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# The Role of Labour Market Expectations and Admission Probabilities in Students' Application Decisions on Higher Education: the case of Hungary

JÚLIA VARGA

Labour Research Department, Institute of Economics,
Hungarian Academy of Sciences

Department of Human Resources, Budapest University of Economics and Public Administration

Budapest

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Author:Júlia VARGA, Department of Human Resources, Budapest University of Economics and Public Administration, Fővám tér 9. H–1093 Budapest, Hungary. Address: Fővám tér 9. H–1093 Budapest, Hungary.
E-mail: vargajulia@hotmail.com

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# THE ROLE OF LABOUR MARKET EXPECTATIONS AND ADMISSION PROBABILITIES IN STUDENTS' APPLICATION DECISIONS ON HIGHER EDUCATION: THE CASE OF HUNGARY

**BY**

JÚLIA VARGA

## *Abstract*

*This paper analyses the effects of labour market expectations and admission probabilities on students' application strategies to higher education. The starting hypothesis of this study is that students consider the expected utility of their choices, a function of expected net lifetime earnings and the probability of admission. Based on a survey carried out among Hungarian secondary school students, three aspects of application decisions are investigated: the number of applications; the institutions/field specialisation ranked first and last in students' choices; and the selection between state-funded and cost-priced education. The results of this paper confirm that both expected wages and admission probabilities determine students' application strategies and that the seemingly irrational student preferences for institutions/orientations with less favourable labour market opportunities might be the result of a rational decision process.*

*Keywords: Education, Human Capital, Skills, Occupational Choice, Labor Productivity*

*JEL Classification: I20, J24*

VARGA JÚLIA

# A MUNKAERŐ-PIACI KILÁTÁSOK ÉS A FELVÉTELI VALÓSZÍNŰSÉGEK SZEREPE A DIÁKOK FELSŐOKTATÁSI FELVÉTELI JELENTKEZÉSÉBEN MAGYARORSZÁGON

## *Összefoglaló*

*A tanulmány a munkerő-piaci várakozásoknak és a felvételi esélyeknek az érettségizők felsőoktatási jelentkezési stratégiájában betöltött szerepét vizsgálja. A kiinduló hipotézis az, hogy az érettségizők választásaik várható hasznosságát figyelik, mely nettó életkereseti várakozásuknak és bekerülési esélyüknek függvénye. A tanulmány a középiskolások körében végzett kérdőíves adatfelvétel eredményeire támaszkodva az érettségizők jelentkezési döntéseinek három mozzanatát elemzi: a jelentkezések számára vonatkozó döntést; az első és utolsó helyen történő jelentkezés intézményére és szakirányára vonatkozó döntést; és az állami finanszírozású és költségtérítéses képzés közötti választást. Az eredmények megerősítik, hogy az érettségizők jelentkezési stratégiájában a kereseti várakozások és a bekerülési esélyek is szerepet játszanak és, hogy az a látszólag irracionális magatartás, hogy kedvezőtlenebb munkaerő-piaci lehetőségeket biztosító intézményeket/szakokat választanak racionális döntéshozatali folyamat következménye lehet.*

## 1. INTRODUCTION

Similarly to most transition economies, a rapid expansion has taken place in the higher education of Hungary since the beginning of the transition. Between 1990 -2002 there was a more than two and a half-fold increase in the number of full time students, and within the age cohort of 18-22 year olds the percentage of students participating in higher education rose from 10.4 to 23 per cent. The increase in the demand for higher education was also significant during the same period. The number of applicants to full time higher education doubled, and there was a more than four-fold increase in the number of applications (students in the Hungarian higher education system may apply to as many institutions as they wish). The cause of the upward shift in the demand for higher-education studies was the increased returns to education for the most educated young employees (see for example Kertesi-Köllő, 1999, 2002; Kézdi 2002). In spite of the sharp rise in the number of graduates there is no evidence that the returns to higher education have fallen in the meantime. Nevertheless, labour market prospects in terms of earnings and employment probabilities differ substantially for young graduates according to their field of speciality and home institution. Some field specialisation (business/economics, technical and foreign language studies) provide above average returns, while others (teacher preparation programs, medical and agricultural studies, natural sciences) result in less favourable labour market opportunities (Galasi, 2003). It has to be pointed out that the changes in the demand for higher education are characterised by a growing interest toward institutions/field specialisation in the latter group as well. The number of applications to teacher preparation programs doubled between 1990 and 2000, and there was a four-fold increase in the number of applications for agrarian studies and natural sciences (Higher Education Admission Office, 2001). Based on these facts several authors question the economic rationality of students' choices. They claim that potential students do not have accurate information on the labour market prospects of different orientations. They also conclude that the expanding possibilities of multiple applications to higher education or the more flexible adaptation of education to individual needs by field specialisation may lead to mismatches between skill supplies and market needs and may result in waste of resources. Further down the opposite of this hypothesis will be proved, namely that the existence of quantitative barriers in admissions and the relatively slow adaptation to the demand of the structure of higher education by field specialisations may lead

to growing interest in less favourable orientations even if prospective students make perfectly rational choices when they apply for further studies.

The application decisions of students will be analysed within the framework of human capital theory. Human capital theory states that students, when making schooling decisions, compare the outcomes of different possibilities and choose the option with the highest return. Most studies that analyse the effects of labour market expectations on schooling decisions consider the actual return to education of graduates with similar characteristics a proxy for the expected return. Several studies have proved that there is substantial individual heterogeneity in returns to schooling. A common explanation for this phenomenon is that people sort themselves into schooling based on the principle of comparative advantage. It also means that individual characteristics influence the expectations and that there is heterogeneity in students' earnings expectations. For instance a highly talented student in physics will expect greater returns in case of choosing physics for field specialisation. Some papers concerning college attendance choice use selection models for correcting this problem. (See for example Heckman-Li 2003.) A growing number of studies have examined directly students' earnings expectations (Betts, 1996; Dominitz – Manski, 1996; Wolter, 2000; Brunello-Lucifora-Ebmer 2001). This paper also uses direct observations for students' expectations and thus the heterogeneity of these expectations can be taken into account in students' choices. The survey, on which our data is based, asked prospective students to state their personal labour market prospects in different schooling scenarios.

If the supply were perfectly elastic, individuals would choose to apply to a field specialisation/institution, which would maximise their expected lifecycle income. As the number of students admitted to certain institutions/field specialisation is limited students may take into account not only the expected wage gain, but also the probability of admission (and graduation), because they can realise higher earnings only if they are accepted to the chosen place (and they finish their studies successfully). As a consequence, demand for institutions/field specialisations with less favourable labour market opportunities may grow even if students make perfectly rational choices. If the supply of places in the most sought after institutions/field specialisation grows at a slower pace than the demand, admission criteria will get stricter or remains unchanged for areas providing above average labour market opportunities. If at the same time the supply of places in institutions providing less favourable orientations increases and admission criteria for these institutions/field specialisations is less strict, students may apply there.

This paper will use the theoretical contention of Mingat and Eicher (1982) that students take into account two dimensions of their educational choice, labour market returns and the probability of success, meaning that they operate a trade off between the risk and the return components of the orientation choice. Most of the studies analysing the choice of a college major assumed constant probability of success across majors but some recent studies (Rochat-Demeulemeester 2001; Montmarquette et al. 2002, Chevalier et al. 2003) used models based on the assumption of Mingat and Eicher. This paper applies a model similar to the one used in Montmarquatte et al., but as the focus of this analysis is on the application decisions, the probability of admission (and not the probability of successful graduation) will be used as a "risk component" of the orientation choice. An earlier study based on the same survey (Varga 2001) has found that students' labour market expectations have an effect on their application decisions (whether to apply for further studies and for which level -college/university- to opt for ). This paper analyses the application strategy of those students who submit an application. In the Hungarian admission system prospective students may apply[i] to as many institutions as they want, and they may choose between state-funded and the so-called cost-priced education. At state funded places education is tuition-free while at cost-priced places students have to pay the full market costs of their education. Costs of the application itself are negligible. Three aspects of student choice strategies are investigated: the decision on the number of applications; the choice of field specialisation/institution of multiple applications; and the decision on applying to a state funded or a so-called cost-priced program[ii]. The question that has to be answered below is the following: what is the role of labour market expectations and admission probabilities in students' application decisions?

## THEORETICAL CONSIDERATIONS

It is assumed that the field specialisation/institution affects the earnings of graduates and the probability of admission. For field specialisations/institutions which are in demand on the labour market, and/or provide higher quality (higher earnings after graduation) the probability of admission is lower as the demand for these courses is more significant and the quantitative barriers in admission change slowly. Students' application decisions are based on the expected utility of application, which is a function of expected lifetime earnings and of the probability of admission. Let $w_{ij}$ denote the expected earnings of individual $i$ after graduating in institution/field specialisation $j$, where $p_{ij}$ is the probability of admission of indi-

vidual ***i*** to institution/field specialisation ***j***, and $w_{i0}$ represents the expected earnings of individual ***i*** with a rejected application, thus this last indicator shows the expected earnings with secondary school qualification. Then the expected utility of individual ***i*** when applying to institution/field specialisation ***j*** is:

$$E(U_{ij}) = \sum_{t=0}^{n} \frac{p_{ij} w_{ij} + (1 - p_{ij}) w_{i0}}{(1+r)^t}$$

where ***r*** is the student's discount rate and ***n*** is the expected number of years in the labour force.

When students decide on their applications they evaluate the expected utility of all possible alternatives (institutions/field specialisation). For all students who submit an application to a higher education institution, there is at least one field specialisation/institution where the expected utility of application is greater than or equal to the non-learning alternative. It means that the additional earnings after graduation weighted by the probability of admission are equal to or greater than the discounted expected earnings with secondary school qualification and the costs of further studies ($c_{ij}$), (earnings foregone, direct schooling costs and costs of application).

$E(U_{ij}) \geq E(U_{i0})$, that is,

$$\sum_{t=0}^{n} \frac{p_{ij} w_{ij} + (1 - p_{ij}) w_{i0}}{(1+r)^t} \geq \sum_{t=0}^{s} \frac{w_{i0} + c_{ij}}{(1+r)^t}$$

where ***s*** denotes the expected number of years in schooling. In the decision making process students rank all alternatives for which $E(U_{ij}) \geq E(U_{i0})$, based on their utility. If costs of studying do not differ across alternatives (as it is the case in Hungary at state funded institutions), alternative ***j*** will be ranked above alternative ***k*** if $E(U_{ij}) \geq E(U_{ik})$, that is:

$$\sum_{t=0}^{n} \frac{p_{ij}(w_{ij} - w_{ik}) + (p_{ij} - p_{ik})(w_{ik} - w_{i0})}{(1+r)^t}$$

If $p_j$ and $p_k$ are close to each other ($pj \approx pk$), expected lifetime earnings ($w_{ij} - w_{ik}$) may play a decisive role in the ranking order of institutions/field specialisations. When $p_j > p_k$, the difference in admission probability could play a major role in ranking field specialisation/institution ***j*** over ***k***.

If the costs of studying differ across alternatives (as it is the case in Hungary when choosing between state-funded and cost-priced education) alternative ***j*** will be ranked above alternative ***k*** if:

$$\sum_{t=0}^{n} \frac{p_{ij}(w_{ij} - w_{ik}) + (p_{ij} - p_{ik})(w_{ik} - w_{i0})}{(1+r)^t} \geq \sum_{t=0}^{s} \frac{c_{ij} - c_{ik}}{(1+r)^t}$$

where $c_{ij}$ and $c_{ik}$ are the direct costs of studying for individual $i$ with field specialisation $j$ and $k$ respectively.

If students may apply to one institution/field specialisation only, they will choose the alternative where they can maximise the expected utility. If the number of applications is not limited and there are no application costs, or the application costs are negligible, students will apply for all possible alternatives, where $E(U_{ij}) \geq E(U_{i0})$ and they may apply for institutions/field specialisation where expected lifetime earnings are lower but admission probabilities are higher. If there are application costs involved (fees or other costs, like the expenses of preparing for an additional entrance examination) students will apply to further institutions if the expected increase in utility equals to the marginal costs of an additional application.

## DATA AND EMPIRICAL METHODOLOGY

The data used in this paper constitute a sub-sample of the data gathered for a survey on earnings expectations of secondary school students. The survey was carried out in 2000, two months before students had to submit their applications for admission to higher education.[iii] The sub-sample which is used in this paper contains a group of 1700 students, who plan to apply for further studies after finishing secondary school. In addition to questions about their personal and family background, their results in secondary school, students were asked to state their labour market expectations (i.e. earnings and the probability of finding an appropriate job) assuming two scenarios: (1) their school career would finish with a secondary school diploma or (2) they would be accepted to the field/institution they applied to and they would complete their studies successfully. Students were also asked about their application plans, they had to state to which institution/field specialisation they would submit an application in the first, second, third and fourth place.

Although students were asked to state their earnings expectations, in this analysis computed earnings are used. The reason for this is that the survey inquired about expected earnings, assuming that students were accepted to the field/institution of their first preference. For analysing student choice behaviour, data would be needed on their earnings expectations assuming that they were enrolled not only to institutions of their first but also second,

third and fourth preference. First of all the deviation of each student's expectation (which he/she stated in the survey as earnings expectation in case of graduating from the most preferred institution/field specialisation ) from average starting earnings of new graduates from the same institution/specialisation was computed.[iv] Then the deviation of students' expectations from average starting earnings was regressed on their observed characteristics (gender, type of secondary school, type of settlement, family income, educational level of parents, ability). The estimated coefficients were used to predict earnings expectations of students. Using this method it was assumed that the same observed and unobserved characteristics determine the deviation of expected earnings from the average, irrespective of the rank order of a given application to a certain institution/field specialisation. This means that students who expect their earnings potentials to be higher/lower than those of an average graduate of their most preferred institution/field specialisation, would also expect the earnings potentials to be higher/lower than those of an average graduate of a less preferred institution/field specialisation. Although this method disregards the possibility that students may value their earnings potentials compared to average earnings differently in their various choices, the results of the analysis of students' earnings estimations and expectations based on the same survey support the assumption that those who think that their potentials are higher/lower than the average after graduating at the most preferred institution/field specialisation, would also expect their earnings potentials to be higher/lower in general (for example with secondary school qualification). (Varga, 2001)

The set of independent variables used in the analysis is presented in Table 1. Two variables were used for indicating *labour market expectations* of students: (i) the (log of) expected wage gain after graduation, which is the difference between students' expected earnings with a degree and with a high school diploma ; (ii) the expected increase in the probability of finding a job, which is the difference between their expected probability of finding a job after graduating from higher education and after finishing secondary school. As some authors have shown (Berger, 1988) that the expected future earnings' stream may effect schooling decisions more than the initial earnings. This seems to be the case in Hungary as well (Varga, 2001), but the data on students' expectations of starting salaries were computed ones, so it seemed to be risky to construct a whole age-earnings' profile. For measuring the *probability of admission* of applicants, each student's "accumulated score" was computed as a percentage of the minimum admission score for state-funded places in the targeted institutions and programs (in the preceding year.)[v] The score is based on the students' secon-

dary school achievements (grade point averages, language exams etc.) The students' accumulated score is used as a proxy for *„ability"*. *Socio/demographic variables* measure gender, family income, the educational level of parents. The aim of including these variables was to see whether there is any systematic relation between the family background and students' application strategies: like the intention to choose a field specialisation/institution with a higher risk of rejection; to apply for more/less places or to apply for a cost-priced place. *The type of secondary school* was also incuded[vi]. The Hungarian secondary school system is stratified, thus the type of the school might have an effect on the costs of application (different types of secondary schools differ in the curricula and as a result, preparing for the entrance exams may require different effort ) and the costs of studies (for example opportunity costs of studies may be higher for students who were formerly studying in vocational schools and already have a vocational qualification after graduating from secondary school). Students` choices are classified in seven *field specialisations*. The list and definitions of the different field specialisations are presented in Table 1.

First, the decision-making on the number of applications was analysed with the help of an ordered logit model. In addition to the socio/demographic variables, explanatory variables include (1) „ability" of students, (2) the expected increase in the probability of finding a job after graduating from higher education, (3) the difference between the expected wage gain when graduating from their most and least preferred (which is the first for students with one and the second for students with two submitted applications, etc.) institutions ; and (4) the choice between state-funded or cost-priced education.

As a second step the determinants of choosing a field specialisation were analysed using multinominal logit estimations. Estimations were made (1) for the students' first choice if they want to apply for more than one place; (2) and for the last choice of the whole sample. Independent variables include expected wage gain after graduating from a given institution/field specialisation; the expected increase in the probability of finding a job; the probability of gaining admission to a given institution/field specialisation, the type of secondary school and gender. A less detailed classification of secondary schools was used in these estimates and some of the socio/demographic variables were omitted.[vii] The aim of repeating the same estimation for the most and least preferred applications was to compare the determinants of the different choices, to test whether students give different weights to admission probability and labour market expectations in their first and last choices.

Finally, the determinants of choosing cost-priced education are examined with the help of logit estimations. Independent variables include socio/demographic variables, type of secondary school, field specialisation of the first application and the probability of gaining admission to a state-funded place in the same institution/field specialisation.

## EMPIRICAL RESULTS

First, the determinants of the number of applications are examined. The sample contains those students who want to apply for further studies. It implies that there is at least one field specialisation/institution for each student where the expected earnings after graduation weighted by the probability of admission are equal to or greater than the discounted expected earnings with secondary school qualifications and the costs of further studies. In case of students who want to apply for more than one place there is more than one institution/field specialisation for this holds. For state-funded education which is tuition free, if we ignore possible differences in direct costs, the costs of studying do not differ across alternatives. Application fees are negligible. Nevertheless, non-monetary costs may differ from student to student, as well as expected utility from the different alternatives. For less talented students the probability of admission is low in most field specialisations/institutions, while for more able students there are several institutions/field specialisation where the probability of admission is high. In the latter group non-monetary costs of each additional application (passing another entrance examination) are also lower. The initial expectation was that more talented students would apply for more places.

Table 2. shows the determinants of the number of applications (1-4), the results of the ordered logit estimations, the estimated coefficients and partial effects in case of different outcomes. Results show that the effect of ability is in line with the expectations. More talented students with higher accumulated scores are more likely to apply for a larger number of places. Ability has a negative effect on the probability of applying for 1 or 2, and a positive effect on the probability of applying for 3 or 4 places. Expected improvement of employment possibilities after graduation also has a significant effect. The larger the expected improvement in the probability of finding a job after graduation, the smaller is the probability of one submitted application and the larger of three or four applications. The same is true for the difference between expected wage gain of the first and the last chosen alternatives. The bigger the difference in expected wage gain between the first and last choices, the higher the probability is that the student will

apply for three or four places and the smaller the probability is that he/she will apply for one place only. The results show that the effect of the variable indicating whether a student will apply for a cost-priced place is statistically insignificant. Students differ in their application strategies by certain socio/demographic characteristics as well. Males are less likely to apply for more places. The type of secondary school has a significant effect on the number of applications. Students finishing their secondary school studies in vocational schools with technical and economics programs are more likely to apply for one institution/field specialisation only. This highlights the importance of the structure of secondary vocational education in the demand for the different orientations. It seems that the costs of application to another field for students who graduate in vocational schools with these orientations are too high, consequently applying to the corresponding fields is relatively cheap. Certain field specialisation as a first choice have a significant effect on the number of applications when other variables are controlled for. The probability of applying for one place only is smaller for those students who have chosen medicine, economics/business and law as a first priority and they are more likely to apply for three or four places. The educational level of the mother is the only family background variable that has an effect on students' application strategies concerning the number of applications. Those students whose mother has at least college education are less likely to apply for 1 institution/field specialisation only and more likely to try for three or four places.

The second part of the analysis is aimed at investigating the determinants of choosing a field specialisation. We will test the hypothesis that in their orientation choices students take into account both the expected wage gain and the admission probability. We will also examine if students give different weights to these two components in their various choices. Comparing the differences between students' earnings expectations and the probability of admission, as we proceed in the ranking of applications we find that the majority of students expect smaller earnings in case of graduating from field specialisation/institution of his/her second choice compared to fields of first choice; and smaller earnings when graduating from the fourth place in their ranking compared to the third, etc. The opposite is true for their probability of admission. For most students the probability of admission is increasing as we go down in the ranking of the applications. (Table 3.) This simple comparison seems to support the assumption that students give smaller weight to the expected return and higher to the probability of admission as we proceed in the rank order of their applications.

Students' institution/field specialisation choices were analysed with MNL estimations. MNL estimations were made with the same explanatory variables (i) for the first choice of those students who apply for more than one field specialisation/institution and (ii) for the last choice of the whole sample. Results are summarised in Table 4, and they have to be interpreted with reference to Field.1, „Humanities and languages". Estimation results show that expected labour market opportunities and the probability of admission have a significant effect on choosing a field specialisation. Students choosing different orientations tend to differ in their wage expectations as well. Those who expect their wage-gain to be lower than that of the reference group (applicants for humanities and languages) are more likely to apply for pre-primary and elementary teacher training with first and last priority. Students who expect higher wage gain are more likely to choose technical studies, economics and natural sciences in the first place and technical studies and economics last in ranking rather than humanities and languages. If we compare partial effects for first and last choices at the mean value, it turns out that for choices last in order the partial effect of expected wage gain on the probability of choosing a field specialisation is smaller. For instance in case of choosing economics and business with first priority the partial effect of expected wage gain is 23 per cent, while for last ranking choices it is 6 per cent. The results show that with other factors being equal, there is a smaller difference in earnings expectations between students who are choosing humanities, languages and other orientations with last rank order than between students with the same orientation as their first preferences. The probability of admission is significant for three orientations (pre-primary and elementary teacher training, medical studies and natural sciences) chosen in the first place and for two orientations as last priority (pre-primary and elementary teacher training and natural sciences). These are the very orientations which provide below-average returns. The estimated coefficients are negative, meaning that students, with lower probability of admission than applicants for humanities and foreign languages, are more likely to opt for an orientation with less favourable labour market opportunities. At the same time partial effects also show that for last priority choices the difference in admission probability is smaller for students who choose these orientations than for the reference group. It means that in case of applications ranked last on the priority list, the differences in admission probability have a smaller effect on the likelihood of choosing an orientation with less favourable labour market opportunities. This seems to support the assumption that in their last choice 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 probability is higher.

The variable describing the student's willingness to apply for a cost-priced place is positive and significant in the case of economics and business majors, both for first and last priority choices. Economics/business orientations provide the greatest return after graduation, so this result is in line with expectations. Students who choose to try for a cost-priced place are 20 and 15 per cent more likely (at first and last options respectively) to apply for majors in economics or business (at the mean value). Applying for a cost-priced place increases the probability of choosing law as a major in the first place, decreases the probability of applying for natural sciences ranking first and last , and medical studies as a last option. Summarising the facts we can arrive to the conclusion that students who opt for a cost-priced place are more likely to apply for the most popular orientations with the best labour market opportunities and are less likely to apply for field specialisations which provide below average earnings.

There are systematic differences in the probability of choosing an orientation by gender and type of secondary school as well. Men are significantly more likely to choose technical studies, mathematics and natural sciences both for first and last options, and are also more likely to apply for economics, business or law in last the place than women. On the other hand it is significantly less likely that they go to pre-primary and elementary teacher preparation courses than women. Students from the most prestigious type of secondary schools (gymnasium with 8 grades, i.e. joint junior high and high school) are significantly less likely to choose pre-primary and elementary teacher preparation programs than those who finish their studies in the reference school category (gymnasium with 4 grades). And students from vocational schools are more likely to choose technical studies, economics, business or pre-primary and elementary teacher training than students from the reference category.

When submitting an application for further studies students have to state if they want to be admitted to a state-funded or a cost priced place. In the following section we will investigate the choice between state-funded and cost-priced studies with the help of a binary logit model. The estimation results are presented in Table 5. Admission probability, family income, and field specialisation of first application, if it is economics or business, have a significant effect on the probability of applying for a cost priced place. The partial effects show that the chances of admission are the determining factor in the probability of choosing cost-priced education. The statistically significant impact of the admission probability variable is six times greater

than the impact of the other significant variables. The impact of family income is smaller, students with per capita family income below 30000 HUF are 5 per cent, and with family income between 30-60000 HUF are 9 per cent less likely to apply for a cost-priced place than students from the reference group. Those who submit an application for economics/business majors as first choice are 9 per cent more likely to apply for a cost-priced place. Variables describing labour market expectations of students: like expected wage gain and expected improvement in the probability of employment proved to be insignificant as well as costs of tuition and other socio/demographic variables. It seems that the costs of tuition are too high for students from poorer families in all cases, while the relatively small variation in tuition fees among programs has no significant effect on the decision of students from wealthier families.

## CONCLUSIONS

This paper analyses the higher education application decisions of students in order to test the hypothesis that the increase in the demand for institutions/field specialisations with less favourable labour market opportunities is not a consequence of irrational student preferences, but it can be the results of perfectly rational choices. The initial assumption was, that students when making application decisions, consider the expected utility of their choices which is a function of expected net lifetime earnings after graduating from the chosen institution/field specialisation and the probability of admission.

First, the determinants of the number of applications were considered. The results suggested that the difference in the expected wage gain with first and last rank order applications has a significant positive effect on the number of applications. Students with relatively high expected wage gain in their first application are more willing to apply to further institutions, even though their expected wage gain is going to be lower. It was also found, that more talented students with a higher probability of admission to different institutions/field specialisations are more likely to submit a larger number of applications . In the second part of the analysis the determinants of choosing a particular field specialisation in the first and last place were investigated. The results supported the assumption that students take into account the admission probability of their last choice with a larger weight and they are more willing to apply for a major with less favourable labour market opportunities if the admission probability is higher . The impact of expected wage gain proved to be smaller for last, compared to first choices.

Finally, the results suggest that the main determinant of the probability of choosing cost-priced education (where students have to pay the full market costs of their studies) is the admission probability to a state-funded place. The impact of other significant variables (family income and economics/business orientation) is much smaller. It became clear that the seemingly unwise application choices of students are in fact the result of a rational decision-making process and the increasing demand for orientations with less favourable labour market expectations can be explained by these facts.

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# TABLES

## *Table 1:* List of explanatory variables and assignment of dummy variables

| | | Mean | Std.dev. | ologit | mlogit | logit |
|---|---|---|---|---|---|---|
| *Labour market expectations* | | | | | | |
| (log of) Expected wage gain | Difference between (the log) of students' expected starting salaries if they were admitted to the given insttuion/program and they received their degree and (the log of) their expected starting salaries with secondary school diploma | | | X | X | X |
| | First rank order application | 11.2 | 0.50 | | X | |
| | Last rank order application | 11.0 | 0.62 | | X | X |
| Expected improvement in the probability of finding an appropriate job after graduation | The difference between students' expectations of the chances of getting an appropriate job if they were admitted to higher education and received their degree (%) and their expectation of the chances of getting an appropriate job with a secondary school degree (%) | 16.6 | 30.7 | X | X | X |
| *Probability of admission/ability* | | | | | | |
| Ability | Accumulated score of each student based on his/her secondary school achievement | 49.9 | 8.81 | X | | |
| Probability of admission | Accumulated score of students as a percentage of the minimum admission score(in the preceeding year) of the targeted institution/program for state-funded places | | | | X | |
| | First rank order application | 0.51 | 0.09 | | X | |
| | Last rank order application | 0.54 | 0.10 | | X | X |
| *Applying for a cost-priced place* | 1 if yes, 0 otherwise | 0.16 | | X | X | |
| *(log of) Tuition* | (log of)Tuition at the institution/program the application is submitted to | 5.47 | 5.91 | | | X |
| *Gender* | 1 if male, 0 if female | 0.37 | | X | X | X |
| *Type of secondary school* | | | | | | |
| Gymnasium (8 grades) | 1 if yes,0 otherwise | 0.09 | | X | X | X |
| Gymnasium (6 grades) | 1 if yes,0 otherwise | 0.09 | | X | X | X |
| Gymnasium (4 grades) | 1 if yes,0 otherwise | 0.41 | | X | X | X |
| Vocational secondary school | 1 if yes,0 otherwise | 0.37 | | | X | |
| Vocational tecnical (secondary) school | 1 if yes,0 otherwise | 0.10 | | X | | X |
| Vocational business/ economics (secondary) school | 1 if yes,0 otherwise | 0.14 | | X | | X |
| Vocational medical (secondary) school | 1 if yes,0 otherwise | 0.02 | | X | | X |
| Vocational (secondary) school with other orientation | 1 if yes,0 otherwise | 0.08 | | X | | X |

*Table 1. continued from page 17*

| | | | | |
|---|---|---|---|---|
| *Educational level of parents* | | | | X |
| Father with secondary school qualification | 1 if yes,0 otherwise | 0.32 | X | X |
| Father with at least college education | 1 if yes,0 otherwise | 0.35 | X | X |
| Mother with secondary school qualification | 1 if yes,0 otherwise | 0.41 | X | X |
| Mother with at least college education | 1 if yes,0 otherwise | 0.39 | X | X |
| *Per capita family income* | | | | |
| HUF – 30 000 | 1 if yes,0 otherwise | 0.38 | X | X |
| HUF 31 000- 60 000 | 1 if yes,0 otherwise | 0.20 | X | X |
| HUF 61 000-100 000 | 1 if yes,0 otherwise | 0.13 | X | X |
| HUF 100 000- | 1 if yes,0 otherwise | 0.04 | X | X |
| *Field specialisation of application* | | | | |
| Field 1. Humanities and languages | 1 if yes,0 otherwise | 0.15 | X | X |
| Field 2. Pre-school and elementary teacher training | 1 if yes,0 otherwise | 0.04 | X | X |
| Field 3. Medical studies | 1 if yes,0 otherwise | 0.11 | X | X |
| Field 4. Technical studies and informatics | 1 if yes,0 otherwise | 0.16 | | X |
| Field 5. Economics and Business | 1 if yes,0 otherwise | 0.33 | X | X |
| Field 6. Law | 1 if yes,0 otherwise | 0.11 | X | X |
| Field 7. Mathematics and natural sciences | 1 if yes,0 otherwise | 0.10 | X | X |

*Table 2:* **Determinants of the number of applications: ordered logit estimate**
Dependent variable: 1 application (outcome 1), 2 applications (outcome 2), 3 applications (outcome 3), 4 applications (outcome 4)

| | | | Outcome 1 | | Outcome 2 | | Outcome 3 | | Outcome 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | z | dy/dx | z | dy/dx | z | dy/dx | z | dy/dx | z |
| (Log of) the difference in expected wage gain between first and last choice | 0.3963* | 5.24 | -0.1070* | -5.16 | -0.001 | -0.38 | 0.0679* | 5.08 | 0.0500* | 5.02 |
| Expected improvement in the probability of finding an appropriate job after graduation | 0.0046* | 2.97 | -0.0009* | -2.96 | -0.001 | -0.37 | 0.0005* | 2.95 | 0.0004* | 2.91 |
| Ability (Accumulated score) | 0.0341* | 5.36 | -0.0067* | -5.31 | -0.0009 | -0.38 | 0.0043* | 5.20 | 0.0031* | 5.32 |
| Applying for a cost-priced place[1] | 0.0206 | 0.14 | -0.0040 | -0.14 | -0.0008 | -0.11 | 0.0026 | 0.14 | 0.0019 | 0.14 |
| Male[1] | -0.3529* | -3.03 | 0.0705* | 3.00 | -0.0006 | -0.22 | -0.0441* | -3.02 | -0.0320* | -3.10 |
| Type of secondary school | | | | | | | | | | |
| Gymnasium (8 grades)[1] | 0.2470 | 1.55 | -0.0473 | -1.61 | -0.0004 | -0.81 | 0.0309 | 1.56 | 0.0248 | 1.44 |
| Gymnasium (6 grades)[1] | -0.2309 | -1.41 | 0.0470 | 1.38 | -0.0026 | -0.57 | -0.0288 | -1.43 | -0.0199 | -1.52 |
| Vocational technical[1] | -0.3704** | -2.16 | 0.0762** | 2.10 | -0.0070 | -0.95 | -0.0451* | -2.21 | -0.0307* | -2.38 |
| Vocational business/economics[1] | -0.7567* | -4.56 | 0.1590* | 4.47 | -0.0311** | -2.16 | -0.0898* | -4.94 | -0.0558* | -5.55 |
| Vocational medical[1] | -0.6708 | -1.44 | 0.1420 | 1.40 | -0.0306 | -0.73 | -0.0793 | -1.61 | -0.0481** | -1.91 |
| Vocational other[1] | 0.2351 | 1.26 | -0.0450 | -1.31 | -0.0004 | -0.67 | 0.0295 | 1.27 | 0.0235 | 1.17 |
| Educational level of parents | | | | | | | | | | |
| Father has secondary school qualification[1] | -0.0877 | -0.66 | 0.0174 | 0.66 | 0.0002 | 0.03 | -0.0110 | -0.66 | -0.0080 | -0.67 |
| Father has at least college education[1] | -0.1147 | -0.79 | 0.0228 | 0.78 | 0.0001 | 0.11 | -0.0141 | -0.79 | -0.0105 | -0.79 |
| Mother has secondary school qualification[1] | 0.2493 | 1.70 | -0.0489 | -1.72 | -0.0017 | -0.70 | 0.0313 | 1.71 | 0.0236 | 1.65 |
| Mother has at least college education[1] | 0.3639* | 2.20 | -0.0714* | -2.22 | -0.0025 | -0.80 | 0.0456* | 2.21 | 0.0345** | 2.14 |
| Per capita family income | | | | | | | | | | |
| - 30000 HUF[1] | 0.1768 | 1.39 | -0.0348 | -1.40 | -0.0010 | -0.59 | 0.0222 | 1.40 | 0.0166 | 1.37 |
| 31000 – 60000 HUF[1] | 0.1134 | 0.85 | -0.0222 | -0.86 | -0.0008 | -0.47 | 0.0142 | 0.85 | 0.0107 | 0.83 |
| 61000 - 100000 HUF[1] | -0.1072 | -0.70 | 0.0215 | 0.69 | -0.0003 | -0.21 | -0.0134 | -0.70 | -0.0096 | -0.72 |

*Table 2. continued from page 19.*

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Field specialisation of first application | | | | | | | | | | |
| Field 2[1] | -0.4539 | -1.60 | 0.0948 | 1.55 | -0.0136 | -0.78 | -0.0554 | -1.68 | -0.0355** | -1.91 |
| Field 3[1] | 0.4430* | 2.47 | -0.0822* | -2.67 | -0.0134 | -1.26 | 0.0548* | 2.55 | 0.0473** | 2.16 |
| Field 4[1] | -0.1600 | -0.94 | 0.0322 | 0.92 | -0.0009 | -0.34 | -0.0200 | -0.94 | -0.0142 | -0.97 |
| Field 5[1] | 0.3118* | 2.33 | -0.0604* | -2.38 | -0.0040 | -1.06 | 0.0391* | 2.33 | 0.0304* | 2.21 |
| Field 6[1] | 0.8501* | 4.05 | -0.1458* | -4.93 | -0.0452** | -2.11 | 0.0983* | 4.84 | 0.1035* | 3.17 |
| Field 7[1] | 0.1600 | 0.82 | -0.0310 | -0.84 | -0.0001 | -0.45 | 0.0201 | 0.82 | 0.0156 | 0.78 |
| Number of observations | 1610 | | | | | | | | | |
| Log likelihood value | -2139.7122 | | | | | | | | | |
| Pseudo R-squared | 0.0528 | | | | | | | | | |
| Wald chi2 | 226.29 | | | | | | | | | |
| Prob>chi2 | 0.000 | | | | | | | | | |

[1] dy/dx is for discrete change of dummy variable from 0 to 1

* Significant at the 1 % level ** Significant at the 5 % level

Reference category: female; not applying for cost-priced place; gymnasium (4 grades); father with less than secondary school qualification; mother with less than secondary school qualification; per capita family income more than 100000 HUF; Field 1

*Table 3:* **Distribution of students (%) by the sign (+, - ) of the difference in earnings expectations and the difference in admission probability between their 1st and 2nd, 2nd and 3rd, 3rd and 4th applications**

| | Difference in earnings expectations | | | Difference is admission probability | | |
|---|---|---|---|---|---|---|
| | ≤ 0 | > 0 | | < 0 | 0 ≥ | Total |
| (application2) – (application1) | 62 | 38 | 100 | 33 | 67 | 100 |
| (application3) – (application2) | 59 | 41 | 100 | 39 | 61 | 100 |
| (application4) – (application3) | 64 | 36 | 100 | 3 | 61 | 100 |

*Table 4:* **The determinants of field specialisation/institution choices:MNL estimations**

| Variable | Comparison | Application with first rank order | | | | Application with last rank order | | | |
|---|---|---|---|---|---|---|---|---|---|
| Expected wage gain | | Coeff. | z | dy/dx | z | Coeff. | z | dy/dx | z |
| | Field 1 | | | | | | | | |
| | Field 2/1 | -2.222* | -2.85 | 0.000 | .. | -1.345* | -3.69 | -0.001* | -3.48 |
| | Field 3/1 | -0.360 | -0.98 | -0.147* | -6.09 | -0.262 | -1.36 | -0.057* | -4.01 |
| | Field 4/1 | 1.747* | 5.24 | 0.054* | 2.83 | 0.690* | 3.73 | 0.060* | 3.40 |
| | Field 5/1 | 1.737* | 5.96 | 0.232* | 5.86 | 0.498* | 2.95 | 0.064* | 2.26 |
| | Field 6/1 | 1.237 | 1.23 | 0.003 | 0.12 | 0.394 | 1.58 | 0.004 | 0.28 |
| | Field 7/1 | 1.370* | 3.66 | 0.011 | 0.61 | 0.120 | 0.58 | -0.022 | -1.47 |
| Expected improvement in employment probability | | | | | | | | | |
| | Field 2/1 | 0.007 | 0.93 | 0.000 | .. | 0.002 | 0.30 | -1.80e-08 | -0.34 |
| | Field 3/1 | 0.017* | 4.13 | 0.001** | 1.98 | 0.004 | 1.06 | -0.0001 | -0.05 |
| | Field 4/1 | 0.012* | 2.86 | 0.002 | 0.61 | 0.008* | 2.47 | 0.0007** | 2.04 |
| | Field 5/1 | 0.011* | 3.60 | 0.004 | 0.85 | 0.002 | 0.88 | -0.0007 | -1.42 |
| | Field 6/1 | 0.010* | 2.52 | -0.012 | -0.03 | 0.005 | 1.27 | 0.0001 | 0.36 |
| | Field 7/1 | 0.012* | 2.39 | 0.003 | 0.40 | 0.010* | 2.33 | 0.0005** | 1.82 |
| Probability of Admission | | | | | | | | | |
| | Field 2/1 | -10.093* | -3.44 | 0.000 | .. | -8.134* | -3.72 | -0.0001* | -3.48 |
| | Field 3/1 | - 4.525* | -3.13 | -0.235* | -2.39 | -2.014 | -1.36 | -0.1601** | -1.95 |
| | Field 4/1 | - 2.791* | -1.82 | -0.080 | -0.79 | -0.011 | -0.01 | 0.0531 | 0.47 |
| | Field 5/1 | -1.217 | -0.97 | 0.349 | 1.81 | 0.075 | 0.08 | 0.1614 | 0.93 |
| | Field 6/1 | -0.425 | -0.32 | 0.242** | 2.01 | 1.781 | 1.28 | 0.1572 ** | 1.96 |
| | Field 7/1 | -8.932* | -4.59 | -0.529* | -5.62 | -2.884** | -2.12 | -0.2590* | -2.63 |
| Applying for cost priced place[1] | | | | | | | | | |
| | Field 2/1 | -1.197 | -1.09 | 0.000 | ... | -0.153 | -0.25 | -3.20e-06 | -0.97 |
| | Field 3/1 | 0.210 | 0.46 | -0.038 | -1.71 | -0.527 | -1.14 | -0.062 * | -2.97 |
| | Field4/1 | 0.246 | 0.56 | -0.039 | -1.80 | 0.168 | 0.51 | -0.031 | -1.05 |
| | Field 5/1 | 1.104* | 3.23 | 0.203* | 4.18 | 0.691* | 2.45 | 0.148* | 3.13 |
| | Field 6/1 | 0.718** | 1.81 | 0.002 | 0.05 | 0.825** | 2.10 | 0.040 | 1.39 |
| | Field 7/1 | -0.356 | -0.65 | -0.057* | -3.61 | -0.208 | -0.50 | -0.047* | -2.08 |

*Table 3 continued from page 22.*

| Variable | Comparison | Application with first rank order | | | | Application with last rank order | | | |
|---|---|---|---|---|---|---|---|---|---|
| Gender[1] | | Coeff. | z | dy/dx | z | Coeff. | z | dy/dx | z |
| | Field 2/1 | -34.503* | -69.70 | -3.23e-06** | -1.92 | -1.388** | -1.93 | -0.0001* | -3.05 |
| | Field 3/1 | -0.121 | -0.32 | -0.070* | -3.40 | 0.516 | 1.61 | -0.0651* | -3.41 |
| | Field 4/1 | 2.721* | 7.90 | 0.278* | 9.00 | 2.921* | 10.47 | 0.3029* | 11.48 |
| | Field 5/1 | 0.381 | 1.35 | -0.158* | -4.36 | 0.789* | 3.21 | -0.1861* | -5.82 |
| | Field 6/1 | 0.564 | 1.75 | -0.030 | -1.20 | 1.153* | 3.58 | -0.0110 | -0.71 |
| | Field 7/1 | 1.598* | 4.66 | 0.065* | 3.19 | 2.573* | 8.59 | 0.1297* | 5.92 |
| Gymnasium (8 grades) [1] | | | | | | | | | |
| | Field 2/1 | -33.644* | -58.22 | 0.000 | .. | -32.436* | -69.85 | -0.0001* | -2.73 |
| | Field 3/1 | 0.891** | 2.09 | 0.029 | 0.86 | 0.668 | 1.62 | 0.0394 | 1.01 |
| | Field 4/1 | 0.998** | 2.08 | 0.045 | 1.13 | 0.415 | 1.00 | 0.0192 | 0.41 |
| | Field 5/1 | 0.506 | 1.27 | -0.047 | -0.80 | 0.269 | 0.80 | -0.0155 | -0.27 |
| | Field 6/1 | 0.946* | 2.31 | 0.057 | 1.37 | 0.651 | 1.51 | 0.0295 | 0.94 |
| | Field 7/1 | 0.284 | 0.52 | -0.022 | -0.94 | -0.052 | -0.12 | -0.0316 | -1.27 |
| Gymnasium (6 grades) [1] | | | | | | | | | |
| | Field 2/1 | -33.897* | -58.99 | 0.00 | .. | -32.446* | -81.19 | -0.0004* | -2.68 |
| | Field 3/1 | 0.622 | 1.41 | 0.003 | 0.13 | 0.498 | 1.25 | -0.0081 | -0.31 |
| | Field 4/1 | 0.863 | 1.80 | 0.032 | 0.74 | 1.090* | 2.93 | 0.1040** | 1.98 |
| | Field 5/1 | 0.654** | 1.83 | 0.033 | 0.57 | 0.437 | 1.42 | -0.0591 | -1.11 |
| | Field 6/1 | 0.517 | 1.28 | -0.009 | -0.26 | 0.789** | 1.96 | 0.0157 | 0.59 |
| | Field 7/1 | 0.580 | 1.19 | -0.000 | -0.00 | 0.777** | 2.01 | 0.0199 | 0.68 |
| Vocational secondary school[1] | | | | | | | | | |
| | Field 2/1 | 1.761* | 3.29 | 0.000 | .. | 1.820* | 4.56 | 6.57e-06 | 1.78 |
| | Field 3/1 | -0.066 | -0.98 | -0.070* | -3.84 | 0.577 | 1.25 | -0.0378 ** | -1.94 |
| | Field 4/1 | 1.766* | 5.25 | 0.107* | 3.79 | 1.710* | 6.16 | 0.1286* | 4.33 |
| | Field 5/1 | 1.329* | 4.78 | 0.215* | 5.30 | 1.430* | 5.94 | 0.1686* | 4.59 |
| | Field 6/1 | -0.159 | 0.83 | -0.126* | -4.96 | 0.134 | 0.33 | -0.0568* | -3.20 |
| | Field 7/1 | 0.323 | 0.83 | -0.035* | -2.09 | 0.179 | 0.53 | -0.0732* | -3.82 |
| Sample size | | 984 | | | | 1136 | | | |
| Log likelihood at convergence | | -1416.769 | | | | -1702.3631 | | | |
| Pseudo R square | | 0.1651 | | | | 0.1413 | | | |
| Wald chi square | | 17487.82 | | | | 22972.71 | | | |
| Prob > chi2 | | 0.0000 | | | | 0.0000 | | | |

[1] dy/dx is for discrete change of dummy variable from 0 to 1. * Significant at the 1 % level ** Significant at the 5 % level

Reference category: female;not applying for cost-priced place; gymnasium (4 grades); father with less than secondary school qualification; mother with less than secondary school qualification; per capita family income more than 100000 HUF

## *Table 5:* **Determinants of applying for cost-priced education**

Results of logit estimation

| | Coef. | z | dy/dx | z |
|---|---|---|---|---|
| (Log of) expected wage gain | 0.0788 | 0.60 | 0.0086 | 0.60 |
| Expected improvement in employment probability | -0.0029 | -1.17 | -0.0003 | -1.17 |
| Admisssion probability to a state-funded place | -5.7657* | -6.36 | -0.6343* | -6.78 |
| (Log of) tuition | -0.0100 | -0.67 | -0.0011 | -0.67 |
| Male[1] | -0.1095 | -0.58 | -0.0119 | -0.59 |
| *Type of secondary school* | | | | |
| Gymnasium (8 grades) [1] | -0.6092** | -1.81 | -0.0558* | -2.24 |
| Gymnasium (6 grades) [1] | -0.5383** | -1.88 | -0.0507* | -2.22 |
| Vocational technical[1] | -0.3149 | -0.93 | -0.0317 | -1.04 |
| Vocational business/economics[1] | -0.5286** | -1.81 | -0.0498* | -2.15 |
| Vocational other[1] | 0.1619 | 0.50 | 0.0187 | 0.48 |
| *Educational level of parents* | | | | |
| Father has secondary school qualification[1] | 0.1868 | 0.77 | 0.0211 | 0.75 |
| Father has at least college education[1] | 0.3629 | 1.39 | 0.0411 | 1.35 |
| Mother has secondary school qualification[1] | 0.2932 | 1.08 | 0.0331 | 1.05 |
| Mother has at least college education[1] | 0.2580 | 0.89 | 0.0287 | 0.88 |
| *Per capita family income* | | | | |
| - 30000 HUF[1] | -0.8176* | -3.84 | -0.0843* | -4.08 |
| 31000 – 60000 HUF[1] | -0.5871* | -2.62 | -0.0572* | -2.97 |
| 61000 – 100 000 HUF [1] | -0.2709 | -1.14 | -0.0277 | -1.22 |
| *Field specialisation of first application* | | | | |
| Field 2[1] | -0.5297 | -0.77 | -0.0482 | -0.95 |
| Field 3[1] | -0.2096 | -0.58 | -0.0216 | -0.62 |
| Field 4[1] | 0.1613 | 0.48 | 0.0184 | 0.46 |
| Field 5[1] | 0.7570* | 3.20 | 0.0919* | 2.95 |
| Field 6[1] | 0.4896 | 1.54 | 0.0622 | 1.35 |
| Field 7[1] | -0.4115 | -1.08 | -0.0398 | -1.24 |
| Constant | 0.3566 | 0.23 | | |
| Number of observations | 1340 | | | |
| Wald chi2(23) | 101.15 | | | |
| Prob > chi2 | 0.0000 | | | |
| Pseudo R2 | 0.0997 | | | |
| Log pseudo-likelihood | -517.72565 | | | |

[1] dy/dx is for discrete change of dummy variable from 0 to 1.

* Significant at the 1 % level ** Significant at the 5 % level

Reference category: female; not applying for cost-priced place; gymnasium (4 grades); father with less than secondary scool qualification; mother with less than secondary school qualification; per capita family income more than 100000 HUF; Field 1

## NOTES

i In the Hungarian admission system prospective students have to apply for a given orientation/institution (such as economics, education, medical studies etc.) Students accepted to a degree program in a certain field of study follow an established program of courses and exams. Mobility is low and it is difficult to change fields of study once accepted to a specific degree program. Each year the Ministry of Education determines the number of students admitted to tuition-free, state financed places by educational levels (university, college), fields of study and institutions. When determining state financed places the Ministry takes into account the excess-demand for the different courses beside other considerations. The Ministry considers the total number of applications and the number of applications to the given institution and program with first preference ranking. Prospective students may apply for as many programs as they want but they have to rank their preferences. They also have to state if they apply for a state-funded or a cost–priced place. But it is acceptable if they submit two different applications to the same institution/field specialisation, one for a state-funded and another for a cost-priced place. Offers are made in accordance with the student's preference ranking and are conditional on achieving the minimum admission score to the targeted institution/course. Each student can get only one offer, in case he/she has achieved the minimum admission score for an institution/field specialisation which he/she had applied for with a better preference ranking. But his/her applications are rejected automatically from all other institutions where he/she had also applied to and achieved the minimum admission score . The minimum admission score is determined following the entrance exams and it is changing from year to year depending on the number of applications, the average admission score of students applying to the given institution/program and the number of places. The admission score of students is based partly (50%) on the points achieved by the applicant at the entrance exam, and partly on his/her secondary school achievements (final examination grades, grade point averages). This is his/her so-called "accumulated score". The applicants are ranked based on the final score. An average student applies for more than 3 programs in addition to his/her first choice.

[ii] Since 1997 there have been state-funded and cost-price places in higher education institutions. It means that in the same higher education institution and within the same program there are students who are fully funded by the state and others who pay the full market-cost of their education.

[iii] A detailed description of the survey can be found in Varga (2001).

[iv] Data on average starting salaries of new graduates came from the Second Higher Education Survey on Young Graduates which was a postal survey carried out in 2000. All students who graduated in 1999 got the questionnaire. The response rate was 22 %.

[v] Data on minimum admission scores for institutions/programs come from the yearly data collection of the National Higher Education Admission Office indicating the number of applicants and students admitted, and the scores of admission by institutions and programs.

[vi] The Hungarian secondary school system is stratified, including vocational secondary schools with different orientations ( technical, medical, economics, and other) and gymnasiums which are general secondary schools where students can study alterna-

tively from 5-12th grades (gymnasium with 8 grades), 7-12th grades (gymnasium with 6 grades) or 9-12th grades (gymnasium with 4 grades).

[vii] The reason for a less detailed classification of vocational secondary schools was that there were identification problems at the time when the detailed classification was used. This was the result of the fact that from certain types of secondary schools there were no applications to certain field specifications and the number of observations was 0. The estimates were made with other specifications, where the previously omitted socio/demographic variables were also included, but they proved to be insignificant.