Earnings Differences Between Transfer and Non-transfer Students*

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Abstract

Using data on three cohorts of Swedish university entrants, this study examines whether earnings vary between students who change universities and students who do not change. The results show that earnings, during the first years after leaving the university, are significantly lower for students who change universities compared to students who do not change. Earnings differences decrease significantly over time and over the earnings distribution. The pattern in the estimates seems consistent with non-transfer students, who have higher earnings because of their relatively earlier labor market entry, and transfer students catching up because of their additional human-capital investments.

Keywords: College education, University choice, Earnings distribution

JEL Classification: J24, J31

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1 Introduction

For the past 20 years, many OECD countries have experienced an increase in the earnings premium to college education (see, for example, Katz and Autor, 1999). But there is large variation in earnings among college-educated individuals. For example, results for the US show that wages vary significantly across majors (Arcidiacono, 2004) and between students who attended different colleges (Black and Smith, 2004; Dale and Krueger, 2002; Monks, 2000; Brewer, Eide and Ehrenberg, 1999; Behrman, Rosenzweig and Taubman, 1996; Loury and Garman, 1995). Wages of college-educated workers also depend on type of college degree and whether or not the student switched colleges (Light and Strayer, 2004). In comparison, there is little evidence on the impact of college choice or variation in earnings among the college-educated workforce in Europe.

One issue that is high up on the European political agenda is the mobility of college students. For example, mobility of students is one of the key objectives of the Bologna process and there are special EU-programs that promote mobility in education. Even though students in Europe have become more mobile, little is known about the consequences (e.g. in terms of earnings) of combining courses from different colleges. This paper fills a gap in the literature by examining earnings differences between students who switch colleges and students who do not.

This study uses a large administrative dataset of all Swedish university entrants in 1995, 1996, and 1997 and focuses on students who switch between Swedish colleges. Data reveal that (*i*) more than 30% of the students changed universities at least once,[1] (*ii*) students change to all types of universities, and

[1] Transfer students are students who obtained credits at more than one university.

(*iii*) students who change universities have higher educational attainments than students who do not change. This suggests that students might change universities to improve their human-capital. Transfer students' additional human-capital investments may improve their careers and result in higher subsequent earnings, compared to students who do not change universities. Students might also change for reasons other than to improve their human-capital. For example, they might change to a university that is closer to where they grew up (to be near family and friends) or to be in an area in which they can pursue their hobbies. If students change for one of those reasons, transferring might be uncorrelated with earnings, or even be negatively correlated.

To our knowledge, there is only one previous study that examines earnings of students who switch universities.[2] Using survey data on US college students, Light and Strayer (2004) analyze the impact of all types of college transfers. Based on their data, we calculate an average transfer rate of about 30% in the US (calculated as the average over transfer students with varying degrees), which is similar to the transfer rate in our data.[3] Light and Strayer estimate a log-earnings equation with transfer patterns as right-hand side variables. They control for individual ability (AFQT scores), number of public colleges in state, and enrollment duration, assuming that ability adjusts for the non-random selection of transfer students. They find that students who change universities receive about 6% higher wages than those who do not change.

[2] Kane and Rouse (1995) and Hilmer (2000) provide two related studies. Kane and Rouse consider only a particular type of transfer students (non-degree recipients who attended both two- and four-year colleges). Hilmer considers various types of transfer students and estimates inter-group variation in terms of college quality rather than in terms of consequences of college transfer on wages.

[3] Data exist on percentages of college drop-outs in most European countries (see, for example, OECD, 2008). But we have not found a study that reports data on percentages of European students who switch colleges.

They also find that transfer students are at least as likely as non-transfer students to earn a degree.

This study provides the first estimates of the earnings differences between transfer and non-transfer students for a non-US country. In addition, it includes quantile regression estimates of the earnings gap, which can tell us whether the average estimates are driven by students in specific parts of the earnings distribution. The large data set allows separate regressions for various sub-samples, which facilitates further analyses of heterogeneity in the results. This study also investigates whether the results vary between students who switch to universities of varying observed quality.

The results show that Swedish transfer students have significantly lower earnings than non-transfer students during the first years after leaving the university, but the earnings differences decrease over time. The earnings differences also decrease over the earnings distribution. One possible explanation to the results is that non-transfer students have higher earnings because of their relatively earlier labor market entry and transfer students catch up because of their additional human-capital investments.

The rest of this paper is structured as follows. Section 2 contains representative facts about higher education in Sweden. Section 3 presents the theoretical framework and the empirical strategy, while Section 4 describes the data. Section 5 reports the estimated earnings differences between students who change universities and students who do not change and the results from the sensitivity analyses. Section 6 presents conclusions.

2 Higher education in Sweden

In 2008, Sweden had 36 universities and university colleges, besides independent education agencies/organizations that were entitled to award higher education degrees or diplomas. In all, Sweden had 61 higher education organizations in 2008. In the 1980s, the number of registered students hovered around 190,000. During the early 1990s, this figure started to rise and grew at a steady pace until 2005. In 2006, about 390,000 students were enrolled in various higher education organizations.

Universities have permanent public funds for research and postgraduate education and can award doctoral degrees. Generally, university colleges do not award doctoral degrees.[4] In Sweden, colleges and universities provide the same type of undergraduate education (often identical courses) and award similar undergraduate degrees. Transfers among these colleges and universities are rather easy. Universities are mostly located in larger cities, while colleges are scattered throughout the country. For simplicity, the terms university and college are used interchangeably throughout this paper. During the 1977–1993 period, Sweden's parliament (and government) regulated the higher education system in detail. Since 1993, higher education institutions have gradually gained increased autonomy in organization of studies, use of resources, and general administration. But the government still decides which university is allowed to award a certain degree. A university can lose its rights to award a degree if the observed quality of education is considered too low.

There is a supply constraint on higher education, so admission to some programs and courses is selective. Selection of students in Sweden is

[4] Four university colleges have the same rights as universities but these colleges are restricted to *one research area* only: Blekinge Institute of Technology (*technology*), Malmö University College (*medical sciences*), Kalmar University College (*natural sciences*), and Mälardalen University College (*engineering*).

transparent and almost exclusively based on GPA from upper secondary school or a university aptitude test (SweSAT). Studies are organized as programs or as single courses. Until 2006, Sweden had a credit-point system in which a normal 40-week academic year corresponded to 40 credit points.[5] Degrees from all government-recognized higher education institutions have equal official value.

Higher education is free of charge for all students, and the government provides financial support to Swedish students and immigrants who hold a permanent residence permit. This support is twofold: grants and loans, which combined, constitute student aid of about SEK 7,500 (≈ EUR 800) per month in 2008. Parents' or spouse's income or wealth do not affect the amounts that students receive, and universities do not provide financial support to students.

3 Theoretical framework and empirical strategy

A substantial proportion of university students switch universities during their studies. When they switch universities, they may also consider the benefits and costs of changing academic fields and whether to graduate. These types of students do not fit into Becker's (1964) standard human-capital model, which assumes that there are no uncertainties about schooling decisions. In the traditional human-capital framework, utility maximizing students choose the college education that offers the highest discounted returns, and the decision is made before enrollment. In short, students simply choose a path and stay on it.

Early on, Comay et al. (1973) introduced the idea that human-capital accumulation should instead be seen as a dynamic process. They develop a

[5] The Swedish credit point system was aligned to other European countries in 2007 which implies that a normal 40 week academic year now corresponds to 60 higher education credits. Credit points in our data correspond to the old system.

model that treats the educational decision as a sequential decision problem. Exogenously specified probabilities drive the college decision, and there are no uncertainties about earnings. Altonji (1993) also treats education as a sequential choice, but in contrast to Comay et al., Altonji assumes that the choice is made under uncertainty. Heckman et al. (2003, 2006) describe further extensions of these approaches. Although, no model explicitly discusses why students switch colleges; the models suggest that a human-capital decision is not a once-and-for-all decision and that a decision can be changed at each level. In addition, the aforementioned papers suggest that benefits and costs of the investments affect the education decision-making process.

Based on this theoretical base, Light and Strayer (2004) discuss several reasons why students change colleges. They focus on the issue of match quality and argue that students may decide to change colleges after reassessing costs and benefits of their investment options. Students continuously learn about the institutions and their own capacities and might change because they believe that they will benefit more from being at a different institution. They might also change after receiving new information about the future payoffs of particular programs. Further, students can change to lower their living expenses or to improve their part-time employment prospects.

Switching colleges might enable direct and indirect effects on earnings. A positive direct effect occurs if students (who switch) improve their opportunities for skill acquisitions beyond what is reflected in their formal college education (for example, degree, number of credits, and academic fields). Students, who initially enroll at a small university that focuses on undergraduate education, might change to one that focuses on research or to one with specialized programs. A positive indirect effect occurs from changing colleges if the change increases the probability of graduating. For example, students who start at a college with too much peer pressure or demanding

teachers might consider dropping out of college. If they instead change to one in which attitudes are different, then they might finish their studies or take courses required for certain jobs.

Human-capital investments or optimal match quality do not necessarily drive a student's transfer decision. Students may also change colleges to come closer to friends and family or to be in a different social environment (for example, fewer students, smaller campuses, and varying leisure activities). In addition, genuine movers could dominate the group of college transfer students, that is, individuals who are more mobile than other students. These students may be less likely to commit to a particular college or program. They may also be less stable on the labor market, which implies that they more often change jobs and are more willing to take on short-term employment. Employers might consider transfer students to come from a group of predominantly bad matches and to be less reliable individuals.[6] A transfer then signals lower productivity and may be a criterion that employers use when screening job applicants. Consequently, a positive relationship between changing colleges and earnings might *not* exist.

The following equations for earnings and transfer decision describe the empirical problem of estimating earnings differences between transfer and non-transfer students:[7]

$$\ln(Y_{it}) = \beta_{0t} + \beta_{1t} X_{it} + \beta_{2t} \Delta C_i + \varepsilon_{it} \tag{1}$$

$$\Delta C_i^* = \alpha_1 Z_i + \eta_i, \;\; \Delta C_i = 1 \;\; if \;\; \Delta C_i^* > 0, \;\; \Delta C_i = 0 \; otherwise \tag{2}$$

[6] This is related to literature on job mobility, match quality, and adverse selection. See, e.g., Jovanovic (1979), Greenwald (1986), Gibbons and Katz (1991), and Widerstedt (1998).
[7] This is a conventional setup in the non-experimental evaluations literature (see e.g. Heckman et al. 1999).

In Eq. (1), log yearly earnings of individual i in period t, Y_{it}, is a function of a vector of individual characteristics, X_{it}; a dummy variable that indicates if the individual has switched universities ΔC_i; and a transitory disturbance, ε_{it}. The coefficient on ΔC_i, denoted β_{2t}, captures the earnings differences between transfer and non-transfer students. As previously discussed, we expect $\beta_{2t}>0$ if students change to improve their human-capital. If factors unrelated to individuals' marketable skills drive the decision to change universities, then β_{2t} is expected to be zero or even less than zero. It is also negative if employers believe that the productivity of transfer students is lower than that of non-transfer students.

Eq. (2) specifies the underlying transfer decision, where individuals change universities if the latent variable ΔC_i^* exceeds zero. The latent variable is a function of the observed Z_i (which may include X_i variables), and unobserved η_i variables. In the present study, we do not use the estimates of the decision equation to adjust for selection of transfer students. Using Eq. (1), we focus instead on whether there are earnings differences between transfer and non-transfer students. But if the decision to change colleges is due to observed characteristics, the inclusion of Z_i variables adjusts for the potential non-random decision to change colleges.

Note that the present study does not seek to identify the causal relationship between switching colleges and earnings. Instead, we want to investigate whether or not there is an earnings gap between the groups and suggest an empirical framework for future studies. The aforementioned empirical framework clearly shows underlying potential sources of selection, which

might be present in work done by Light and Strayer (2004) and in our study. In contrast to Light and Strayer, we have a rich dataset that allows us to examine how grades from upper secondary school, family background, and choices of university types affect the results.

To obtain further insights into potential heterogeneity in the impact of changing colleges, we use quantile regression (see, for example, Buchinsky, 1994; Koenker and Basett, 1978). We estimate the θ^{th} percentile of Y_i conditional on individual characteristics (X_i), observed selection variables (Z_i) and the dummy variable that indicates if an individual has changed universities (ΔC_i). q_θ, which is the value of Y_i conditional on X_i and ΔC_i in percentile θ, is assumed to be linear in these variables. The following equation is estimated:

$$q_\theta(Y_i) = \beta_{0\theta} + \beta_{1\theta} X_i + \beta_{2\theta} \Delta C_i + Z_i \lambda_\theta + \varepsilon_{\theta i} \quad (3)$$

The coefficients are interpreted as the earnings premium in percentile θ of the conditional earnings distribution. The method uses all observations, which means that the sample size in each percentile is weighted by the total sample size. The method is also robust to outliers of the dependent variable. In addition, heteroscedastic-consistent standard errors (bootstrapped standard errors) are estimated.

The quantile regression was developed to analyze potential heterogeneity in the effects of a particular variable, here, the ΔC_i variable. The estimates of the quantile regressions will tell us if students in a particular part of the income distribution drive the average estimates and provide information about the

mechanisms behind the results. For example, if the quantile regression estimates reveal that earnings of transfer students are significantly lower at the bottom of the distribution but are similar at the top, then students at the bottom of the earnings distribution drive the average OLS estimates.

4 Data

Data were obtained from Statistics Sweden (SCB) records and include all Swedish-born college entrants during the 1995-1997 period. SCB collects data about college education from universities' records. In Sweden, schools and universities are required to report individuals' educational attainment to SCB. Most universities use identical reporting systems.[8] So data on education are of high quality at individual and university levels. Students were followed for 12 semesters. For each semester, information is available regarding the college they attended, the courses they completed, and the number of credits they earned. If they achieved a degree, there is detailed information about the level and academic field.

The dataset also includes individual register data from 1993, 1995, 1998, 2000, 2002, 2003, 2004, and 2005. Analyses in this study focus on the 2002-2005 period. Data include standard individual characteristics (age, marital status, and children), basic work-related data (sector, region of work, and unemployment) and parental characteristics (age, origin, and education level). Information is also available regarding compulsory school (years 1–9) grades and upper secondary school (years 10–12) grades for students who left

[8] Most universities report students' educational attainments in LADOK, an IT system. Among the major colleges, only the Stockholm School of Economics uses a different system and is thus not included in the analyses.

compulsory school in 1988 or later and upper secondary school in 1990 or later. Gross yearly earnings (outcome variable) are based on tax records.[9]

Table 1 presents basic information about outcomes of higher education of all university entrants 1995-1997, which were measured six years after enrollment. Column 1 shows that 67.1% of those who entered college in 1995 studied at one college only; as many as 25.4% studied at two universities, and 7.5% studied at three or more universities. The percentages are similar for those who began studying in 1996 and 1997. This implies that about one-third of the students changed universities at least once.

We imposed the following restrictions on the data. No missing data on educational attainment, college type, and grades from upper secondary school was permitted, and all students must have earned some credits.[10] Independent program providers and colleges specialized in nursing, music, art, and dance were excluded because similar restrictions were invoked in previous Swedish studies; instead, we focused on universities and colleges with many students.[11] To ensure that individuals are attached to the labor market and to reduce the likelihood of being in college, all individuals must have some earnings in all outcome years, namely, 2002-2005.[12] Self-employed individuals are not

[9] Earnings include all job-related income (formally, all income for which employers had to pay payroll tax). This is a standard outcome measure in Swedish educational studies (see e.g. Isacsson, 2004).

[10] In 1995, 1996, or 1997, 163,166 students were registered as college entrants; 11,356 of these entrants did not earn credits and are thus excluded. We only have GPA data on individuals who left upper secondary school in 1990 and onward. We ran regressions on individuals without GPAs, but the results lead to the same conclusions as those reached in this study. The GPA restriction reduces the sample by 45,645 individuals.

[11] This reduces the sample by 4,421 individuals. Table A1 in the Appendix shows the included universities, the distribution of students, and the percentages of transfer students. At four universities/colleges, the transfer rate exceeds 40%.

[12] This reduces the sample by 17,672 individuals.

Table 1: The outcome of higher education, six years after enrollment

	University entrants 1995	University entrants 1996	University entrants 1997
Studied at			
One university, %	67.1	64.5	63.2
Two universities, %	25.4	27.6	28.4
Three or more universities, %	7.5	7.9	8.4
Changed universities			
Once, %	14.9	15.5	15.6
Twice, %	6.4	6.1	6.3
At least three times, %	11.6	13.9	14.9
Obtained at least			
One degree, %	57.3	56.2	55.2
Two degrees, %	7.0	7.4	7.8
Number of			
Credits earned	119.7	120.8	123.9
	(67.3)	(66.7)	(66.2)
Semesters in college	6.3	7.0	7.2
	(3.1)	(3.3)	(3.3)
Credits earned for those without a degree	79.6	78.8	82.5
	(63.4)	(63.1)	(63.8)
Credits earned for those with a degree	149.6	153.5	157.6
	(53.0)	(48.7)	(46.0)
Semesters in college for those without a degree	4.8	5.4	5.6
	(3.3)	(3.5)	(3.5)
Semesters in college for those with a degree	7.3	8.3	8.5
	(2.6)	(2.5)	(2.4)
Number of observations	51,145	51,477	49,188

Note: The samples include all college entrants who obtained at least 0.1 credits during a six-year period after enrollment. Standard deviations are within parentheses.

included. We excluded transfer students who have changed universities more than once.[13] The final sample consists of 61,410 individuals.

Table 2 reports mean sample characteristics of university entrants used in this study and odds ratios from a logistic regression of individual characteristics on

[13] Exclusion of students, who changed more than once, reduces the sample by 19,025 individuals. A few individuals are also excluded because of missing values on some of the variables used in the analyses.

the likelihood of changing colleges. Because no major differences exist in individual characteristics among the three cohorts and because we ran regressions for all university entrants together, the mean values are based on the complete sample. But there are separate means for students who changed colleges (transfer students) and those who did not change (non-transfer students).

Earnings of transfer students are lower than earnings of non-transfer students, but the earning spread is wider for transfer students. Earnings of transfer students grow faster than earnings of non-transfer students. There are more women and fewer married individuals among transfer students than among non-transfer students. Transfer students have much stronger family backgrounds (much higher percentage of mothers and fathers with college educations) and slightly higher grades from upper secondary school. Table 2 also shows that transfer students earned about 15 credits more than non-transfer students, which corresponds to 15 weeks of full-time studies. This suggests that transfer students took more courses and probably stayed longer in college than non-transfer students.[14]

Column 4 (calculated odds ratios) in Table 2 indicates that age decreases the likelihood of changing universities and that the odds of changing are higher for women. Students who were married in 1995 were less likely to change universities than those who were not married. The probability of changing is also lower for students in most academic fields compared to students in humanities. Moreover, students with parents who are not college educated have a lower probability of changing, while students with fathers who have a doctoral degree have higher probability of changing, compared with students who have college-educated parents. In addition, university entrants in 1996

[14] Transfer students in the US also stay longer in college (Light and Strayer, 2004).

Table 2: Mean sample characteristics and odds ratios

	Non-transfer students	Transfer students	Odds ratio
Annual earnings			
2005 (SEK 1,000)	252.3	233.0	
	(128.4)	(142.1)	
2004 (SEK 1,000)	237.1	212.9	
	(118.0)	(130.4)	
2003 (SEK 1,000)	221.6	188.6	
	(112.0)	(120.9)	
2002 (SEK 1,000)	199.8	158.6	
	(108.4)	(111.3)	
Age, 1995	19.9	19.6	0.93***
	(2.0)	(1.8)	
Women, %	51.3	58.9	1.32***
Married (men and women), 2005, %	25.4	21.4	
Married (men and women), 1995, %	0.68	0.40	0.72*
Children, ages 0–6, 2005, %	34.0	26.6	
Children, ages 7–15, 2005, %	3.1	2.0	
Upper secondary GPA	49.1	50.3	1.00***
	(28.9)	(28.2)	
% with a degree, 2005	60.0	59.2	
Number of credits	127.1	141.9	
	(62.3)	(57.5)	
Area of first course			
Teacher education, %	5.7	4.1	0.52***
Humanities, %	23.8	33.7	Ref
Social science, %	28.6	30.7	0.79***
Natural science, %	28.5	21.7	0.58***
Technology, %	4.7	3.4	0.59***
Agriculture, %	0.18	0.05	0.19***
Medicine, %	7.4	4.9	0.47***
Personal services and logistics, %	0.78	0.11	1.04
Mother's education			
Compulsory, %	23.4	19.5	0.80***
Upper secondary, %	35.6	33.3	0.88***
College education, %	37.6	43.4	Ref
Graduate work, %	0.36	0.56	1.18
Father's education			
Compulsory, %	27.1	22.8	0.81***
Upper secondary, %	33.0	31.2	0.89***
College education, %	32.0	36.7	Ref
Graduate work, %	2.0	2.9	1.19**
University entrants			
1995, %	34.0	35.4	Ref
1996, %	34.3	33.1	0.91***
1997, %	31.7	31.5	0.89***
Number of observations	50,782	10,628	61,410

Note: Standard deviations are in parentheses. GPAs are percentile ranked. Parental education does not add to 100%, because of missing data. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

and 1997 have lower probability of changing universities than students who began studying in 1995.

5 Empirical findings

The dependent variable is the logarithm of gross yearly earnings. Three different models are considered. Model 1 controls for basic individual characteristics (women, age, and age squared), parental background characteristics (age, origin, and level of education), GPA (percentile-ranked GPA from upper secondary school), and cohort dummies (dummies for year of university entry). This model controls mainly for factors that tend to have a large effect on individuals' education decisions.

Models 2 and 3 add a number of explanatory variables to model 1. Model 2 also includes number of children in various age categories, marital status, a dummy variable which is 1 if the student has a degree, number of credits, number of credits squared, and eight subject areas (based on first course). That is, here we added family factors and outcomes of individual college decisions. Model 3 adds to model 2 ten sectors of employment, county of work,[15] a dummy variable that indicates unemployment experience during the outcome year and potential work experience.[16] This model adjusts for differences in choices on the labor market. For expositional purposes, we only report the estimate of ΔC_i, the dummy variable that indicates if the individual switched universities.[17]

[15] Labor market selection might correlate with university selection. For example, local students may never intend to move, and college education at some universities can be designed to meet needs of local businesses. But the variable might fully capture regional earnings differences in Sweden.

[16] Potential work experience is calculated as (years of age - years in college - 19). On average, students leave upper secondary school at age 19.

[17] Table A2 in the Appendix reports some estimates of other right-hand side variables.

First we estimate all three models for the complete sample and for men and women separately. Then we investigate whether the results depend on choice of university. And finally, we examine whether the results vary over the earnings distribution.

5.1 Baseline estimates

Table 3 reports baseline estimates of earnings differences between students who change universities and students who do not change universities.[18] The model 1 estimates indicate that students who change universities have significantly lower earnings in all years compared to students who do not change universities. The estimated earnings differences decrease significantly over time, from about 33% in 2002 to 9.5% in 2005. The pattern in the model 2 estimates is similar to model 1. The model 2 estimates also decrease over time. But inclusion of college-related variables leads to smaller earnings differences between transfer and non-transfer students in the early years but larger earnings differences in later years, compared to model 1.

The pattern in the model 3 estimates is the same as in the other models, but model 3 suggests smaller earnings differences between the groups. It predicts that transfer students have about 5% lower earnings in 2005. The model 3 estimates show that choice of regional labor market and employment sector explains quite a large percentage of earnings differences between transfer and non-transfer students. Although the magnitude of earnings differences varies across models, all models suggest that students who change universities have lower earnings than students who do not change.

[18] The complete results from the regressions are available from the authors upon request.

Table 3: Estimates of earnings differences between transfer and non-transfer students

Year	Model 1	Model 2	Model 3
2002	-0.325*** (0.011) *Adj* R^2=0.078	-0.249*** (0.010) *Adj* R^2=0.188	-0.223*** (0.010) *Adj* R^2=0.261
2003	-0.234*** (0.010) *Adj* R^2=0.055	-0.215*** (0.009) *Adj* R^2=0.138	-0.188*** (0.009) *Adj* R^2= 0.234
2004	-0.142*** (0.009) *Adj* R^2=0.064	-0.160*** (0.009) *Adj* R^2=0.145	-0.136*** (0.009) *Adj* R^2=0.249
2005	-0.092*** (0.009) *Adj* R^2=0.079	-0.125*** (0.009) *Adj* R^2=0.166	-0.048*** (0.007) *Adj* R^2=0.479
Number of observations	61,410	61,410	61,410

Note: The dependent variable is log gross yearly earnings. All models include a constant and a dummy variable for changing universities (ΔC). Model 1 also includes women, age, age^2, parental characteristics (age, country of birth, and education of mother and farther), percentile-ranked GPA from upper secondary school and cohort dummies. Model 2 also includes number of children in various age categories, a dummy for marital status, a dummy variable that is equal to one if students have a degree, number of credits, number of credits squared and eight education areas (based on first course). Model 3 includes the covariates from model 2 plus an indicator of unemployment experience during the outcome year, ten employment sectors, county of work, and potential work experience. Standard errors are within parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

The earnings gap narrows rapidly over time, and a hypothesis might be that it shrinks because premiums of the observed factors vary between non-transfer and transfer students. For example, earnings of non-transfer students might be larger because they enter the labor market earlier and thus have larger returns to experience compared to transfer students. Transfer students might catch up because they receive larger returns on their additional investments in college education. The estimates of these variables provide some information about this mechanism. Table A2 in the Appendix displays the estimates, which show that non-transfer students have higher returns on potential experience compared to transfer students in all years except 2005. The pattern over time (for experience estimates) follows the estimated earnings gap pattern between groups.

Table A2 also shows that transfer students have a significantly higher earnings premium for a degree than non-transfer students. The transfer students' estimate is nearly twice the estimate for non-transfer students in all years. This might indicate that transfer students benefit more from investments in college education and might explain why the earnings gap shrinks over time. It is also possible that a degree act as a signal for transfer students but not for non-transfer students. Because if employers believe that transfer students, on average, are adversely selected, a degree might signal a relatively higher productivity.

5.2 Gender-based estimates

The log odds in Table 2 show that women are more likely than men to study at more than one university. Moreover, Albrecht et al. (2003) show that there is a significant gender wage gap on the Swedish labor market, which is wider at the top than at the bottom of wage distribution. If women dominate among transfer students, then female transfer students, who hold relatively low-paid jobs or part-time work, might explain earnings differences between transfer and non-transfer students. So we run separate regressions for women and men. Table 4 reports the results, which show that the pattern in the estimates over time is similar for women and men. For both samples, there are large earnings differences in the first years, which decrease over time. Based on models 1 and 2, earnings differences between those who change and those who do not change are larger among males than females in all outcome years. The difference between the estimates for men and women are smaller in model 3. And in 2005, earnings differences are about as high for female transfer students as for male transfer students.

Model 3 estimates also indicate that transfer students in low-wage regions and sectors explain much of the earnings differences between transfer and non-transfer students. But a significant earnings gap still exists between transfer and non-transfer students. In all, gender-based estimates reject the hypothesis that low-paid female transfer students drive earnings differences between transfer and non-transfer students.[19]

[19] We also ran separate regressions for students who graduated the same year, students with and without a degree, students who come from various regions, students with different observed ability, and students with varying parental background characteristics. The results led to the same conclusions as those presented above.

Table 4: Estimated earnings differences between transfer and non-transfer students, men and women

	WOMEN			MEN		
Year	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
2002	-0.275***	-0.232***	-0.220***	-0.398***	-0.291***	-0.245***
	(0.014)	(0.013)	(0.013)	(0.016)	(0.015)	(0.014)
	Adj R^2=0.040	*Adj* R^2=0.206	*Adj* R^2=0.254	*Adj* R^2=0.107	*Adj* R^2=0.203	*Adj* R^2=0.307
2003	-0.172***	-0.192***	-0.179***	-0.322***	-0.264***	-0.218***
	(0.013)	(0.013)	(0.012)	(0.014)	(0.014)	(0.012)
	Adj R^2=0.017	*Adj* R^2=0.174	*Adj* R^2=0.234	*Adj* R^2=0.067	*Adj* R^2=0.122	*Adj* R^2=0.273
2004	-0.082***	-0.146***	-0.134***	-0.226***	-0.197***	-0.155***
	(0.014)	(0.013)	(0.012)	(0.013)	(0.012)	(0.011)
	Adj R^2=0.016	*Adj* R^2=0.183	*Adj* R^2=0.250	*Adj* R^2=0.043	*Adj* R^2=0.087	*Adj* R^2=0.270
2005	-0.036***	-0.119***	-0.058***	-0.171***	-0.155***	-0.056***
	(0.013)	(0.012)	(0.011)	(0.012)	(0.012)	(0.008)
	Adj R^2=0.015	*Adj* R^2=0.187	*Adj* R^2=0.420	*Adj* R^2=0.029	*Adj* R^2=0.086	*Adj* R^2=0.604
Number of observations	32,295	32,295	32,295	29,115	29,115	29,115

Note: Table 3 describes the models. Standard errors are reported within parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

5.3 University choices

The percentages of teachers with doctoral degrees vary significantly between universities in Sweden (see, for example, Holmlund 2009). If teachers with doctoral degrees provide higher quality education, then students might change so that they are taught by these teachers. But students might also change to a regional college with few teachers with doctoral degrees if the college is in a region in which they can pursue their interests or if the college is located near family and friends.[20] This suggests that observed university quality or regional location might affect students' decision to change universities. If observed university quality or regional location also are correlated with earnings the results in the previous sections might be biased

To examine whether choice of university type matters, we divide universities into three groups based on similar values on observed quality indicators: group 1 (universities of highest observed quality), group 2 (universities of semi-high observed quality), and group 3 (universities of lower observed quality).[21] We compare transfer students with non-transfer students from the same universities. In other words, before the change of universities, the transfer and non-transfer students were enrolled in the same group of universities.

[20] Most Swedish universities/colleges recruit most of their students from the county in which they are located or from neighboring counties, and students are more likely to stay in the region after graduation than to move. If transfer students switch to colleges in low-wage regions, then the estimated earnings gap between transfer and non-transfer students might be due to transfer students choosing to work in a region in which the college is located and thus receive lower wages.

[21] Group 1 includes Lund, Stockholm, Uppsala and Gothenburg universities, Swedish University of Agricultural Sciences, Chalmers University of Technology, Royal Institute of Technology and Karolinska Institutet. Group 2 includes Umeå, Linköping, and Luleå universities. Group 3 includes Södertörn, Borås, Skövde, Mälardalen, Örebro, Karlstad, Växjö, Kalmar, Jönköping, Gävle, Kristianstad, Dalarna, Halmstad, University West, Blekinge Institute of Technology, Mid Sweden University and Stockholm Institute of Education.

Table 5 reports the estimated earnings gap between transfer and non-transfer students conditional upon university choice. Table 5 includes only estimates for 2005, because the purpose of the analysis was to examine whether university choice explains the earnings gap between the groups and not the development over time. Columns 1–3 report the earnings gap conditional upon transfer patterns, and columns 4–6 report the average estimated earnings differences among students who started in the same group of universities. The specifications are the same as those used above.

Results for model 3 in Table 5 suggest that the earnings gap between transfer and non-transfer students is wider for students who started at group 2 and group 3 universities than it is for students who started at group 1 universities. For example, column 8 (last column) in Table 5 shows that the average earnings gap for students, who began studying at a group 1 university, is 3.6% compared with 6.7% for group 2 students and 6.9% for group 3 students. Further, the estimates in column 3 show that group 2 and group 3 transfer students have lower earnings for all types of changes, while group 1 students have lower earnings only for changes to another group 1 university.

Model 3 suggests that there is a significant earnings gap for changes between group 1 universities, but the gap is insignificant for changes from group 1 to group 2 and group 3 universities. Regardless of starting university, the earnings gap is widest for transfers to group 1 universities. Despite differences across universities, these results suggest that transfer students' choices of university do *not* explain the earnings gap between transfer and non-transfer students.

Table 5: Estimated earnings differences between non-transfer and transfer students in 2005, conditional upon university choice

	Model 1	Model 2	Model 3		Model 1	Model 2	Model 3
BEGAN STUDYING AT A GROUP 1 COLLEGE							
Ref group: students who stay at group 1 colleges				*Ref group: students who stay at group 1 colleges*			
Changed from grp 1 to grp 1	-0.141*** (0.021)	-0.148*** (0.020)	-0.057*** (0.015)	Changed from grp 1	-0.107*** (0.015)	-0.092*** (0.015)	-0.036*** (0.011)
Changed from grp 1 to grp 2	-0.138* (0.043)	-0.136*** (0.041)	-0.050 (0.032)				
Changed from grp 1 to grp 3	-0.061** (0.022)	-0.018 (0.021)	-0.009 (0.016)				
BEGAN STUDYING AT A GROUP 2 COLLEGE							
Ref group: students who stay at group 2 colleges				*Ref group: students who stay at group 2 colleges*			
Changed from grp 2 to grp 1	-0.077*** (0.028)	-0.121*** (0.026)	-0.080*** (0.022)	Changed from grp 2	-0.087*** (0.021)	-0.114*** (0.020)	-0.067*** (0.016)
Changed from grp 2 to grp 2	-0.208*** (0.050)	-0.254*** (0.047)	-0.065* (0.038)				
Changed from grp 2 to grp 3	-0.050** (0.033)	-0.042 (0.031)	-0.050* (0.026)				
BEGAN STUDYING AT A GROUP 3 COLLEGE							
Ref group: students who stay at group 3 colleges				*Ref group: students who stay at group 3 colleges*			
Changed from grp 3 to grp 1	-0.088*** (0.020)	-0.198*** (0.019)	-0.090*** (0.017)	Changed from grp 3	-0.074*** (0.014)	-0.165*** (0.014)	-0.069*** (0.012)
Changed from grp 3 to grp 2	-0.066** (0.036)	-0.186*** (0.034)	-0.075** (0.029)				
Changed from grp 3 to grp 3	-0.062*** (0.021)	-0.122*** (0.020)	-0.045*** (0.017)				

Note: There are 24,411 individuals in group 1 colleges, 11,836 in group 2, and 25,163 in group 3. Table 3 describes the models. The *Adj* R^2 varies between 0.061 for model 1 and 0.520 for model 3. Standard errors are within parentheses; ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

5.4 Quantile regression estimates

Individuals who are unemployed, combine work and university studies, or have part-time jobs have lower earnings than individuals who work full time. Students, who try various types of jobs in search of a perfect match, may have shorter or longer spells of lower-paid jobs or unemployment, with lower earnings than students who select a job and stay with it. If transfer students are over-represented in any of these groups, then they will have lower earnings than non-transfer students, which in turn can explain the OLS estimates. In this case, we would expect relatively lower earnings of transfer students at the bottom of the earnings distribution.

When transfer students finally settle for a professional full-time job, their earnings should be about the same as earnings of non-transfer students, given that the OLS earnings gap is due to behavior at the bottom of the earnings distribution. This implies a narrower earnings gap at the top of the earnings distribution. At the top, the individuals probably work full time, and a potential earnings gap must be related to factors other than those at the bottom of the distribution. The quantile regression method provides estimates of the earnings differences between transfer and non-transfer students in various parts of the earnings distribution.

Table 6 reports the estimates of the earnings differences between the groups in 2005 for the same models as those used in previous sections. The estimates should be interpreted as the earnings gap in a particular percentile of the conditional earnings distribution. Table 6 includes only the estimate of the ΔC -variable, and *p10-p90* indicate percentiles of the earnings distribution; *p10* is the 10% of the sample with the lowest earnings (90% earn more) and *p90* is the 10% with the highest earnings (90% earn less).

Table 6: Quantile regression estimates of the earnings differences between transfer and non-transfer students in 2005

Percentile	Model 1	Model 2	Model 3
p10	-0.294*** (0.033)	-0.259*** (0.023)	-0.109*** (0.016)
p20	-0.182*** (0.017)	-0.200*** (0.019)	-0.079*** (0.009)
p30	-0.098*** (0.009)	-0.132*** (0.011)	-0.056*** (0.006)
p40	-0.073*** (0.006)	-0.090*** (0.009)	-0.041*** (0.004)
p50	-0.050*** (0.005)	-0.064*** (0.007)	-0.036*** (0.004)
p60	-0.030*** (0.004)	-0.049*** (0.005)	-0.031*** (0.004)
p70	-0.028*** (0.003)	-0.040*** (0.005)	-0.029*** (0.003)
p80	-0.030*** (0.004)	-0.040*** (0.005)	-0.021*** (0.004)
p90	-0.024*** (0.005)	-0.034*** (0.006)	-0.020*** (0.005)
Number of observations	61,410	61,410	61,410

Note: Table 3 describes the models. Bootstrap standard errors are within parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

The model 1 estimates show that earnings of transfer students are significantly lower than earnings of non-transfer students in all parts of the earnings distribution. But the earnings differences decrease significantly over the distribution. The estimates go from 29.4 in *p10* to 9.8 in *p30*. In *p90*, transfer students only have about 2.5% lower earnings. Obviously, transfer students at the bottom of the earnings distribution explain a significant portion of the estimated average earnings gap. Note, for example, that all percentile estimates above *p30* are less negative than the OLS estimate for 2005 in Table 3.

The other models' estimates are similar to the model 1 estimates. They are more negative at the bottom of the earnings distribution than at the top of the distribution, and percentile estimates above *p30* are less negative than the OLS estimates in Table 3. The level of model 2 estimates is about the same as model 1 estimates, while the model 3 estimates are less negative. Furthermore, model 1 and model 3 estimates are about the same in *p50–p90*.

In all, the results indicate that a large part of the average earnings differences reported in previous sections are due to transfer students at the bottom of the earnings distribution. These students might still be in college, in part-time employment, unemployed or simply between jobs. But there are significant earnings differences also at the top of the earnings distribution. The earnings gap at the top is about 2.5% and amounts to the returns from about one-half year of potential work experience in 2005 (see Table A2). One-half year is equal to one semester in college. Perhaps, this is the lowest cost of postponing labor market entry.

6 Concluding remarks

About one-third of Swedish university entrants studied at more than one university. Based on the earnings estimates in this paper, this decision does not appear to generate extra earnings in the short run. Instead, students who change universities receive significantly lower annual earnings than students who do not change universities. This concerns students who change to universities of higher, observed quality and students who change to universities of lower, observed quality. The pattern in the estimates seems consistent with transfer students spending more time in college and postponing their labor market entry. During that time period, non-transfer students accumulate experience, which results in relatively larger earnings. The earnings differences decrease significantly over time, but transfer students do

not overtake non-transfer students when it comes to earnings during our observation period.

If the trend in the data continues, transfer students might catch up or surpass non-transfer students after a few years. But it is difficult to say whether their long-term earnings growth will compensate for their lower earnings in the first few years in the labor market. If earnings of transfer students continue to grow significantly faster than earnings of non-transfer students, then in the long run, transfer students might pass non-transfer students in terms of earnings. But it is possible that non-transfer students' relatively longer labor market experience actually is worth more than transfer students' additional human-capital investment. Naturally, it is also possible that by changing universities, individuals signal that they may also be more mobile on the labor market, which some employers consider a negative factor.

By adjusting for observed ability and family background, we find that students who change universities have lower earnings, which is in contrast to results reported for the US. There are various explanations for these differences. One may be that the small sample used in the previous US study included a highly selective sample of transfer students or that lack of proper controls for family background and ability resulted in upward-biased estimates of the earnings gap. Another explanation might be that the US study follows students for a longer time period (they do not report how long they follow their students). It is also possible that there are institutional differences between the countries, which affect transfer students. For example, because Sweden's state-run system of higher education guarantees education quality (which among other things means that a university degree is identical across colleges/universities), students might not transfer primarily for the reason of improving their human-capital.

Finding out more about the process that generates the earnings differences between the groups is an issue for future research. Future research on consequences of switching universities must examine factors that affect the decision to change universities and use the information to adjust for selection of transfer students. In addition, one should investigate whether the results are sensitive to choice of empirical model.

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Appendix

Table A1: Distribution of students over universities and percentages of transfer students of college entrants per college

	The sample used in the analyses		All college entrants	
University	Number of students	Percentage who changed colleges once	Number of students	Percentage who changed colleges
Blekinge Institute of Technology	838	15.8	1,894	34.1
Borås	998	10.1	2,246	22.9
Chalmers University of Technology	1,877	11.1	4,080	34.7
Dalarna	1,455	18.5	3,382	25.8
Gävle	1,398	17.2	3,328	25.3
Göteborg	4,755	18.2	11,759	31.4
Halmstad	1,052	23.0	2,712	41.2
Jönköping	1,655	15.2	3,371	24.7
Kalmar	1,417	14.9	3,127	30.8
Karlstad	2,225	14.5	4,964	28.7
Karolinska institutet	398	10.1	1,073	24.1
Kristianstad	1,196	13.6	2,749	34.0
Royal Institute of Technology (KTH)	2,573	10.6	5,621	31.0
Linköping	4,523	13.9	8,816	25.6
Luleå	2,348	14.1	5,050	23.2
Lund	5,321	13.6	15,159	43.7
Stockholm Institute of Education	1,356	9.4	3,486	20.2
Mid Sweden	3,181	14.7	7,669	29.7
Mälardalen	2,196	22.6	5,362	31.0
Skövde	672	14.7	1,552	32.9
Swedish University of Agricultural Sciences (SLU)	489	7.4	1,189	32.1
Stockholm	4,207	28.6	11,747	41.8
Södertörn	355	22.3	1,125	54.1
Umeå	4,965	19.8	10,076	30.8
Uppsala	4,791	24.8	10,646	42.7
West	853	10.7	2,100	26.7
Växjö	1,638	13.9	3,525	33.0
Örebro	2,678	23.5	5,592	30.6
Mean		*17.3*		*33.1*
Number of observations	61,410	61,410	143,400	143,400

Table A2: Estimated returns to experience and college education for transfer and non-transfer students

Group of students	Transfer	Non-transfer	Transfer	Non-transfer	Transfer	Non-transfer	Transfer	Non-transfer
Outcome year	2002	2002	2003	2003	2004	2004	2005	2005
Potential experience	0.129***	0.187***	0.102***	0.130***	0.071***	0.087***	0.048***	0.046***
	(0.017)	(0.006)	(0.015)	(0.006)	(0.015)	(0.006)	(0.011)	(0.005)
Degree (no degree= ref group)	0.794***	0.448***	0.571***	0.282***	0.332***	0.146***	0.077***	0.036***
	(0.023)	(0.009)	(0.022)	(0.009)	(0.021)	(0.009)	(0.016)	(0.008)
Total number of credits	0.000	0.006***	0.000	0.004***	0.001	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Fields (humanities=ref group)								
Education	0.059	0.081*	0.027	0.012	0.058	0.012	0.006	-0.018
	(0.052)	(0.048)	(0.017)	(0.016)	(0.045)	(0.016)	(0.035)	(0.014)
Social science	0.116***	0.156***	0.092***	0.094***	0.133***	0.094***	0.093***	0.066***
	(0.025)	(0.023)	(0.010)	(0.010)	(0.022)	(0.010)	(0.017)	(0.008)
Natural science	0.152***	0.151***	0.115***	0.121***	0.145***	0.121***	0.114***	0.095***
	(0.028)	(0.026)	(0.010)	(0.010)	(0.025)	(0.010)	(0.019)	(0.008)
Technology	0.085	0.182***	0.192***	0.187***	0.191***	0.187***	0.122***	0.133***
	(0.057)	(0.053)	(0.018)	(0.018)	(0.050)	(0.018)	(0.038)	(0.015)
Agriculture	0.640	0.000	0.180**	0.205**	0.181	0.205**	0.494	0.164**
	(0.451)	(0.420)	(0.083)	(0.081)	(0.396)	(0.081)	(0.303)	(0.068)
Health care	-0.014	0.054	-0.067***	-0.009	0.005	-0.009	-0.017	-0.028**
	(0.049)	(0.046)	(0.016)	(0.016)	(0.043)	(0.016)	(0.033)	(0.013)
Service and transports	0.192**	0.145	0.108***	0.126***	0.183**	0.126***	0.106*	0.038
	(0.095)	(0.089)	(0.040)	(0.039)	(0.084)	(0.039)	(0.064)	(0.033)
Adj R^2	*0.245*	*0.255*	*0.221*	*0.233*	*0.219*	*0.257*	*0.511*	*0.470*
Number of observations	10,628	50,782	10,628	50,782	10,628	50,782	10,628	50,782

Note: The estimated models correspond to model 3 (except for the dummy for changing universities), see Table 3. Standard errors are within parentheses. ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.