applied sciences and graduation cohort; i.e. the grades have been standardised for the 191 cells (by means of descriptive statistics).
Working while studying	Working while studying is mapped with two dummy variables. The first variable describes whether a person worked while studying (regularly or on an occasional basis) in a job which related to their studies. The second variable describes working while studying in a job not related to the study course.
Working before studying	Working before starting study is also described through two dummy variables. The first variable takes the value 1 if a person worked before starting study in a job related to the study. The second variable describes working before starting study in a job not related to the study course.
Exchange semester at another institution	The dummy variable describes whether someone has spent some time during the study course studying at a host university in Switzerland or abroad.
Gender: Female	The variable takes the value 1 if the respondent is female, otherwise 0.
Age	The age is the difference between the year in which the first-wave survey is carried out and the year of birth. In addition a quadratic term is included in the analyses.
Tertiary education of parents	The tertiary education of the parents is described with two dummy variables, one for the mother and one for the father. The variables take the value 1 if the highest completed education or training level is tertiary level 5A or 5B (including teacher training), and 0 otherwise.
Migrant background	The variable distinguishes between Swiss nationals, foreigners educated in Switzerland (Swiss admission qualification) and foreigners educated abroad (foreign admission qualification).
<i>Institutional characteristics</i>	
Subject area	The variable distinguishes 14 different subject areas.
University of applied sciences	The variable describes the seven public-sector universities of applied sciences.
Graduation year	Year of graduation for a university of applied sciences

Table A.2: Descriptive statistics of the variables (pooled sample)

	First-wave survey		Second-wave survey	
	Obs.	Mean	Obs.	Mean
Employment situation				
- qualification match	15935	0.74	5236	0.81
- qualification mismatch	15935	0.16	5236	0.13
- economically inactive	15935	0.10	5236	0.06
Earnings (log.)	12755	11.24 (0.22)	4557	11.42 (0.26)
Job satisfaction	7295	0.00 (0.95)	2608	0.00 (0.94)
Final grade				
- bottom quintile	15493	0.15	4593	0.16
- second-lowest quintile	15493	0.18	4593	0.17
- middle quintile	15493	0.33	4593	0.31
- second-highest quintile	15493	0.18	4593	0.19
- top quintile	15493	0.15	4593	0.17
Working while studying in a job related to studies	17595	0.69	5152	0.70
Working while studying in a job not related to studies	17339	0.52		
Working before studying in a job related to studies	17205	0.71	4963	0.73
Working before studying in a job not related to studies	17191	0.64		
Exchange semester at another institution	17832	0.12	5264	0.13
Gender: female	17886	0.41	5287	0.35
Age at first-wave survey	17886	28.28 (5.00)	5287	28.32 (4.95)
Mother with tertiary degree	16785	0.32	5132	0.27
Father with tertiary degree	16757	0.49	5134	0.46
Migrant background				
- Swiss nationals	17886	0.85	5287	0.88
- Foreigner educated in Switzerland	17886	0.05	5287	0.05
- Foreigner educated abroad	17886	0.10	5287	0.07

Note: For metric variables standard deviation in parentheses

Table A.3: Determinants of the employment situation five years after graduation (pooled sample)

	Qualification match	Qualification mismatch	Economically inactive
Qualification match in first-wave survey	Ref.	Ref.	Ref.
Qualification mismatch in first-wave survey	-0.230** (0.022)	0.217** (0.021)	0.013 (0.010)
Economically inactive in first-wave survey	-0.163** (0.026)	0.089** (0.021)	0.074** -0.019
Grade: middle quintile	Ref.	Ref.	Ref.
Grade: bottom quintile	-0.026 (0.021)	0.038* (0.018)	-0.012 (0.012)
Grade: second-lowest quintile	0.000 (0.019)	0.008 (0.016)	-0.009 (0.011)
Grade: second-highest quintile	0.039* (0.017)	-0.030* (0.014)	-0.009 (0.011)
Grade: top quintile	0.057** (0.018)	-0.031* (0.016)	-0.026** (0.010)
Working while studying in a job related to studies	-0.007 (0.014)	0.002 (0.012)	0.005 (0.009)
Working while studying in a job not related to studies	0.001 (0.015)	0.002 (0.013)	-0.003 (0.009)
Exchange semester at another institution	-0.015 (0.018)	0.013 (0.016)	0.002 (0.011)
Gender: female	-0.034* (0.015)	0.011 (0.013)	0.023** (0.009)
Age at first-wave survey	0.002 (0.002)	-0.002 (0.002)	0.001 (0.001)
Mother with tertiary degree	0.010 (0.015)	-0.001 (0.013)	-0.009 (0.009)
Father with tertiary degree	-0.005 (0.013)	-0.001 (0.012)	0.006 (0.008)
Swiss nationals	Ref.	Ref.	Ref.
Foreigner educated in Switzerland	-0.041 (0.030)	0.022 (0.027)	0.019 (0.019)
Foreigner educated abroad	-0.032 (0.032)	-0.014 (0.025)	0.046* (0.022)
<i>Fixed effects</i>			
Subject areas		X	
University of applied sciences		X	
Year of graduation		X	
Pseudo R <sup>2</sup> (McFadden)		0.092	
N		4053	
Notes: Multinomial logistic regression: Average marginal effects, standard error in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01.			
Category percentages: qualification match: 82.3%, qualification mismatch: 12.7%, economically inactive: 5.0%.			