

**Why to get a 2<sup>nd</sup> diploma? Is it life-long learning or the outcome of state intervention in educational choices?**

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**Abstract**

This paper analyzes the determinants and labour market effects of further higher education studies of graduates, the factors that induce them to switch to other fields (switching decision) and in comparison the determinants of deciding upon “deepening” their knowledge (to proceed with further higher educational studies in the original field of study) and its labour market consequences. Based on data from a follow-up survey of Hungarian Higher Education Graduates the paper demonstrates that graduates who obtained their first diploma in other than their most preferred field specialisation are more likely to participate in further higher education studies and to switch to another field. In addition, this paper finds some evidence that those, who switch fields, lose a part of their human capital in the short run. The results suggest that state intervention in the supply of field specialities in higher education or the inelasticity of these supplies may lead to further higher education studies of graduates and to a wastage of resources.

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## **1. Introduction**

Many students go back to college or study part time after graduating from higher education. Part of them study for a higher, a Master's or Doctoral degree in their original major or field specialization, but a substantial fraction of graduates who participate in further post-secondary studies choose a different major than their original field. Changing the field of further higher education studies may lead to more flexible labour market conditions and to better adjustment to labour market demand. Nevertheless, changing the educational field may result in a waste of resources: the total time spent in education increases, and if the human capital accumulated in higher education is partly discipline specific and these competences are not transferable to other disciplines, a part of the accumulated human capital will also be lost.

Several studies have analyzed the determinants of selecting a major and found that expected future earnings play a decisive role in the probability of selecting a specific field (Berger, 1988; 2003; Boudarbat, 2004.) Large differences exist in graduates' earnings by specialization, a part of which is due to ability sorting. Students choose majors in which they have a comparative advantage (Paglin and Rufulo, 1990). Some papers have shown that even after controlling for selection, large earnings premiums exist for certain majors (Arcidiacono, 2003) There might be different reasons why students choose field specializations with less promising labour market prospects. Tastes, preferences, risk aversion of students may differ. Papers that had taken into account the probability of success in selecting a major (Rochat and Demeulemeester, 2001; Montmarquette et al., 2002) found that there is a trade-off between the economic returns and the perceived risk of failure related to majors.

The possible reasons why a graduate continues higher education studies and changes field specialization just (or a short time) after graduation might be that in the course of studies he/she received new information influencing his/her preferences or abilities, or that he/she had false expectations about the future or could not foresee some unexpected labour market

changes. Studies on students' labour market expectations found that students are capable of making realistic estimates of future incomes (Betts, 1996; Dominitz and Manski, 1994 Carvajal, 2000; Varga 2002) and that at an individual level students make good predictions concerning their starting salaries (Hartog and Webbink, 2000). Borghans and Golsteyn (2005, 2006) investigated the reasons why people participate in education targeted at another field than their original studies and why they participate in general education at an older age. They found that many people go back to college because they discover belatedly that the course they took earlier does not fit their preferences, they had wrong expectations about the future or there is an unexpected change in the environment. Regret of educational choice is one of the main determinants in their model of switching to another discipline after graduation. They also analyse the role of skill transferability in the switching decision and show that higher skill transferability induces switching. They come to the conclusion that substantial gains could be obtained by policies that assist people in making adequate choices when they are young.

This paper provides additional explanation why students may switch to another field of study just (or a short time) after graduation. Most studies assume that students have free access to any field they want and that observed choices, observed field specialization of students are their most preferred ones. In fact, in most countries only a limited number of applicants have access to all field specializations, partly because the supply of places is not perfectly elastic, supply of higher education by field specialization adjusts to demand with a lag and partly because education policy, state intervention prevents or slows down the adjustment of the supply side of higher education to demand by field specializations, as it is the case in Hungary.

This study - using a follow-up survey of Hungarian higher education graduates analyses the determinants of further higher education studies of graduates, the determinants of the

“switching” decision and as a comparison, the determinants of the “deepening” decision (that is to continue further higher education studies in the original field of study) and its labour market consequences. The primary focus of the analysis is to investigate if the failure of prospective students to gain admission to their most preferred field of study, the inelasticity of the supply of higher education places by field specialization or state intervention in the supply of higher education plays a role in further higher education studies of higher education graduates and in their decision of switching to another field of study. The paper analyses the question whether graduates who obtained their first diploma in other than their most preferred field specialisation have higher or smaller odds of participating in further higher education studies and of switching to another field of study.

## **2. Some facts about the Hungarian higher education system**

In Hungary students are admitted to specific fields of studies even at an undergraduate level and they complete specialized programmes both at college and university levels (the former provide shorter, 3-4 year study programmes, while the latter are longer, involve 5-6 years of studying). The Ministry of Education determines yearly the number of students admitted to tuition-free, state financed places by educational levels (university, college), by fields of study and by institutions. In determining the number of state financed places among other considerations the Ministry takes into account the excess-demand for the different courses but the prevention of over-supplying graduates from certain field specialisations is another primary aim of the intervention.

Students may apply for as many courses as they want but they have to give their preference ranking. Offers are made in accordance with the student’s preference ranking. All students get at most one offer, if the student has an offer for an institution/field specialisation

which he/she applied for with a better preference ranking he/she will be rejected automatically by the other institutions he/she applied for even if he/she achieved the minimum admission score of the latter institutions.

Field specialisations to which places are available do not correspond to young people's aspirations as far as students' first preference ranking choices are concerned. Previous research shows (Varga, 2006) that when prospective students apply to different institutions/field specializations their application strategy is to assign first preference ranking to field specializations, which provide above average labour market prospects but if the probability of admission is relatively low, they also apply to institutions/field specializations which provide less favourable labour market prospects but where the probability of acceptance is high. As the admission quota to higher education by field specializations and students' most preferred choices of majors differ, students accept offers from institutions/field specializations with less favourable labour market prospects showing up at the end of their preference ranking list.

One of the most notable facts concerning the school to work transition of higher education graduates in Hungary is that two third of them of them undertake further higher education studies within 5 years after graduation and more than a half of graduates switch to another field of study as it is reported in Table 1. The majority of graduates obtain their 2<sup>nd</sup> qualification in part time education where acceptance rate is much higher, the length of studies is shorter but where the direct costs of education supersede that of full time education because most students have to pay tuition, while students in full time education at state financed places do not have to pay any fees.

The distribution of graduates' second qualifications by field specializations and the distribution of applications for a first degree with first preference ranking are close to each other as shown in Figure 1. Table 2 reports the distribution of 2<sup>nd</sup> qualifications of switchers

by discipline and average starting salaries of graduates by field specialization as a percent of average starting salaries of graduates. The distribution of 2<sup>nd</sup> qualification of switchers follow the rank order of early labour market prospects of graduates by field speciality – at least at the top of the list – the latter corresponds to excess-demand for higher education places for 1<sup>st</sup> qualification by discipline. It shows that graduates, who failed to get admission to their most preferred field specialization/institution, try to reach their original goal by going around the obstacles. If it is true, then the inflexibility of the admission quotas in higher education by field specializations - which in Hungary is due mostly to state intervention or planning - will result in the extension of the length of higher education studies and consequently in the increasing costs of education.

## **2. Theoretical considerations**

Following Heijke and Meng (2004) and Borghans and Golsteyn (2005) I assume that higher education programs of a given field provide discipline specific and generic competencies, the latter ones as a combination of competencies that provide basis for further learning. Discipline specific competencies are transferable and if the graduates pursue further higher education studies and decide to switch to different discipline generic skills from their initial education, the transferable skills can be conveyed to the subsequent education. In other words the costs of acquiring a second degree would be lower compared to costs involved if the individual had no higher education degree at all. For example, some of the credits earned in studies for the first degree may be transferred towards the second degree thus the student would finish studying sooner than without having a first degree. Nevertheless, if a graduate switches to another field specialization he/she will lose the non-transferable part of his/her human capital.

Individuals select a learning path, which maximizes their utility. If an individual has no chance to be admitted to his/her most preferred institution/field specialization for a 1<sup>st</sup> degree because of restrictions, but the probability of acceptance is higher for the same institution/field specialization as a 2<sup>nd</sup> degree, the individual may follow another learning path. First, he/she may choose to apply to a field specialization where the admission rate is high, the transferable part of human capital accumulated from earlier studies is also significant then after graduation he/she may try to pursue further studies and switch to the originally intended field specialization. Although this strategy lengthens the duration of studies and results in the loss of a part (the non-transferable part) of the accumulated human capital of the individual, it might be a rational decision if the costs of the whole learning path (including the loss of the non-transferable part of the human capital accumulated through studying for the 1<sup>st</sup> degree and the lengthening of the duration of studies) are smaller than the expected life-cycle earnings gains from the learning path.

### **3. Data**

The data used in the paper were taken from the Hungarian Higher Education Graduates Survey of 1999 and 2000 (HHEGS) and the Follow-up of the Higher Education Graduates Survey (FHEGS). The HHEGSs were postal surveys. The population of the surveys consisted of graduates who finished their studies in 1999 and 2000 in full time higher education. All graduates received the postal survey, the response rates were 31 % and 22.8 % respectively. From the HHEGS we have information on the labour market status and earnings of the graduates, on occupation characteristics one year after graduation and type of first degree: level of education, field specialisation, home institution.

The FHEGS was a phone survey conducted in 2004 among graduates who finished their studies in full time higher education in 1998 and 1999 and answered the HHEGS in 1999 and 2000. The final sample of the FHEGS consists of 3814 persons. The questionnaire requested detailed information on the changes of the labour market position of graduates since the first survey, participation in further studies, type of further studies [level of education, field specialisation, form of study (full or part time) form of financing, earnings, labour market status of graduates in time of second observation].

Annual data published by the National Admission Office of Hungary, which provide detailed information on the number of applicants and admitted students by institutions, field specialisations, and by the form of financing the studies (cost-priced/state financed), were also used.

#### **4. Methods and empirical specification**

First, the determinants of further higher education studies are analyzed. The question to be answered is how the type of first qualification, early labour market success of graduates and obtaining a first degree not in the most preferred field specialization affect the odds of participating in further higher education studies. Two types of further higher education studies are distinguished in the analysis: “deepeners” are graduates who have a second degree in the same field specialization as their first degree and “switchers” are graduates who have a second degree in another field specialization than their first degree. Although the data contain detailed information on the field of studies of graduates, because of sample size limitations field of studies were classed into eight broad categories: Agricultural; Humanities and Languages; Law; Natural Sciences; Economics and Business; Teacher Training; Engineering and Informatics, and Other.

A multinomial probit model was used with the following three outcomes: switching, deepening, and no second diploma. The multinomial probit seemed to be more appropriate than the multinomial logit model, which is typically used for estimating discrete choice probabilities, as a multinomial logit model requires the assumption of the independence of irrelevant alternatives, namely the assumption that the odds ratios derived from the model remain the same irrespective of the number of possible choices, that the relative odds of one choice versus another should not depend on the availability of a third option. In practice, this assumption is inappropriate when the choices are close substitutes. In case of the graduates' choice of further higher education studies it requires that the individuals viewed the decision between switching and deepening as independent, which is unlikely. The multinomial probit does not impose the independence of irrelevant alternatives, it allows for correlation between the unobservable determinants of educational choices.

Specifically the model takes the form:

$$Y_i=j \text{ if } U_{ij}=\max(U_{ij},U_{ik}) \text{ for all } k \neq j,$$

where  $U_{ij} = \beta_j' x_i + \varepsilon_{ij}$  is the random utility associated with choice  $j$ ,  $j=0,1,2$  indexes the three learning states,  $i$  indexes individuals, and  $x_i$  represents individual characteristics.

The multinomial probit model assumes that  $\varepsilon_j$ 's follow a multivariate normal distribution and are correlated across choices.

The independent variables in the model include: (1) a proxy variable indicating if the institution/field specialization of the graduate's first degree was the individual's most preferred one or not; (2) type of first degree, (3) early labour market success of the young employee (labour market success at 1<sup>st</sup> observation) (4) gender and residence of the individual (5) a variable indicating if the graduate obtained his/her first qualification in 1998 or 1999. We have no individual level data on the original field specialization preferences of the students, there are no direct observations in our data showing whether the graduates obtained

their first degree in their most preferred field specialization or not (were they offered a place in a field specialization of their first choice or were they accepted to a place in a less preferred institution/field specialization). We can only observe the actual field specialization of the students' first diploma. As a proxy for the problem the admission rate (admitted as a percentage of total applicants) of the home institution and field specialisation for each individual in the year of admission was used. For constructing the variable the detailed field specialization of graduates was taken into account and data from the National Admission Office were used for constructing this variable.

The lower the admission rate was, the more selective the institution/field specialisation proved to be, and it seems very likely that only applicants who had ranked the institution/field specialization at the top of their preference list were able to gain admission, that is the observed institution/field specialization of the graduates and their most preferred choices are close to each other. In contrast, the higher the admission rate was, the less selective the institution/field specialization proved to be and applicants who had put the given institution/field specialization to the end of their preference ranking list, were also able to gain admission. It means that students who probably failed to get admission to their most preferred institution/field specialization are more likely to graduate from an institution/field specialization where the admission rate is high and that the observed institution/field specialization and the most preferred choice of the graduates are far from each other. (An earlier study on the application strategy of the Hungarian prospective students (Varga, 2006) has found that as we go down in the ranking of the applications students take into account the admission probability with a larger weight and they are more willing to apply for a major with less favourable labour market opportunities if their admission probabilities are higher.) The admission rate of the home institution/field specialization of students may comprise other effects as well, for example the ability of graduates, but as the current analysis is aimed at

investigating the effect of the restrained number of places at popular fields on the probability of switching to another field after graduation, ability sorting does not distort the results.

The group of variables describing the type of first degree includes: a dummy variable indicating whether the first diploma of the young employee is a college (3-4 years) or a university (5-6 years) degree. A set of dummy variables is indicating the field specialisation of the first diploma. Dummy variables indicating the field specialization of the 1<sup>st</sup> diploma were put in the model to test if field specialisations, which on average provide below average returns to higher education, increase the probability of switching to another field of study after graduation. These variables may also capture the differences in skill transferability among majors as Borghans and Golsteyn (2006) showed. The estimations were made using two specifications. In the first one, variables indicating field specialization of first qualification were omitted, while in the second one these variables are also included.

Three variables were used for indicating early labour market success of graduates: (log of) monthly earnings at 1<sup>st</sup> observation, i.e. one year after graduation; a dummy variable indicating if the individual was employed at 1<sup>st</sup> observation; and young employees' subjective assessment whether their first occupation closely corresponded - "matched" - to their education or not. This variable may capture "matching" problems, namely if graduates switch to another field of study because they haven't found a job which requires that particular field of study where they graduated from. (List of variables is summarized in Appendix A.)

The second part of the analysis focuses on the effect of obtaining a second diploma on labour market success of young career beginners. The question was: how does obtaining a second diploma in the same field specialization or in another field specialization change labour market success of young employees compared to what they would have experienced had they not obtained a 2<sup>nd</sup> diploma.

Propensity score matching-average treatment on the treated (ATT) method developed by Rosenbaum and Rubin (1983) was used to estimate the effect of further higher educational studies on labour market success of young graduates. Graduates who have a further qualification and graduates who don't may differ systematically in their observable and unobservable characteristics. The propensity score matching method relies on the assumption of selection on observables. Our data-set does not contain any potential instrument that may determine the choice to undertake further higher education studies but does not affect labour market success of graduates so the problem of selection on unobservable remains unsolved in this paper.

For the analysis the sample was divided into two parts. The first consisted of graduates who have got a 2<sup>nd</sup> qualification with switching to another field specialization and graduates who have no second qualification. The second sample comprised graduates who obtained a 2<sup>nd</sup> diploma in their original field specialization and graduates who have no 2<sup>nd</sup> diploma. That is, the analysis was conducted for switchers and deepeners separately and both switchers and deepeners were compared with graduates who without a second diploma.

The first step of the propensity score method is to estimate the propensity score (Becker and Ichino 2003), which is defined as the conditional probability of receiving a treatment (in our case obtaining a second diploma) given the pre-treatment characteristics. Individuals with the same propensity scores but different treatment are controls for each other and the difference between the values of their outcome variables is the ATT. For estimating the propensity score, first a probit regression was run with the same covariates as the ones used for the multinomial probit model (both for switchers and for deepeners). Then it was tested whether observations with the same characteristics have the same distribution of characteristics whether the balancing property is satisfied. The sample was split into  $k$  equally spaced intervals of the propensity score, and within each interval it was tested if the average

propensity score of treated and control units did not differ. If the test in one interval failed, the interval was split into halves and tested again. The process was continued until the average propensity score of treated and control units for all intervals did not differ. Within each interval the means of each characteristic were tested for difference between treated and control units.

Two methods were used to match 2<sup>nd</sup> diploma obtainers against non obtainers: (1) Kernel matching (ATTK), when all treated are matched with a weighted average of all controls with weights that are inversely proportional to the distance between the propensity scores of treated and controls, (2) and stratification matching (ATTS), which consist of dividing the range of variation of the propensity score in intervals in such a way that within each interval treated and control units have on average the same propensity score, then within each interval the difference between the average outcomes of the treated and the controls is computed. The average treatment effect is finally obtained as an average of the average treatment effect of each block with weights given by the distribution of treated units across blocks. For comparison, an average treatment effect using OLS regression was also estimated when propensity score played the role of control function<sup>1</sup>:

Two outcome variables describing labour market success are analysed: (1) earnings at 2<sup>nd</sup> observation, (2) the difference between earnings of the 2<sup>nd</sup> and 1<sup>st</sup> observations.

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<sup>1</sup>  $\log y_i = \alpha + \beta D_i + \gamma p_i + u_i$ , where  $y_i$  denotes the outcome variable,  $p_i$  denotes the estimated propensity score,  $D_i$  a dummy variable indicating treatment (switching in the first and deepening in the second part of the analysis). The estimated coefficient  $\beta$  can be interpreted as average treatment effect:  
 $B = E[\log y \mid p_i, D=1] - E[\log y \mid p_i, D=0]$

## **5. Results**

### **5.1. Determinants of further higher education studies**

Estimation results for determinants of the probability of further studies, the multinomial probit estimates marginal effects are reported in Table 3. One of the main objectives of the analysis was to investigate if obtaining a first degree - most likely - not in the most preferred field specialization affects the odds of participating in further higher education studies and to appraise the effect of early labour market success on the probability of the switching or “deepening” decision.

The results in both specifications show the crucial role played by the admission rate of the institution/field specialization of the 1<sup>st</sup> diploma in the switching decision. Estimated marginal effects are positive and significant in both specifications. The larger the admission rate is, the more likely it is that the graduate switches to another field of study after graduation. In both specifications this variable has the largest effect on the choice of switching to another field of study. It seems that young employees who did not have the possibility to enrol to their most preferred institution/field specialisation and finally accepted an offer from a less promising institution/field specialisation or chose an institution/field specialisation with a higher probability of admission but with worse labour market prospects, are likely to go for a further degree in a field specialisation with more promising prospects, most probably in a field specialization, which is closer to their original preferences. The effect of the admission rate to an institution/field specialization of the 1<sup>st</sup> diploma on the probability of obtaining a 2<sup>nd</sup> degree in the first field specialization is negative and significant in the base model (in which dummy variables indicating the field of specialization of 1<sup>st</sup> diploma were omitted) while the effect is not significantly different from zero in the extended model.

Estimation results show that early labour market success of young graduates in terms of employment has no significant effect on switching to another field specialization. Employment status of graduates one year after graduation proved to be insignificant and the same is true for the dummy variable which indicates whether the individual stated that his/her occupation at 1<sup>st</sup> observation closely corresponded to his/her education of 1<sup>st</sup> qualification. The effect of earnings of the graduate at 1<sup>st</sup> observation on the probability of switching was negative and significant in the base model while it proved to be insignificant in the extended model which contained dummy variables indicating the field specialization of the 1<sup>st</sup> diploma. It seems that field specific earnings differences play a role in switching decision. The estimated effect of field specialisation of the 1<sup>st</sup> qualification show that graduates, who got their 1<sup>st</sup> qualification in a field specialisation, which provide below average returns, switch to another field of study with higher probability, even if we control for earnings and employment at the 1<sup>st</sup> observation. Graduates from teacher training, humanities and languages, agricultural studies, and natural sciences have greater odds of switching to another field as compared to graduates from engineering. The results may also reflect that these fields of studies provide more transferable skills than studies in the reference category and that skill transferability was the reason for submitting an application and accepting admission to these field specializations when students enrolled to higher education for first qualification.

In the decision of pursuing further studies in the same discipline as that of the first qualification, early labour market success - in terms of earnings at 1<sup>st</sup> observation – does not have significant effect in the base model while in the extended model in which we controlled for field of specialization earnings at 1<sup>st</sup> observation play a role. The smaller the starting salary of a graduate is, the more likely it is that he/she will obtain a second diploma in his/her original field specialization within 5 years after graduation in the extended model. Having a 1<sup>st</sup> degree in economics and business (which on average provides the highest earnings' gains)

increases the probability of obtaining a 2<sup>nd</sup> qualification in the same discipline, while obtaining a 1<sup>st</sup> degree in teacher training decreases the odds of going for a 2<sup>nd</sup> qualification in the same discipline

Male graduates switch to another field specialization with smaller probability than female graduates and they get a 2<sup>nd</sup> qualification in the same discipline as the 1<sup>st</sup> one with higher probability. Graduates from colleges switch to another field specialization with smaller probability and they follow further studies in their original discipline with higher probability than graduates whose first qualification was a university level diploma.

These findings, which show that early labour market success of graduates does not have a significant effect on the probability of the switching decision if we control for field of study, seem to support the assumption that further higher educational studies of switchers form a part of their learning strategy, in the course of which first they obtain a degree in an institution/field specialization with a high probability of admission and after graduating they get a 2<sup>nd</sup> qualification which is closer to their preferences. If false expectations or regret were the reasons for the switching decision, early labour market success ought to have an effect on the probability of the switching decision.

## **5.2. The impact of further higher education on labour market performance**

The second part of the analysis focuses on the labour market impact of obtaining a second diploma. The results of the propensity score estimates for switchers and deepeners are reported in Appendix B. As the results are very similar to those of the multinomial probit estimates I do not discuss them in detail.

Table 4 reports the average treatment effects on the treated based on OLS estimate, Kernel matching and stratification matching procedure for switchers and deepeners. The

results show that in the short run switchers do not gain from further studies in terms of earnings. The labour market success of graduates who have a 2<sup>nd</sup> qualification in the same discipline as the original one improves in both terms of earnings and earnings growth.

The results of all three methods: OLS, stratification and Kernel-based matching suggest that the earnings of switchers are smaller than they would be had they not obtained a 2<sup>nd</sup> diploma, earnings of switchers are lower than those of their matched counterparts by 4 % points. All three methods indicate that the effect of obtaining a 2<sup>nd</sup> qualification in another field specialization on the change of earnings between the 1<sup>st</sup> and 2<sup>nd</sup> observations is insignificant in the short run. The results seem to support the assumption that graduates who pursue further studies in another field specialization than their original one do lose a part of their human capital and that may explain why their earnings at the 2<sup>nd</sup> observation are lower than they would be without switching.

The estimated effects of further higher education studies for deepeners are also in line with the expectations. Graduates, who obtain a 2<sup>nd</sup> qualification in the same discipline as the original field do not have to suffer a loss in their accumulated human capital, on the contrary, they accumulate more. The expectation was that their earnings would improve after receiving a 2<sup>nd</sup> degree. The OLS estimate presents the lowest estimates for the effect of obtaining a 2<sup>nd</sup> qualification in the same field specialization on earnings at 2<sup>nd</sup> observation. According to the OLS results, deepeners earn more by 3.5 % points than they would, had they not obtained a 2<sup>nd</sup> degree. Using the stratification method, the results show somewhat higher earnings gains 4.6 % points and using the Kernel-based method the effect is 4.8 % points. All three methods show that obtaining a 2<sup>nd</sup> qualification in the same discipline has a significant positive effect on the change of earnings between 1<sup>st</sup> and 2<sup>nd</sup> observations. The estimation results of OLS estimates show that the earnings' increase of deepeners is 12.9 % points higher than that of

graduates with the same characteristics but without a 2<sup>nd</sup> qualification. The effect is larger using stratification and Kernel-based methods, 17 and 16 % points respectively.

## **6. Conclusions**

The aim of the paper was to show that state intervention, which leads to the inelasticity of the supply of places by field specialization and results in a strong selection of students applying to field specializations with favourable labour market prospects, toward which fields there is a high demand, may result in further higher education studies of graduates. The assumption was that students select a learning path, which maximizes their utility. If they cannot enrol to their most preferred institution/field specialization because the number of places is restricted, they may choose a learning path, in the course of which they first obtain a degree in another institution/field specialization where they apply to in order to raise the probability of admission and where the transferable part of human capital resulting from their studies is also high. After graduation they continue studying and switch to their preferred field specialization.

The results concerning the determinants of switching to another field of study after graduation and following higher educational studies in another field seem to support this assumption. Graduates, who obtained their first qualification not in their most preferred field specialization, have higher odds of switching to another field specialization after graduation. Early labour market success in terms of earnings – if we control for field specialization of the 1<sup>st</sup> diploma - and employment does not have a significant effect on the probability of switching, not even if the graduate's first job is closely related (or not) to the field of his/her 1<sup>st</sup> qualification. This may suggest that it is not regret, withered expectations or matching problems that induce the graduates to switching to another field of study, but their studies

might represent a part of their originally intended learning strategy. It means that the reason why they choose to pursue further studies is that they had to face restrictions in their preferred field specialization. As the set quotas result in ability sorting, less able students are more likely to acquire a 1<sup>st</sup> qualification in a field specialization other than their most preferred one, where they can accumulate more transferable human capital and they plan to switch to another field of study after graduation when their chances get higher. The effect of switching on labour market success of graduates in the short run seems to support that switchers lose a part of their accumulated human capital, their earnings in the short run become lower than they would be hadn't they obtained a 2<sup>nd</sup> degree. It means that indeed the inflexibility of the admission quotas by field specializations results in the extension of the lengthening of the duration of studies, that is "lifelong learning" is partly the result of the inflexibility of supply of higher education by field speciality and that state intervention results in the increase of costs of higher education due to longer studies and a loss in a part of accumulated human capital of switchers.

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## Appendix A

### List of variables

	Mean	Std. dev
Male	54.2	
<i>Early labour market success</i>		
(log) earnings at 1 <sup>st</sup> observation	10.938	0.5157
Employed at 1 <sup>st</sup> observation	77.5	
Occupation at 1 <sup>st</sup> observation closely related to type of 1 <sup>st</sup> degree	67.1	
<i>Type of 1<sup>st</sup> degree</i>		
College	58.03	
<i>Field specialisation of 1<sup>st</sup> diploma</i>		
Agricultural	0.155	
Humanities and languages	0.132	
Law	0.046	
Natural sciences	0.048	
Economics, business	0.181	
Teacher training	0.041	
Engineering and informatics	0.286	
Other	0.093	
Admission rate of institution/field specialization of 1 <sup>st</sup> diploma	0.416	0.3501
Residence Budapest	0.174	
Graduated in 1998	0.396	
Employed at 2 <sup>nd</sup> observation	0.862	
(log) earnings at 2 <sup>nd</sup> observation	11.681	0.4587
(log) earnings difference between 2 <sup>nd</sup> and 1 <sup>st</sup> observation	11.02	0.721

## Appendix B

### Propensity score equations

1) Obtained 2<sup>nd</sup> diploma switching to another field specialisation/haven't obtained 2<sup>nd</sup> diploma

2) Obtained 2<sup>nd</sup> diploma in the same field specialisation (deepening)/haven't obtained 2<sup>nd</sup> diploma

	1) Switching	2) Deepening
<b>Male</b>	-0.2584* (0.0643)	0.1255 (0.0710)
<b>Early labour market success</b>		
(log) Earnings at 1 <sup>st</sup> observation	-0.1694 (0.0359)	-0.2109** (0.0716)
Employed at 1 <sup>st</sup> observation	-0.2538 (0.2527)	0.2462 (0.3467)
Occupation at 1 <sup>st</sup> observation closely related to type of 1 <sup>st</sup> degree	0.1851 (0.0668)	0.1603 (0.0734)
<b>Type of 1<sup>st</sup> degree</b>		
College	-0.0627 (0.0644)	0.2844* (0.0747)
<i>Field specialisation of 1<sup>st</sup> diploma</i>		
Agricultural	0.82195* (0.0925)	0.2611** (0.1159)
Humanities and languages	0.8797* (0.1336)	0.5105* (0.1551)
Law	-0.19320 (0.1794)	0.2226 (0.1762)
Natural sciences	0.9688* (0.2058)	1.1346* (0.2084)
Economics, business	0.0914 (0.1123)	0.6657* (0.1151)
Teacher training	0.3362** (0.1555)	-0.3175 (0.2150)
Other	1.6837* (0.1907)	0.1494 (0.3444)
<b>Admission rate of institution/field specialization of 1<sup>st</sup> diploma</b>	3.5666* (0.9177)	0.3318 (1.0521)
<b>Residence Budapest</b>	0.0872 (0.0837)	0.0315 (0.0874)
<b>Graduated in 1998</b>	0.2548* (0.0623)	0.1524** (0.0692)
Constant	0.8569 (0.7526)	0.7886 (0.8452)
Log likelihood	-1250.1631	-1049.3325
LR chi2(15)	271.24	121.28
Prob > chi2	0.0000	0.0000
Pseudo R2	0.0979	0.0546
Number of observations	2066	1803

*Standard errors in parentheses*

\* Significant at 1 % level \*\* Significant at 5 % level

*Reference categories: female; not employed at 1<sup>st</sup> observation; occupation at 1<sup>st</sup> observation is not related to type of 1<sup>st</sup> degree; 1<sup>st</sup> degree university level; field specialisation of 1<sup>st</sup> degree engineering or informatics; residence: elsewhere; graduated in 1999*

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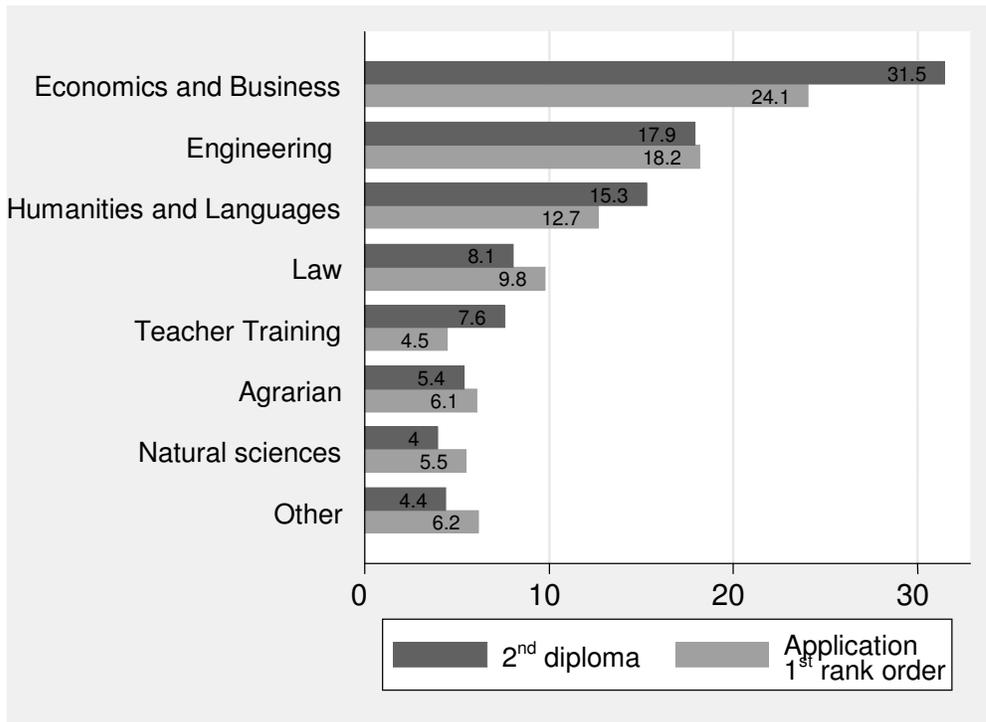
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**Figure 1**

**Distribution of applications for 1<sup>st</sup> degree with 1<sup>st</sup> preference ranking\* and distribution of 2<sup>nd</sup> qualifications\*\* by field specializations**



\* Source: Data of National Higher Education Office

\*\* Data of the Follow-up of Higher Education Graduates' Survey

## Tables

**Table 1**

**Distribution of graduates by further higher education studies %**

	No 2 <sup>nd</sup> diploma	Switching	Deepening	Total
All	42.9	34.9	22.2	100
Female	41.2	37.8	21.0	100
Male	45.3	31.0	23.7	100
1 <sup>st</sup> qualification college level	44.0	33.4	22.5	100
1 <sup>st</sup> qualification university level	41.3	37.0	21.7	100
Field specialization of 1 <sup>st</sup> qualification				
Agricultural	32.1	50.5	17.4	100
Humanities and languages	36.8	47.4	15.8	100
Law	51.7	24.7	23.6	100
Natural Sciences	25.5	33.7	40.8	100
Engineering and informatics	50.2	26.8	23.0	100
Economics and business	43.6	19.5	36.9	100
Teacher training	48.1	41.0	10.9	100
Other	32.1	59.3	8.6	100

**Table 2**

**Distribution of switchers by field specializations to which they switch and average starting salaries of graduates by field specialization as a % of average starting salaries of graduates %**

<b>Field specialization</b>	<b>Percentage of switchers</b>	<b>Average starting salaries of field as a % of average starting salaries</b>
<b>Economics and business</b>	<b>41.4</b>	<b>151.0</b>
<b>Engineering and informatics</b>	<b>16.2</b>	<b>124.5</b>
<b>Law</b>	<b>15.6</b>	<b>122,7</b>
<b>Humanities and languages</b>	<b>12.5</b>	<b>83.5</b>
<b>Teacher training</b>	<b>4.6</b>	<b>62.9</b>
<b>Other</b>	<b>4.7</b>	<b>78.5</b>
<b>Natural sciences</b>	<b>4.0</b>	<b>79.6</b>
<b>Agricultural</b>	<b>1.1</b>	<b>94.9</b>
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 3**

**Determinants of obtaining a 2<sup>nd</sup> qualification in another field specialization and in the same field specialization as the field specialization of 1<sup>st</sup> qualification**  
**Multinomial probit Marginal effects**

	Base model		Extended model	
Base category: have not obtained 2 <sup>nd</sup> diploma	Outcome=1 Switching dy/dx	Outcome=2 Deepening dy/dx	Outcome=1 Switching dy/dx	Outcome=2 Deepening dy/dx
<i>Male</i>	-0.1100* (0.0195)	0.0655* (0.0165)	-0.1121* (0.0207)	0.0645* (0.0174)
<i>Early labour market success</i> (log) Earnings at 1 <sup>st</sup> observation	-0.0985* (0.0192)	0.0138 (0.0163)	-0.0328 (0.0209)	-0.0425** (0.018)
Employed at 1 <sup>st</sup> observation	-0.1433 (0.0894)	0.0746 (0.0607)	-0.1209 (0.0908)	0.0692 (0.0637)
Occupation at 1 <sup>st</sup> observation closely related to type of 1 <sup>st</sup> degree	-0.04677 (0.0201)	0.04545 (0.0168)	0.0301 (0.0207)	0.0341 (0.0179)
<i>Type of 1<sup>st</sup> degree</i>				
College	-0.0602* (0.0197)	0.0836* (0.0169)	-0.0441** (0.0210)	0.0758* (0.0180)
<i>Admission rate of institution/field specialization of 1<sup>st</sup> diploma</i>	0.6581* (0.1934)	-1.0324* (0.1754)	1.1599* (0.2967)	-0.2091 (0.2733)
<i>Residence Budapest</i>	-0.0261 (0.0253)	0.0121 (0.0226)	0.0243 (0.0274)	0.0007
<i>Graduated in 1998</i>	0.0353 (0.0193)	.0325036 (0.0171)	0.0702** (0.0203)	0.0192 (0.0175)
<i>Field specialisation of 1<sup>st</sup> diploma</i>	-	-		
Agricultural	-	-	0.2750* (0.0330)	-0.0347 (0.0260)
Humanities and languages	-	-	0.2554* (0.0487)	0.0283 (0.0416)
Law	-	-	-0.0800 (0.0517)	0.0848 (0.0563)
Natural sciences	-	-	0.1582** (0.0687)	0.1987** (0.0674)
Economics, business	-	-	-0.0456 (0.0343)	0.2004* (0.0369)
Teacher training	-	-	0.1421** (0.0583)	-0.0961** (0.0377)
Other	-	-	0.5658* (0.0415)	-0.1524* (0.0287)

*Standard errors in parentheses*

\* Significant at 1 % level

\*\* Significant at 5 % level

*Reference categories: female; not employed at 1<sup>st</sup> observation; occupation at 1<sup>st</sup> observation is not related to type of 1<sup>st</sup> degree; 1<sup>st</sup> degree university level; field specialisation of 1<sup>st</sup> degree engineering or informatics; residence: outside Budapest; graduated in 1999*

**Table 4**

**The effect of 2<sup>nd</sup> diploma on labour market success of switchers**  
**Average treatment effect on the treated**

<b>SWITCHERS</b>						
		<b>(log) earnings at 2<sup>nd</sup> observation</b>				
		<b>ATT</b>	<b>t</b>	<b>Standard errors</b>	<b>No. of treated</b>	
<b>OLS</b>		-0.041	-1.79	0.023	N=1473	
<b>ATTS</b>	Stratification method	-0.037	-1.787	0.021 <sup>2</sup>	836	1648
<b>ATTK</b>	Kernel-based matching	-0.037	-1.797	0.023 <sup>2</sup>	836	1145
		<b>(log) earnings difference between 2<sup>nd</sup> and 1<sup>st</sup> observation</b>				
<b>OLS</b>		-0.011	-0.27	0.040	N=1487	
<b>ATTS</b>	Stratification method	-0.011	-0.327	0.034 <sup>2</sup>	836	1648
<b>ATTK</b>	Kernel-based matching	-0.008	-0.244	0.035 <sup>2</sup>	836	1145
<b>DEEPENERS</b>						
		<b>(log) earnings at 2<sup>nd</sup> observation</b>				
<b>OLS</b>		0.035	1.171	0.035	N=1341	
<b>ATTS</b>	Stratification method	0.046	1.752	0.027 <sup>2</sup>	508	1958
<b>ATTK</b>	Kernel-based matching	0.048	1.649	0.029 <sup>2</sup>	508	1132
		<b>(log) earnings difference between 2<sup>nd</sup> and 1<sup>st</sup> observation</b>				
<b>OLS</b>		0.129	2.71	0.047	N=1277	
<b>ATTS</b>	Stratification method	0.171	4.054	0.042 <sup>2</sup>	508	1958
<b>ATTK</b>	Kernel-based matching	0.164	3.450	0.048 <sup>2</sup>	508	1132

<sup>1</sup> Analytical standard errors

<sup>2</sup> Bootstrapped standard errors