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ARTICLE *in* LABOUR · SEPTEMBER 2012

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Working Paper No. 49

Earning While Learning: Labor Market Returns to Student Employment During Tertiary Education

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UNIVERSITÄT BERN

Leading House Working Paper No. 49

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February 2010

Published as: "Earning While Learning: When and How Student Employment is Beneficial." *Labour*, 26(2012)3: 313-340. By Uschi Backes-Gellner and Regula Geel.

Available at: http://dx.doi.org/10.1111/j.1467-9914.2012.00548.x

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The Swiss Leading House on Economics of Education, Firm Behavior and Training Policies is a Research Programme of the Swiss Federal Office for Professional Education and Technology (OPET).

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Earning While Learning:
Labor Market Returns to Student Employment During Tertiary Education

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Abstract

We examine how different student employment statuses during tertiary education affect short-term and medium-term labor market returns. We focus on differences between students studying full-time and students studying and working part-time, i.e., 'earning while learning'. In addition, we distinguish between student employment with and without relation to the study. Using a representative survey of Swiss graduates of tertiary education, we find significant positive labor market returns of 'earning while learning', but only for related student employment and not for unrelated student employment. The returns come in the form of lower unemployment risk, shorter job search duration, higher wage effects and greater responsibility. Therefore, student employment with a relation to the study is a complement to formal education and augments skills and knowledge.

Key Words: Student Employment, Part-time Studies, Tertiary Education

JEL Classification: I21, J31, J64

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[1] This research is partly funded by the Swiss Federal Office for Professional Education and Technology through its Leading House on Economics of Education, Firm Behaviour and Training Policies. We thank the participants in the research seminars at the University of Zurich for helpful comments and suggestions as well as Katharina Schwarzinger and Tim Hagmann for excellent research assistance. The data used in this paper from the survey on Swiss graduates of tertiary education in 2000 were collected by the Swiss Federal Statistical Office. The producers of the data do not bear any responsibility for the analysis and interpretation of the data in this paper.

1. Introduction

Not only does the highest level of education crucially determine an individual's later labor market success, but so does the educational path chosen. As a large number of previous studies have repeatedly shown, an individual's highest level of education (often measured by a standard number of years for a particular level of education) crucially determines labor market success (see Card 1999 for an overview). However, almost all of these studies have not taken into account that a certain level of education may have been reached through different paths, for example, academic vs. vocational education (Tuor/Backes-Gellner 2008, Dearden et al. 2002) or full-time vs. part-time education (see Ruhm 1997 for an overview). Instead, they have usually simply calculated returns to (full-time) education as an average premium given an individual's highest qualification level and have ignored any systematic differences depending on differences in the educational path chosen.

Therefore, in our study, we will investigate how differences in tertiary[2] educational paths systematically affect labor market returns to education. In doing so, we focus on differences between students studying full-time vs. students working part-time and studying part-time during tertiary education (thus 'earning while learning'). We investigate the later labor market outcome of a student's employment status, that is, part-time work vs. no work or part-time study vs. full-time study, respectively. We further differentiate between part-time work that is related to the study (*related student employment*) and part-time work that is not related to the study (*unrelated student employment*). To be more precise: an economic student working part-time in a bank is an example of related student employment, whereas an economic student working part-time as a waiter in a restaurant is an example of unrelated student employment. Although this differentiation is crucial, only a few studies have examined the effect of the quality of student

[2] Graduation from upper secondary education provides access to further tertiary education. Tertiary education covers a wide range of programs differentiated into tertiary-type A courses (university-level education) and tertiary-type B courses (vocationally oriented tertiary education). Overall tertiary education serves as an indicator of a country's production of advanced skills and ensures the development and maintenance of a highly educated population and labor force (OECD 2009).

employment on academic performance[3], but they ignore later labor market returns. Moreover, in our study, we are not only interested in wage effects but also in non-pecuniary returns of students' employment statuses. We thus contribute to the existing literature by considering qualitatively different types of student employment (related vs. unrelated) and various labor market outcomes. The results of our study help to show whether the combination of tertiary education and student employment is a detour or whether it is rewarded in the labor market.

The effects of working during schooling on subsequent labor market outcomes have already been investigated in the literature. However, many studies consider the effects of employment during high school (e.g., Dustmann/van Soest 2007, Ruhm 1997, Marsh 1991), and less research has been done on the effects of working during higher education, that is, at a college or university (e.g., Schrøter Joensen 2009, Häkkinen 2006, Metcalf 2003). This later work experience acquired during studies, though, is probably a more important factor determining labor market success in the subsequent career than early work experience is. However, previous studies do not use qualitative information about the relation of student employment to studies. Moreover, information about the field of study was mostly missing, which is especially important because labor market prospects after graduation vary enormously across fields of study. As a result, the question of whether there exist systematic differences in the labor market outcomes of different student employment statuses during tertiary education - including qualitative information thereof - has not been thoroughly analyzed.

Taken together, our study is innovative in several ways. First, we consider different educational paths chosen and not only differentiate the student employment status between full-time and part-time students but also differentiate students working part-time in terms of whether their employment is related to their study or not. Furthermore, we differentiate between higher academic and higher vocational education, taking into account the former curriculum of the schooling, as the returns to academic and vocational qualifications might not be the same and lead to different earning profiles over time.

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[3] McNeal (1997) shows that the job type has a significant effect on dropping out. Wenz/Yu (2009) find higher grades for students working for career-specific skills. Ehrenberg/Sherman (1987) differentiate on-campus and off-campus student employment and find that only the latter adversely affects academic achievement in parts.

Because students have to choose their educational track in an early age, our results can lead to useful implications for schooling decisions. Second, we consider different labor market outcomes; we not only investigate labor market effects shortly after graduation but also investigate the mid-career developments of graduates because it is not clear whether student employment generates only transitory advantages and improves only initial outcomes or still has longer-lasting effects in one's further career. Moreover, we go beyond short- and medium-term income effects of education and also consider further outcomes, such as the duration of job search after graduation, unemployment risk as well as an indicator of great responsibility. Third, due to a unique and detailed dataset, we are able to control for various characteristics that are not considered in previous studies. For example, we include proxies for individual intrinsic characteristics, which are often unobservable to researchers, such as ability, motivation and time preference, to reduce bias. We furthermore control for the field of study to avoid bias due to field-specific labor market characteristics.

In our empirical analysis, we use data from a representative survey on Swiss graduates of tertiary education conducted by the Swiss Federal Statistical Office. The cohort we look at graduated in the year 2000 and were surveyed a first time one year after graduation (in 2001) and a second time five years after graduation (in 2005). This panel design allows us to analyze short-term as well as medium-term labor market success of different educational paths. The survey is well suited for our analysis of different educational paths, as it contains detailed information on each graduate's student employment status (e.g., the duration of student employment and its relation to the studies), as well as on the studies, transition to the labor market, the employment one year and five years after graduation and socio-demographic variables.

In a first step, we study the *short-term labor market effects* (one year after graduation) of different student employment statuses during tertiary education. Our results show that student employment per se has significantly positive effects on short-term labor market outcomes compared to full-time studies. Moreover, we find that qualitative information about student employment is important: only related student employment generates positive labor market effects (such as lower unemployment risk, lower job search duration and higher wage effects); unrelated student employment does not.

In a second step, we analyze *medium-term labor market effects* (five years after graduation) of different student employment statuses during tertiary education. Again, student employment per se does not have any negative effects on medium-term labor market outcomes compared to full-time studies. Differentiating qualitative information, we find that related student employment has significantly positive effects on medium-term labor market outcomes (such as lower unemployment risk, higher wage effects and greater responsibility) compared to full-time studies. Therefore, student employment does not turn out to be a detour. However, only related student employment can be seen as a complement to the formal education and augments skills and knowledge, whereas unrelated student employment does not.

The remainder of this paper is structured as follows. Section 2 derives testable hypotheses regarding the labor market effects of different student employment statuses. Section 3 explains our estimation methods, and Section 4 introduces the data set. Section 5 presents our empirical results, and Section 6 concludes.

2. Theoretical framework

Regarding the effects of student employment ('earning while learning'), we can derive implications based on standard human capital theory (Becker 1964). Likewise, we assume that all types of experience, skills or knowledge increase productivity. Therefore, on the one hand, additional labor market experience while studying can lead to additional returns on the labor market compared to full-time studies. As a result, we expect student employment to have a positive effect on returns to education, as student employment is in this sense a complement to the education received, augmenting skills and knowledge and increasing future productivity. We thus derive our first empirical testable hypothesis:

H1a: Student employment has positive labor market effects.

On the other hand, we can derive implications based on a learning perspective: because students have to trade study time in for working time within a given time budget, we can assume that student employment effectively prevents students from acquiring human capital during their educational years and thus leads to less augmentation of skills

and knowledge. This means that student employment could interfere with learning and academic performance if it crowds out study time and thus detracts from potentially more productive educational investments. This leads us to the following hypothesis:

H1b: Student employment has negative labor market effects.

In our paper, we argue, moreover, that these effects depend on whether or not student employment is related to the study: For related student employment, we expect the negative effects stemming from time-use trade-offs to be rather small and the positive effects stemming from complementarities to be rather large. However, for unrelated student employment, we expect the negative effects from time-use trade-offs to be larger and the positive effects from complementarities to be smaller. Taken together, we anticipate differences in returns to qualitatively different types of student employment depending on the relation between student employment and studies. As a result, we would expect that working as a waiter while studying economics has different returns to education than working at a bank. Therefore, we derive our last empirical testable hypothesis:

H2: Related student employment has larger positive (or smaller negative) labor market effects than unrelated student employment.

In addition to human capital theory, signaling theory (Spence 1973) can also be applied to analyze the effects of student employment. With the student employment status as an observable characteristic, students can signal their ability to potential employers. Those can use this signal to sort workers according to their unobserved abilities and thus screen them (Stiglitz 1975), as hiring is an investment decision under uncertainty. However, a signal is only valid if the costs of signaling are negatively correlated with the productive capability. Student employment therefore signals higher ability if the more able students choose to work besides study because they can cope more easily with the dual burden of studying and working simultaneously than less able students. Signaling theory thus also supports our first hypothesis H1a, predicting positive labor market effects of student employment. In this theoretical perspective, however, student employment does not necessarily augment skills and knowledge as in human capital theory, but student employment signals high ability, as only students with high ability can afford to work in addition to studying.

As a result, not only the highest level of education, but also various combinations of educational paths matter for later labor market outcomes.

3. Estimation methods

To test the effects of different student employment statuses on various labor market outcomes, we have to account for potential biases. Simply looking at returns to student employment without correcting for possible selection would yield biased estimates, as it is not random who works and who does not work while studying. On the one hand, students' observable characteristics influence their decision to work and study. On the other hand, intrinsic (and for the researcher mostly unobservable) characteristics, such as ability, motivation and time preference, also influence this decision. If these intrinsic characteristics systematically affect the work-study decision, the estimates would be biased. Therefore, we have to adequately control for the decision to work and study including observable as well as intrinsic characteristics. Otherwise, the estimated effects might merely reflect the persistent role of preexisting differences that influence both the likelihood of working during tertiary education and later success in the labor market (Stern et al. 1990a). In our methodological approach, we correct for these biases using a full set of controls.

The basic equation we estimate to test the effects of different educational paths on various labor market outcomes (hypothesis H1a and H1b), our first specification, can be written as

$$y = \alpha + \beta StE + \delta X + \varepsilon, \tag{1}$$

where y stands for various labor market outcomes such as earnings as well as unemployment, duration of job search and a measure for great responsibility. *StE* is a continuous variable representing student employment in years, therefore, β is the influence of an additional year of student employment on the outcome variable. The reference group in our analysis is thus composed of full-time students. Additionally, we include *X*, a vector of control variables containing socio-demographic factors, various characteristics regarding a graduate's study, individual intrinsic characteristics (e.g.,

proxies for ability, motivation and time preference), employment characteristics and labor market controls. ε represents an unobservable error.

To test our second hypothesis (H2), we extend our basic equation with qualitative information and thus differentiate between related and unrelated student employment in our second specification:

$$y = \alpha + \beta_1 StEw + \beta_2 StEwo + \delta X + \varepsilon . \quad (2)$$

StEw is a continuous variable representing student employment *with* a relation to studies in years; therefore, β_1 is the influence of an additional year of related student employment on the outcome variable. Similarly, *StEwo* is a continuous variable representing student employment *without* a relation to studies in years. Therefore, β_2 is the effect of an additional year of unrelated student employment on the outcome variable.

We estimate probit regressions (Wooldridge 2009: 575-578) in case of unemployment risk and responsibility. The earnings equation is basically an extended Mincer (1974) earnings equation specified as an OLS regression. As the duration of one's job search is a corner-solution problem, we use a tobit model (Wooldridge 2009: 587-595) in this case.

4. Data and variable construction

In our empirical analysis, we use data from a representative survey on Swiss graduates of tertiary education (type A[4]) conducted by the Swiss Federal Statistical Office. The cohort we look at graduated in the year 2000 and was surveyed a first time one year after graduation (in 2001) and a second time five years after graduation (in 2005). This panel design allows us to analyze short-term as well as medium-term labor market success of different educational paths. The survey is well suited for our analysis of student employment because it contains detailed and unique information on each graduate's

[4] Tertiary-type A programs are largely theory-based and are designed to provide qualifications for entry into professions with high skill requirements and advanced research programs compared to tertiary-type B programmes, which are classified as being at the same competency level but are more occupationally oriented and usually of shorter duration (OECD 2009).

student employment status (e.g., the duration of student employment and the relation to the study), studies (e.g., university, field of study, duration of study and final grade), transition to the labor market and employment one year and five years after graduation (e.g., earnings, level of employment and leadership function). In addition, individual socio-demographic variables, such as gender, age, marital status, presence of children and area of residence, are recorded.

For our analysis, we exclude all individuals who reported being self-employed and those being 65 years or older (the official retirement age) either one year or five years after graduation. After eliminating observations with missing data, a sample of 2,082 individuals is included in our first analysis of unemployment risk. As the further equation estimates are conditional on working, graduates who are unemployed at the time of the surveys - either one year or five years after graduation - are excluded from the further analysis, leading to a smaller sample. Descriptive statistics of all variables used in our analysis are given in Table A.1 in the Appendix for our full sample of employed graduates.

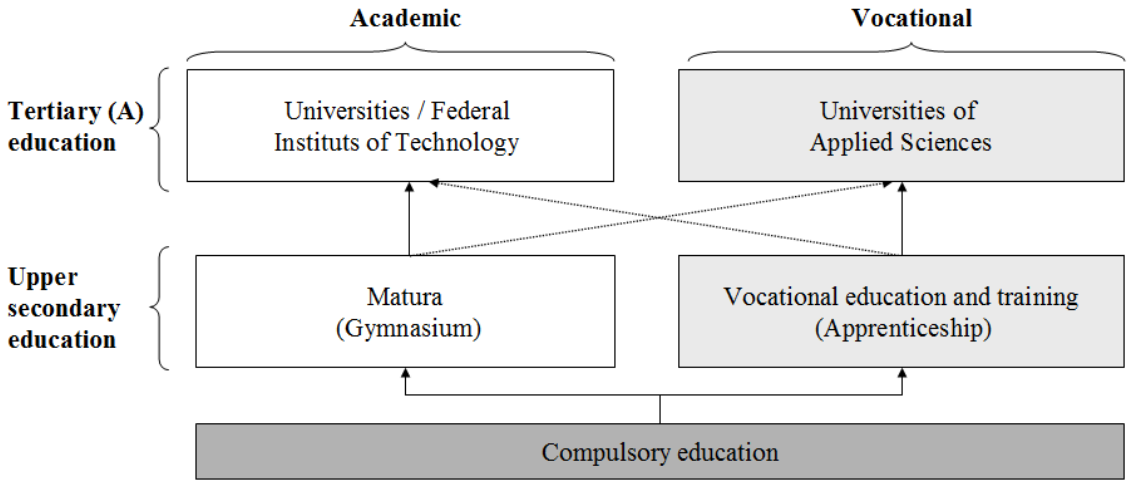
Swiss educational system

As in many countries, the educational system in Switzerland consists of parallel branches of vocational and academic (school or college) education. Having completed nine years of compulsory school, two-thirds of a youth cohort choose to pursue vocational education and training at the secondary education level (OPET 2009), mostly within the so-called dual system of apprenticeship training. After training, apart from working as skilled workers within their occupational field, apprenticeship graduates also have the option to continue their education at the tertiary education level and attend a university of applied sciences on the *vocational educational path* (cf. Figure 1, which gives a simplified diagram of the particular part of the Swiss educational system we look at in our study[5]). Another option for youths after compulsory education is staying in the school system by attending Gymnasium at the secondary education level and ob-

[5] A detailed description of the educational system in Switzerland can be found in Weber et al. (2001: 285-287).

taining a Matura. This certificate grants access to tertiary academic education, that is, to all universities at the tertiary education level (*academic educational path)*. Switching sides within the educational system, thereby combining academic and vocational education, is possible, but partly only after acquiring further qualifications.

Figure 1: Simplified diagram of the Swiss educational system



Explanatory variables

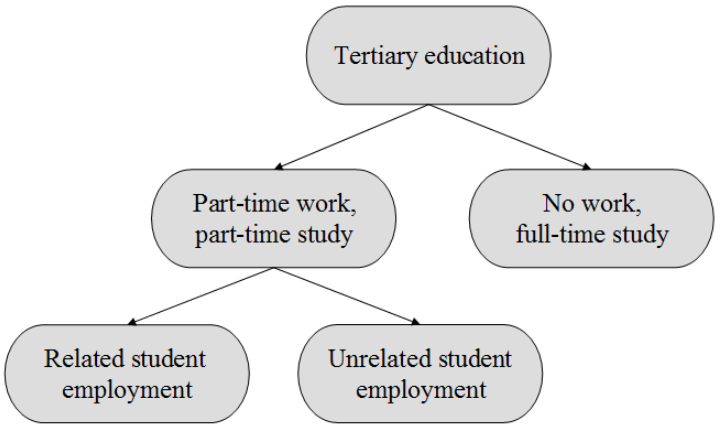
Yearly student employment

Depending on the course program, students are able to choose studying *full-time* without working or studying *part-time* and working part-time. The studies offered at universities of applied science (vocational tertiary education) are mostly either full-time three-year courses or four-year courses if the student only studies part-time (Bonassi/Wolter 2002). University studies (academic tertiary education) are regarded as full-time studies; that is, technically, no part-time studies at university exist. Nonetheless, it is possible to combine work and studies, as no strict limits on the duration of studies are imposed. In our paper, we therefore define university students who are employed in addition to studying as part-time working and part-time studying.

Furthermore, the quality of student employment can differ, in the sense that student employment can be *related* or *unrelated* to the studies. This qualitative information has typically been unavailable to previous researchers, although its importance has already

been pointed out (Stone/Mortimer 1998, Stern et al. 1990b). Because we know the number of months a student worked, we can compute years of student employment for three different variables, namely student employment per se, related and unrelated student employment. As a result, we can distinguish between several different educational paths, as can be seen in Figure 2.

Figure 2: Types of educational paths



Dependent variables

Unemployment in 2001 and 2005

In the surveys one year and five years after graduation, the graduates had to declare their employment status. We generate two dummy variables for the respective years indicating unemployment (1 if unemployed in the respective year 2001 or 2005, 0 otherwise).

Yearly income in 2001 and 2005

The survey contains self-reported annual gross earnings in 2001, one year after graduation. In the second interview in 2005, five years after graduation, the graduates had to report their actual monthly gross earnings. To get comparable annual gross earnings, we

multiply the monthly earnings by a factor of thirteen. We use the logarithm of yearly wages in the first and fifth years after graduation, respectively, as dependent variables[6].

On average, graduates earned about CHF 71,555 one year after graduation, whereas full-time students (CHF 69,120) earned significantly less than part-time students (CHF 72,288). Five years after graduation, graduates earned on average CHF 93,872, whereas the significant difference between full-time (CHF 90,534) and part-time students (CHF 94,877) still exists.

Duration of job search

The graduates had to indicate how many months their job search after graduation lasted. We thus generate a continuous variable indicating the months a graduate was looking for his first employment after studies. This variable can take the value of 0 (if an employment is found already during the studies) and thus presents a corner-solution problem. On average, graduates had to look 2.6 months for their first job after graduation. Five percent had already found a job during their studies, thus registering 0 months spent on job search.

Measure of great responsibility

Graduates had to report how much responsibility for their own tasks they have in their employment five years after graduation. We generate a dummy indicating great responsibility with the value equaling 1 if the graduate responded "great" or "very great responsibility" and 0 otherwise.

Control variables

We use a full set of controls and include socio-demographic factors, various characteristics regarding the graduate's study, individual intrinsic characteristics (e.g., proxies for

[6] We use the information at the level of employment to calculate the corresponding full-time salaries of part-time workers. Furthermore, we drop observations with earnings above the 99th percentile or below the 1st percentile for each year so that the results are not determined by outliers.

ability, motivation and time preference), employment variables and labor market controls. We explain some of these controls in greater detail in the following paragraphs.

Controls regarding the graduate's study

First, we include the type of university attended as a control regarding the graduate's study. Because the skills acquired in different schools vary in terms of the level of specialization and diversification, the labor market outcome depends on the type of education, namely, on vocational or academic education (Tuor/Backes-Gellner 2008; Dearden et al. 2002). We expect both types to have additional returns on the labor market because they all increase productivity in various ways, but we do not expect these additional returns to have the same magnitude. Therefore, we include a dummy that equals 1 in case of studies at a university of applied sciences, that is, tertiary vocational education, and 0 otherwise.

Second, we control for the field of study to avoid that the returns to student employment are driven by field-specific labor market characteristics rather than real returns (Häkkinen 2006, Livanos/Pouliakas 2009). We differentiate between five study fields, namely, business and economics, social sciences, natural sciences, technical sciences and other subjects (5 dummies).

Third, we include the final grade achieved, as academic achievement has an effect on later labor market outcomes (Schweri 2004). The graduates had to report the final grade of their studies as well as the corresponding scale. We use the following formula (Schweri 2004: 12) to standardize the grades knowing the final grade (g_i), the maximum achievable grade (g_{max}) and the minimum passing grade (g_{pass}):

$$grade = \frac{g_i - g_{pass}}{g_{\max} - g_{pass}}. \qquad (3)$$

Due to this transformation, the standardized grades now range from 0 to 1, where 0 corresponds to the minimum passing grade, and 1 corresponds to the maximum achievable grade on the respective scales.

Fourth, we control for the duration of the studies (in numbers of semesters) because different fields of study, types of university and student employment statuses are likely

to affect the time-to-degree. The coefficient of student employment can than be interpreted as the return to work experience, given that the time-to-degree is unaffected by working. Usually, tertiary vocational education is associated with a lower full-time equivalent of study than tertiary academic education.

Moreover, we control for having spent time abroad during or after studies (a dummy for each).

Individual intrinsic characteristics

Our approach to diminish the selection bias in the work-study decision is to include proxy variables (Wooldridge 2009: 306-310) for individual intrinsic and otherwise mostly unobserved characteristics to avoid biased returns to the student employment status (following Light 2001, Blackburn/Neumark 1993, Stern et al. 1990a).

First, we choose the grade at the secondary education level (SEL-grade) as a proxy for unobserved ability, which possibly affects both the work-study decision and later labor market success. Callender (2008) particularly stresses the importance of controlling for prior educational attainment. Similarly, other studies use test scores as proxies to control for unobserved characteristics (e.g., Hotz et al. 2002 and Ruhm 1997: Armed Forces Qualifying Test (AFQT) scores; Light (2001) and Blackburn/Neumark 1993: Armed Services Vocational Aptitude Battery (ASVAB) test scores). As the more able students choose to work in addition to studying, being able to more easily cope with the dual burden of studying and working simultaneously, simple estimates of student employment are biased upwards, as the positive effect largely comes from the ability standing behind the decision to work. Therefore, we use the grade at the secondary educational level as a proxy and standardize it in the same way as the final grade, which has previously been described.

Second, we include a proxy variable for underlying motivation and thus choose a variable indicating the importance of a new challenge as a desire for personal achievement. Motivation may affect a student's decision to work during study as well as his later labor market success (Wenz/Yu 2009). As the more motivated students choose to work in addition to studying to gain additional work experience, simple OLS estimates of student employment may again be biased upwards. The variable indicating the importance

of a new challenge is measured on a five-point scale. It takes the value of 1 if a new challenge is not at all important and a value of 5 if it is very important. As a result, a higher value of this variable indicates the greater importance of a new challenge or the greater motivation of the individual.

Third, as a proxy variable for individual time preference, we choose a variable indicating whether the student still lived at home with his parents during studies (dummy: 1 if living at home, 0 otherwise). The housing situation can indicate the necessity of having to work for a living, as Metcalf (2003) shows a link between financial pressure and part-time employment. Students may be credit constrained and depend on the extra income. Therefore, financial needs can drive students into part-time employment as they are more likely to work, the greater their consumption.

In addition to a proxy for ability, we therefore include motivation and time preference into our estimations. With the inclusion of our three proxy variables, covering individual intrinsic (and otherwise often unobservable) characteristics, we think we are able to produce more reliable estimates.

Table 1 compares some characteristics of full-time and part-time students of our sample. Because part-time students obviously differ from full-time students (part-time students are, for example, less likely to live at home during studies, are older at graduation and choose the academic path rather than the vocational educational path), we have to take into account these preexisting differences when estimating the labor market effects of student employment (Schönhals et al. 1998).

Table 1: Comparison of characteristics of full-time vs. part-time students

Variable	Full-time students		Part-time students		Mean comparison test
	Mean	Std. Dev.	Mean	Std. Dev.	
Annual wage 2001 (CHF)	69120.52	18566.39	72288.30	19093.52	***
Annual wage 2005 (CHF)	90533.85	17243.30	94876.82	18108.22	***
Job search after graduation (in months)	2.45	2.58	2.62	2.62	
Proxy: Ability (grade on secondary education level)	0.47	0.20	0.45	0.20	
Proxy: Motivation (importance of a new challenge)	4.16	0.76	4.16	0.75	
Proxy: Time preference (living with parents during study)	0.44	0.50	0.26	0.44	***
Male	0.75	0.43	0.59	0.49	***
Age at graduation	26.46	3.89	27.03	3.51	***
Parents with higher education	0.52	0.50	0.53	0.50	
University of applied science (tertiary vocational education)	0.43	0.50	0.20	0.40	***
Business/Economics	0.12	0.32	0.19	0.39	***
Social sciences	0.13	0.34	0.26	0.44	***
Natural sciences	0.13	0.33	0.11	0.32	
Technical sciences	0.40	0.49	0.20	0.40	***
Other subjects	0.22	0.41	0.24	0.43	
Duration of study (in terms)	9.24	3.60	10.94	3.78	***
Final grade	0.51	0.19	0.54	0.20	***
Stay abroad during study	0.21	0.41	0.32	0.47	***
Employee with managerial function 2001	0.10	0.29	0.13	0.34	**
Employee with managerial function 2005	0.39	0.49	0.39	0.49	

Notes: * significant at 10%, ** significant at 5%, *** significant at 1%

Source: Swiss Graduate Study 2000; own calculations.

5. Empirical results

We now discuss the key results concerning the labor market effects of different student employment statuses during tertiary education and use various labor market outcomes to test our hypotheses. The first specifications in each case contain student employment per se (H1a and H1b) according to equation (1), whereas in the second specifications we differentiate between related and unrelated student employment (H2) according to equation (2), thus including qualitative information about student employment.

Short-term labor market effects

In a first step, we study the *short-term labor market effects* (one year after graduation). Estimation results with robust standard errors are provided in Table 2.

Table 2: Short-term labor market effects of student employment

	(A) Unemployed 2001 (dummy) *Probit*				(B) Job search (in months) *Tobit*				(C) Wage 2001 (ln) *OLS*			
	(1) dF/dx	Std.Err	*(2)* dF/dx	Std.Err	*(1)* dy/dx	Std.Err	*(2)* dy/dx	Std.Err	*(1)* Coef.	Std.Err	*(2)* Coef.	Std.Err
(1) Student employment (Y)	**-0.004**	**0.002** *			**-0.026**	**0.034**			**0.010**	**0.004** **		
(2) Related student employment (Y)			**-0.007**	**0.004** *			**-0.102**	**0.049** **			**0.024**	**0.005** ***
(2) Unrelated student employment (Y)			**-0.003**	**0.003**			**0.025**	**0.042**			**0.000**	**0.005**
Proxy: Ability (grade on secondary education level)	-0.007	0.024	-0.007	0.024	-0.040	0.346	-0.046	0.345	0.096	0.039 **	0.097	0.039 **
Proxy: Motivation (importance of a new challenge)	-0.005	0.006	-0.005	0.006	-0.151	0.087 *	-0.145	0.087 *	0.003	0.010	0.002	0.009
Proxy: Time preference (living with parents during study)	-0.001	0.011	-0.002	0.011	-0.194	0.155	-0.213	0.155	0.026	0.017	0.029	0.017 *
Male	0.029	0.010 ***	0.029	0.010 ***	0.071	0.153	0.066	0.153	0.068	0.019 ***	0.069	0.019 ***
Age	-0.002	0.009	-0.001	0.009	-0.505	0.176 ***	-0.493	0.176 ***	0.047	0.019 **	0.045	0.019 **
Age^2	0.000	0.000	0.000	0.000	0.009	0.003 ***	0.008	0.003 ***	-0.001	0.000 *	-0.001	0.000 *
Children	-0.023	0.013	-0.023	0.013	-0.222	0.299	-0.218	0.299	0.008	0.033	0.007	0.033
Swiss nationality	0.020	0.015	0.020	0.015	-0.131	0.262	-0.121	0.262	-0.045	0.024 *	-0.047	0.025 *
Parents with higher education	0.008	0.010	0.007	0.010	-0.093	0.135	-0.096	0.135	-0.014	0.015	-0.014	0.015
University of applied science (tertiary vocational education)	0.013	0.018	0.013	0.018	-0.019	0.225	0.011	0.225	0.078	0.021 ***	0.072	0.021 ***
Business/Economics	0.042	0.022 **	0.044	0.023 **	-0.213	0.214	-0.184	0.214	0.105	0.016 ***	0.100	0.016 ***
Social sciences	0.084	0.028 ***	0.083	0.028 ***	0.688	0.247 ***	0.659	0.247 ***	-0.117	0.026 ***	-0.110	0.026 ***
Natural sciences	0.010	0.022	0.009	0.022	0.227	0.254	0.203	0.254	-0.073	0.026 ***	-0.068	0.026 ***
Other subjects	0.007	0.019	0.007	0.019	-0.024	0.223	-0.024	0.222	-0.185	0.029 ***	-0.184	0.029 ***
Duration of study (terms)	0.002	0.002	0.001	0.002	0.072	0.029 **	0.072	0.029 **	0.010	0.003 ***	0.010	0.003 ***
Final grade	-0.031	0.026	-0.029	0.026	0.151	0.366	0.205	0.367	0.105	0.040 ***	0.095	0.040 **
Stay abroad during study	-0.004	0.010	-0.004	0.010	0.147	0.151	0.148	0.151	0.046	0.017 ***	0.046	0.017 ***
Stay abroad after study	0.029	0.012 ***	0.029	0.012 ***	0.008	0.156	0.015	0.156	0.022	0.016	0.021	0.016
Employee with managerial function									0.125	0.016 ***	0.125	0.016 ***
Civil service									-0.028	0.020	-0.031	0.020
Local unemployment rate in 2001	0.009	0.006	0.009	0.006	0.287	0.093 ***	0.290	0.093 ***	-0.034	0.012 ***	-0.034	0.012 ***
Constant									10.065	0.314 ***	10.114	0.310 ***
Observations	2082		2082		1634		1634		1634		1634	
Pseudo R^2 / R^2	0.05		0.05		0.01		0.01		0.22		0.23	
Prob > Chi^2 / F	0.0007		0.0006		0.0000		0.0000		0.0000		0.0000	

Notes: * significant at 10%, ** significant at 5%, *** significant at 1%; robust standard errors; probit and tobit coefficients represent marginal effects.

Source: Swiss Graduate Study 2000; own calculations.

In model A, we analyze the short-term unemployment risk and estimate a probit model with the dependent variable of being unemployed one year after graduation. In our first specification, we find a negative impact of student employment on the probability of being unemployed one year after graduation compared to having been a full-time student. This finding supports hypothesis H1a, where we expect positive labor market effects of student employment. However, in our second specification, we are interested in qualitative information about student employment and thus differentiate it into related and unrelated student employment to test hypothesis H2. We find an even larger negative impact of related student employment on unemployment risk, whereas unrelated student employment does not have a significant effect. As a result, students working part-time with a relation to their studies have a significantly lower short-term risk of being unemployed compared to both full-time students and even students working part-time without a relation to their studies.

In the following models, we condition on working and have to exclude unemployed individuals from the analysis, thus reducing the sample. In model B, we analyze the effects of different student employment statuses on the job search duration after graduation. According to specification 1, student employment does not have any significantly different effects on job search duration compared to full-time studies. Nonetheless, including information about the quality of student employment, we find a significant negative impact on the job search duration in the case of related student employment but we find no significant effect of unrelated student employment compared to full-time studies. Therefore, in line with hypothesis H2, related student employment significantly decreases the duration of the job search after graduation.

In model C, we analyze short-term effects on income and find a positive impact of student employment per se. Therefore, students working part-time can expect higher wages than full-time students can. Again, we differentiate the quality of student employment. The second specification shows that only related student employment generates such positive effects compared to unrelated student employment or full-time studies. These results also confirm hypotheses H1a and H2.

In summary, our results support hypotheses H1a and H2, whereas H1b cannot be confirmed. We find that student employment per se has some significant positive effects on short-term labor market outcomes compared to full-time studies. However, the evidence indicates that the quality of student employment is important, as related student employment has significantly positive effects, whereas unrelated student employment does not. More precisely, students who have worked part-time with a relation to their studies have a significantly lower unemployment risk, shorter job search duration and higher wage effects. Contrarily, unrelated student employment does not have any significantly different labor market effects compared to full-time studies and thus does not generate positive effects as related student employment does.

Medium-term labor market effects

In a second step, we analyze *medium-term labor market effects* (five years after graduation). Estimation results with robust standard errors are provided in Table 3.

We start with the medium-term unemployment risk (model D) and find a negative impact of student employment on the probability of being unemployed five years after graduation compared to being full-time student. These findings support hypothesis H1a. Including qualitative information in the second specification, we find an even larger negative impact of related student employment on the unemployment risk compared to unrelated student employment. As a result, students working part-time have a significantly lower medium-term risk of being unemployed compared to full-time students, whereas related student employment has even larger effects than unrelated student employment.

In the following models, we again exclude unemployed individuals from the analysis, as we condition on working and thus reduce the sample. In model E, we analyze the medium-term effects on income. With our first specification, we find a positive impact of student employment on wages. Again, the second specification shows that only related student employment generates these positive effects compared to unrelated student employment or full-time studies.

Table 3: Medium-term labor market effects of student employment

	(D) Unemployed 2005 (dummy) *Probit*				(E) Wage 2005 (ln) *OLS*				(F) Responsibility for own tasks (Dummy: 1=high) *Probit*			
	(1)		*(2)*		*(1)*		*(2)*		*(1)*		*(2)*	
	dF/dx	Std.Err	dF/dx	Std.Err	Coef.	Std.Err	Coef.	Std.Err	dF/dx	Std.Err	dF/dx	Std.Err
(1) Student employment (Y)	**-0.011**	**0.003** ***			**0.011**	**0.002** ***			**0.005**	**0.006**		
(2) Related student employment (Y)			**-0.013**	**0.004** ***			**0.020**	**0.003** ***			**0.019**	**0.009** **
(2) Unrelated student employment (Y)			**-0.009**	**0.003** ***			**0.004**	**0.003**			**-0.004**	**0.008**
Proxy: Ability (grade on secondary education level)	-0.054	0.027 **	-0.054	0.027 **	0.048	0.023 **	0.049	0.023 **	-0.021	0.062	-0.021	0.062
Proxy: Motivation (importance of a new challenge)	-0.007	0.006	-0.007	0.006	0.013	0.006 **	0.012	0.006 **	0.030	0.015 *	0.028	0.015 *
Proxy: Time preference (living with parents during study)	0.003	0.012	0.003	0.012	0.020	0.010 **	0.022	0.010 **	-0.023	0.028	-0.020	0.028
Male	-0.018	0.012	-0.018	0.012	0.032	0.011 ***	0.033	0.011 ***	-0.046	0.027 *	-0.046	0.027 *
Age	0.005	0.013	0.006	0.013	0.039	0.012 ***	0.038	0.012 ***	0.025	0.034	0.023	0.034
Age^2	0.000	0.000	0.000	0.000	0.000	0.000 **	0.000	0.000 **	0.000	0.000	0.000	0.000
Children	0.052	0.016 ***	0.052	0.016 ***	0.034	0.011 ***	0.034	0.011 ***	0.053	0.030 *	0.053	0.030 *
Swiss nationality	-0.043	0.026 *	-0.043	0.026 *	0.011	0.019	0.009	0.019	0.031	0.048	0.030	0.048
Parents with higher education	0.004	0.010	0.005	0.010	-0.001	0.009	-0.001	0.009	0.019	0.024	0.019	0.024
University of applied science (tertiary vocational education)	0.002	0.019	0.002	0.019	-0.078	0.014 ***	-0.082	0.014 ***	-0.064	0.042	-0.070	0.042 *
Business/Economics	-0.038	0.013 **	-0.037	0.014 **	0.113	0.013 ***	0.109	0.013 ***	0.001	0.038	-0.004	0.039
Social sciences	0.001	0.019	0.000	0.019	-0.024	0.017	-0.020	0.017	0.133	0.041 ***	0.138	0.041 ***
Natural sciences	0.047	0.027 **	0.046	0.026 **	-0.016	0.017	-0.013	0.017	0.072	0.042	0.076	0.042 *
Other subjects	0.025	0.020	0.025	0.020	0.060	0.016 ***	0.061	0.016 ***	-0.082	0.043 **	-0.082	0.043 **
Duration of study (terms)	0.002	0.002	0.002	0.002	-0.004	0.002 **	-0.004	0.002 **	-0.014	0.005 ***	-0.015	0.005 ***
Final grade	-0.056	0.027 **	-0.054	0.027 **	0.040	0.024 *	0.034	0.024	0.024	0.065	0.015	0.065
Stay abroad during study	0.005	0.012	0.006	0.012	-0.002	0.010	-0.002	0.010	-0.006	0.027	-0.006	0.027
Stay abroad after study	0.017	0.013	0.017	0.013	0.011	0.010	0.009	0.010	0.024	0.028	0.022	0.028
Employee with managerial function					0.068	0.009 ***	0.069	0.009 ***	0.189	0.024 ***	0.190	0.024 ***
Civil service					-0.033	0.010 ***	-0.034	0.010 ***	-0.001	0.027	-0.002	0.027
Local unemployment rate in 2005	0.005	0.004	0.005	0.004	-0.008	0.004 *	-0.008	0.004 *	0.005	0.010	0.005	0.010
Constant					10.462	0.225 ***	10.496	0.222 ***				
Observations	2082		2082		1634		1634		1634		1634	
Pseudo R^2 / R^2	0.07		0.07		0.22		0.22		0.06		0.07	
Prob > Chi^2 / F	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	

Notes: * significant at 10%, ** significant at 5%, *** significant at 1%; robust standard errors; probit coefficients represent marginal effects.

Source: Swiss Graduate Study 2000; own calculations.

In our last model (model F), we analyze the effects on the responsibility of graduates in their employment five years after graduation. According to specification 1, student employment does not have any significantly different effects on responsibility compared to full-time studies. Nonetheless, differentiating the quality of student employment, we find a significant positive impact on responsibility in the case of related student employment, whereas unrelated student employment does not generate any significantly different effects compared to full-time studies.

To summarize, we again find some significant positive effects of student employment per se on medium-term labor market outcomes compared to full-time studies. Our results thus also support hypothesis H1a in the medium-term. As a result, related student employment has significantly positive effects on medium-term labor market outcomes compared to unrelated student employment or full-time studies, supporting hypothesis H2. To be more specific, students who have worked part-time with a relation to the studies have a significantly lower unemployment risk, higher wage effects and greater responsibility in their subsequent employment. Again, unrelated student employment has almost the same effects as full-time studies and thus does not cause the same positive labor market effects, as related student employment does.

Robustness check: Academic performance

Previous research has not reached a consensus on whether student employment improves academic performance (e.g., Garasky 1996; Schrøter Joensen 2009 and Lillydahl 1990 for working not too intensively), worsens it (e.g., DeSimone 2008, Callender 2008, Dustmann et al. 1996) or has no impact at all (Dustmann/van Soest 2007; Warren/LePore/Mare 2000, Schönhals et al. 1998). However, we find a positive effect of student employment on *final grades* (see Table A.2 in the Appendix). Within this, related student employment has an even more positive effect on grades, whereas unrelated student employment has no effect at all. This also indicates that complementarities be-

tween study and related student employment exist with a positive effect on academic performance[7] and that qualitative information about student employment is crucial.

Furthermore, we have to consider that our analysis is restricted to individuals *graduating* from tertiary education. If, on the one hand, student employment lowers the probability of graduating, that is, leads to a higher drop-out probability (Marsh 1991, Ehrenberg/Sherman 1987), the effects are lower than estimated in our models. The observed positive labor market returns could therefore be partially offset by an incompletely accounted-for negative effect of student employment on educational attainment. On the other hand, if student employment increases the probability of graduating (Garasky 1996, Steel 1991), the labor market returns to student employment are even higher. Unfortunately, we cannot analyze this relationship using our data. However, as we found a positive relationship between academic achievement and student employment - particularly related student employment – we also assume an increasing probability of graduating. Notably, the type of student employment has a significant effect on dropping out, depending on job characteristics (McNeal 1997).

6. Conclusions

In our study, we investigate how different student employment statuses during tertiary education systematically affect short-term and medium-term labor market returns. We focus on differences between students studying full-time and students studying and working part-time, that is, 'earning while learning'. In addition, we include qualitative information and distinguish between student employment with and without a relation to one's studies.

Our results show that student employment during tertiary education is an investment in job skills, knowledge, and experience that generates higher labor market outcomes after graduation. We find significant positive labor market effects of student employment

[7] Wenz/Yu (2009) report similar results in their analysis of term-time employment on grades, finding higher grades for students who reported to work for career-specific skills (i.e., work as a complement to schooling) than for students seeking general work experience (i.e., work as a substitute for schooling).

compared to full-time studies. Moreover, we find that qualitative information about student employment is important: only related student employment generates positive labor market outcomes. These consist of a lower unemployment risk, a shorter job search duration, higher wage effects and greater responsibility. In contrast, unrelated student employment does not bring about these positive effects. Therefore, the combination of tertiary education and student employment does not turn out to be a detour, but rather is rewarded in the labor market. Student employment is an investment in skills that generates higher labor market outcomes after graduation compared to full-time studying; but only if the student employment is related to the studies. As a result, related student employment can be seen as complement to the formal education and augments skills and knowledge.

For future research, our results imply that not only the highest level of education but also various combinations of educational paths should be analyzed more in-depth because they substantially matter for labor market outcomes, particularly in an international comparison, where 'earning while learning' may take very different patterns. This is also important because in many countries, scholars have to make their first educational decisions at an early age, which they may later want or need to adjust. Consequently, this is a fundamental policy issue for countries with early educational tracking, as students and policy-makers have to know the labor market value of different educational paths. As a result, if they are to make sensible decisions about different paths of educational investment, they need to know not only the simple average return to a year of (full-time) education, but also the return to various combinations of educational paths.

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Appendix

Table A.1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Student employment (in years)	1.99	2.26	0	16
Related student employment (in years)	0.96	1.44	0	10
Unrelated student employment (in years)	1.04	1.73	0	9
Annual wage 2001 (CHF)	71555.48	19014.25	18000	120000
Annual wage 2005 (CHF)	93872.14	18000.11	42900	152100
Job search after graduation (in months)	2.58	2.61	0	24
High responsibility for own tasks	0.68	0.47	0	1
Proxy: Ability (grade on secondary education level)	0.45	0.20	0	1
Proxy: Motivation (importance of a new challenge)	4.16	0.75	1	5
Proxy: Time preference (living with parents during study)	0.30	0.46	0	1
Male	0.63	0.48	0	1
Age at graduation	26.9	3.6	21	49
Children in 2001	0.06	0.24	0	1
Children in 2005	0.19	0.40	0	1
Swiss nationality	0.93	0.25	0	1
Parents with higher education	0.53	0.50	0	1
University of applied science (tertiary vocational education)	0.25	0.44	0	1
Business/Economics	0.17	0.38	0	1
Social sciences	0.23	0.42	0	1
Natural sciences	0.12	0.32	0	1
Technical sciences	0.24	0.43	0	1
Other subjects	0.23	0.42	0	1
Duration of study (in terms)	10.54	3.81	4	30
Final grade	0.53	0.20	0	1
Stay abroad during study	0.30	0.46	0	1
Stay abroad after study	0.25	0.43	0	1
Employee with managerial function 2001	0.12	0.33	0	1
Employee with managerial function 2005	0.39	0.49	0	1
Civil service 2001	0.35	0.48	0	1
Civil service 2005	0.40	0.49	0	1
Local unemployment rate during study	3.48	1.07	1.40	5.70
Local unemployment rate 2001	1.80	0.78	0.30	4.00
Local unemployment rate 2005	3.96	1.26	1.30	7.40

Observations: 1634

Source: Swiss Graduate Study 2000; own calculations.

Table A.2: Effects of student employment on final grades

	Final grade								
	Control for student employment *OLS*			Control for student employment (related/unrelated) *OLS*			No control for student employment *OLS*		
	Coef.	Std.Err.		Coef.	Std.Err.		Coef.	Std.Err.	
(1) Student employment (Y)	**0.004**	**0.002**	*						
(2) Related student employment (Y)				**0.012**	**0.003**	***			
(2) Unrelated student employment (Y)				**-0.001**	**0.003**				
Proxy: Ability (grade on secondary education level)	0.308	0.020	***	0.305	0.020	***	0.308	0.020	***
Proxy: Motivation (importance of a new challenge)	-0.003	0.005		-0.003	0.005		-0.003	0.005	
Proxy: Time preference (living with parents during study)	-0.012	0.009		-0.010	0.009		-0.013	0.009	
Male	-0.005	0.009		-0.005	0.009		-0.006	0.009	
Age at graduation	-0.012	0.008		-0.014	0.008	*	-0.009	0.008	
Age at graduation^2	0.000	0.000		0.000	0.000	*	0.000	0.000	
Swiss Nationality	0.005	0.017		0.004	0.017		0.004	0.017	
Parents with higher education	0.016	0.008	**	0.016	0.008	**	0.015	0.008	*
University of applied science (tertiary vocational education)	-0.069	0.013	***	-0.071	0.013	***	-0.073	0.012	***
Business/Economics	-0.051	0.012	***	-0.054	0.012	***	-0.049	0.012	***
Social sciences	0.053	0.015	***	0.055	0.015	***	0.058	0.015	***
Natural sciences	0.051	0.016	***	0.053	0.016	***	0.051	0.016	***
Other subjects	-0.063	0.014	***	-0.063	0.013	***	-0.062	0.014	***
Stay abroad during study	0.058	0.009	***	0.058	0.009	***	0.058	0.009	***
Stay abroad after study	-0.014	0.009		-0.014	0.009		-0.014	0.009	
Local unemployment rate during study	-0.014	0.005	***	-0.014	0.005	***	-0.014	0.005	***
Constant	0.630	0.140	***	0.658	0.140	***	0.589	0.139	***
Observations		2082			2082			2082	
R^2		0.206			0.210			0.204	
Prob > F		0.0000			0.0000			0.0000	

Notes: * significant at 10%, ** significant at 5%, *** significant at 1%; robust standard errors.

Source: Swiss Graduate Study 2000; own calculations.