PROBIT MODEL OF HIGHER EDUCATION PARTICIPATION DETERMINANTS AND THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY

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Abstract

In this paper we analyse the undergraduate and postgraduate higher education participation determinants in placecountry-regionSlovenia. Using a micro-level probit analysis we find the most important statistically significant higher education participation determinants in placecountry-regionSlovenia, and the most important differences between the determinants on the undergraduate and on the postgraduate level. We use the Slovenian statistical **Household** *Budget* **Surveys (HBS) data for the**

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reference years from 1998 to 2005. *The HBS covers private households in placecountry-regionSlovenia with the basic socio and demographic data for the household members observed within the surveys, data on income, assets and final consumption. In the probit analysis we focus on the determinants of the undergraduate and postgraduate higher education participation separately for different age groups. Based on the results of the three probit models we find six different determinants of the undergraduate higher education participation. The first two most important determinants are the availability of internet access in a household and education of parents. On the postgraduate level of education we also find six important determinants of higher education participation, with the first most important being the availability of information-communication technology, followed by the personal income.*

1 INTRODUCTION

Demand for higher education is usually investigated either at a country macro-level or at an individual micro-level. In this study we investigate the micro-level determinants of undergraduate and postgraduate higher education participation in Slovenia. The micro-level determinants are characteristics that are related to the observed individual or that individual's household.

The previous investigation of micro-level determinants of higher education participation has focused on household income as an important determinant of educational achievement over the entire educational investment cycle of a child (Heckman, 2000). We might expect that *household wealth and income* have a positive effect on participation in higher education as argued for example (Acemoglu and Pischke, 2001; Lopez-Valcarcel and Quintana, 1998). Becker and Tomes (1979, 1986) argue that *short-run financial constraints* are also important for the participation in the higher education. More specifically, Laitner (1992), Benabou (2000) and Aiyagari et al. (2002) argue that credit constraints play an important role in the higher education participation.

However, some other researchers suggest that family or household characteristics are more important than the financial constraints that they face (Chevalier and

Lanot, 2002). Aakvik et al. (2005) find that short-term credit constraints only have a small effect on educational attainment. Long-term factors such as permanent family income and parental education should be relatively more important. *Parental environments* might be one of the first such factors which are significant for higher education participation over the long-run (Heckman, 2000).

Higher levels of *parents' education* positively and strongly affect the children participation in the higher education (Beneito et al., 2001; Albert, 2000).

Rural location of a household has a negative effect on the participation in the higher education (Le and Miller, 2005). However, the lower participation in the higher education for population from the rural areas should be a consequence of specific socioeconomic circumstances that prevails in the rural areas and less a consequence of a greater distance from universities (James, 2001).

A number of children in a family or a *number of household members* is found to have a negative effect on the higher education attainment in some studies (Hartog and Diaz-Serrano, 2004). However, some other studies show that the greater number of children in a family does not necessarily lead to a lower higher education participation in such families (Gonzales-Rozada et al., 2002).

There are rare studies to investigate the role of the information and communication technology (ICT) on higher education demand. Collins et al. (2006) find that the pupils in the secondary schools who have had the unrestricted *access to the internet* are more likely to participate in the higher education than those with no such an access. Others (Kuhlemeier and Hemker, 2007) argue that home computer and internet access have a positive impact on education participation since there is a positive impact of students' use of the internet and the computer at home on digital skills they need for school. The presence of a personal computer and access to the internet proves to be an important factor of the higher education participation. Black et al. (2005) and Sinkoviæ and Kaluerčić (2006) argue that ICT can improve learning effectiveness by the use of different methods of teaching and learning from those used in traditional education. Better learning performance and thus greater probability to get included or to remain in education process for those using modern ICT has also

been proved by Lindroth and Bergquist (2010) and by Liu et al. (2010a).

2 RESEARCH QUESTIONS, DATA AND METHODOLOGY

We aim to empirically test the importance and the direction of the association between the higher education participation determinants and the higher education participation in Slovenia. A special focus is paid to the determinants that are related to the individual household members' characteristics and household characteristics. We set two research questions to test the association between the determinants of higher education participation, particularly the development of ICT tools, and higher education participation. First, which are the most important and statistically significant higher education participation determinants in Slovenia? Second, which are the most important differences between the determinants of higher education participation at the undergraduate and at the postgraduate level.

The dependant variable in our research is a dummy or a binary response nominal variable: this is the participation in the higher education of a household member (PH). It is a binary response nominal variable since it only takes the values 0 and 1. PH = 0 if a household member is currently not participating in higher education, and PH = 1 if a household member is currently participating in the higher education.

The independent or explanatory variables, which are used to explain why some household members are not and why some household members are participating in the higher education, are divided into the two groups. In the first group of the explanatory variables, there are the observed household member characteristics such as household member gender (GENDER) (if female GENDER = 0, and if male GENDER = 1), a household member age (AGE), a household member marital status (MS) (if single, divorced or widowed MS = 0, and if married or living in a non-marital cohabitation MS = 1), and a household member net personal annual income (PI). In the second group of the explanatory

variables are the household characteristics of the observed household member. The first household characteristic is a number of cars (NCAR) in a household measuring the mobility of a household and the living standard conditions. The second household characteristic is a household expenditures for non-formal education activities (NFEDUC) (such as language courses, music school, driving course, sport courses, cooking courses, handcraft courses, computer courses or any other courses), measuring the living culture of a household and openness of a household members for a broader range of interests in the sense of their (free time) activities. The next household characteristic is the presence of the internet access in a household (INTER) (if not present INTER = 0, and if present INTER = 1), measuring the ICT infrastructure development of a household. Computerization of a household is measured by a variable COMP (presence of a computer in a household: if not present COMP = 0, and if present COMP = 1). It is important to know that the data on the presence of internet and computer refer to a longer period of time as the measures of the ICT infrastructure development. In other words, INTER=1 or COMP=1, means that internet or computer are present at home already for a longer period of time. So their presence cannot be a consequence of higher education participation. The value *of own household* production (OP) is another household characteristic for measuring opportunity costs of higher education participation in terms of the rurality (and agrarianisms) of a household and associated access to the higher education institutions. It includes a value of an own home production of food, drinks and a value of a home craft. The household net annual total assets and income together excluding the net annual personal income of the observed household member (HAI) measures the financial ability of a household apart from the financial conditions of the observed household member. It is the sum of the stock of the average yearly assets value and the yearly flow of all sorts of personal incomes. The number of household members (NHM) is the household characteristic, which measures the impact of a household size on higher education participation, through its wealth and social effects. The last household characteristic is the presence of at least one household member with a higher education in addition to the observed household member. This is the higher education of

the others household members (HEO) (if nobody from a household has a higher education HEO = 0, and if there is at least one household member with a higher education in addition to the observed household member HEO = 1), measuring the impact of the parents or any other household members education on the higher education participation of the observed household member. In our research we want to use these different household member characteristics of the observed individual and the household characteristics of the observed individual in order to explain why some individuals are and why some individuals are not participating in the higher education. More specifically, we aim to explain the higher education participation probability of a particular individual. Since the dependant variable has only two possible values or outcomes (0 or 1), the methodology used in our research is a binary response probit model.

In the econometric analysis, a probit model is a popular specification of a generalized linear model. In particular, it is used for a binomial regression using the probit link function (Harnett, 1982; Jobson, 1992a; Jobson, 1992b). We apply a probit regression to the HBS data on the higher education participation and its determinants. It would be also possible to use a logit model, since the coefficients of a logit model can simply be transformed in the coefficient of a probit model. However, probit model is based on a normal distribution function, which makes it more appropriate in our case. The expected value of the dependant binary response variable can be written as $E(y_i) = 0 \cdot P\ (y_i = 0) + 1 \cdot P\ (y_i = 1) = P\ (y_i = 1)$.

It is a typical to choose a reference person, which is defined by a chosen set of values for the explanatory variables (determinants of the higher education participation) since the marginal effects are different for a different observation unit i (observed individual household member). The interpretation of the marginal effects then refers to a chosen reference person. The marginal effect of a chosen explanatory variable tells for how many percentage points will change the probability that a reference person is participating in the higher education if a value of that explanatory variable has increased by one (Maddala, 1977; Verbeek, 2002).

3 RESULTS OF THE PROBIT ANALYSIS

In this section we present the empirical results of the probit model analysis. We present the four probit models of determinants of higher education participation with their impacts on the undergraduate and postgraduate higher education participation for different age groups. We point out the differences in higher education determinants by different age groups of the observed individuals and the differences in higher education determinants by different levels of higher education (undergraduate and postgraduate).

3.1 THE PROBIT MODEL

We focus on the determinants of the undergraduate and postgraduate higher education participation separately for two different age groups for both levels of higher education. Age groups are defined consistently with the most frequent age groups that are engaged in education at a certain level of education. Undergraduate participation determinants were investigated by the age groups of younger (19 to 25 years old) and older (26 to 34 years old) persons. Postgraduate participation determinants were investigated by the age groups of younger (23 to 31 years old) and older (32 to 49 years old) persons. The two age groups for undergraduate and postgraduate higher education cover more than 90% of all undergraduate and postgraduate higher education students in Slovenia. We expect that some undergraduate and postgraduate higher education determinants would be different for the younger and for the older age groups of the observed persons. This is a reason why we divided the observed persons into two sub-age groups, both, in the case of the analysis of the undergraduate and postgraduate higher education participation determinants.

In the probit model analysis, the statistical software package STATA 9.2 was used. In the analysis, the importance of the sampling weights for different observations units from the HBS sample were taken into account. The starting point in our empirical estimations was the initial specification of the explanatory variables for the probit model. In the process of estimation experimentations to find the best probit model we were step by step excluding some of the initially

included explanatory variables. Some of the explanatory variables that were initially included in our analysis have not been confirmed in our final probit models (like number of cars in a household, and household expenditures for non-formal education activities). This is either because these variables have no statistically significant impact on the undergraduate and postgraduate higher education participation probability or because they are reflected in (correlated with) some other explanatory variables, which are a part of the estimated probit models. Some other explanatory variables were left out of the final probit models because it turned out that they were endogenous, like the household member marital status (*MS*), and the *household member net personal annual income (*PI*) in the case of the undergraduate education participation probability analysis and in the case of younger persons within the postgraduate analysis. This means that they do not explain the higher education participation, but vice versa, they are explained by the postgraduate higher education participation.*

In another words, if an individual is participating in higher education (especially undergraduate), it is less likely to be married compared to those, who are not participating in higher education (especially undergraduate). And not the other way around like: if an individual is married, it is less likely to be participating in higher education (especially undergraduate), compared to those who are not married. So marital status is more a consequence of the higher education participation and is not its cause.

It is similar with a household participant personal income when we take into account younger individuals (23 to 31 years old). The individual personal income is more a consequence of the participation in higher education and not its factor. If a person is participating in higher education, it has less time for paid work and is less likely to have a regular job and therefore a person's income is lower. Some parameters for explanatory variables were statistically not significant or some explanatory variables were to strongly correlate with each other due to the presence of multicolinearity. The final best fitting probit model for the undergraduate and postgraduate higher education participation is described as $P(PH=1)=\Phi(\alpha + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot x_3 + \ldots + \beta_i \cdot x_i + \ldots + \beta_n \cdot x_n)$ for all four age groups. Table 1 presents the empirical probit model results.

TABLE 1 Results for the probit models of the undergraduate and post-graduate higher education participation determinants

Higher education participation determinants x_i	Marginal effects for undergraduate higher education participation		Marginal effects for postgraduate higher education participation	
	From 19 to 25 years old* (1)	From 26 to 34 years old* (2)	From 23 to 31 years old* (3)	From 32 to 49 years old* (4)
GENDER	-0.1328 (0.000)	/	-0.0055 (0.010)	-0.0019 (0.005)
AGE	-0.0164 (0.000)	-0.0109 (0.000)	-0.0011 (0.011)	-0.0003 (0.000)
PI	/	/	/	$0.0029*10^{-6}$ (0.000)
COMP	/	/	0.0120 (0.000)	/
INTER	0.2957 (0.000)	0.0503 (0.000)	0.0135 (0.000)	0.0043 (0.000)
OP	/	$-0.0446*10^{-6}$ (0.002)	/	/
HAI	$0.0563*10^{-6}$ (0.000)	$0.0133*10^{-6}$ (0.000)	$0.0026*10^{-6}$ (0.000)	$0.0004*10^{-6}$ (0.026)
NHM	-0.0418 (0.000)	-0.0137 (0.000)	-0.0051 (0.000)	-0.0008 (0.019)
HEO	0.1811 (0.000)	0.0352 (0.000)	/	/
Constant (β_0)	$\beta_0 = 0.4626$ (0.010)	$\beta_0 = 1.6858$ (0.000)	$\beta_0 = -0.9224$ (0.035)	$B_0=-1.2217$ (0.004)
Model	Younger	Older	Younger	Older
CDF	0.3077	0.0451	0.0100	0.0019
N	10376	10007	9822	21234
Sign. of Wald χ^2	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.1641	0.1527	0.1586	0.3197

Source: Own calculations based on the HBS data collected from SORS using statistical software package STATA

Notes: GENDER-household member gender; AGE-household member age; PI-net annual personal income of a household member; COMP-presence of a personal computer in a household; INTER-presence of internet access in a

*household; OP- value of own production of a household (in Slovenian Tolars - SIT); HAI-household net annual total assets and income together excluding net annual personal income of the observed household member (in SIT); NHM-number of household members; HEO-higher education of others - presence of at least one household member with a higher education beside the observed household member; CDF-cumulative distribution function (probability that a reference person is participating in postgraduate higher education); N-number of observations * p-values for significances of regression coefficients (βi) are in the brackets.*

In each row in Table 1, there is a value for the marginal effect and in the brackets is the p-value for the significance of the regression coefficient (β_i) of the corresponding determinant for all four probit models. The marginal effects are calculated for the reference person in household who is female ($GENDER = 0$), whose age equals the lower margin of the corresponding age group ($AGE = 19$, 26, 23 or 32, respectively) and who has an average net annual personal income (PI = average). The reference person in household has no computer ($COMP = 0$), no internet access ($INTER = 0$), and has an average annual value of own production (OP = average). The reference person in household has an average *net annual total assets and income together excluding net annual personal income of the observed household member (*HAI = *average).* The reference person in household has four household members ($NHM = 4$) and has *no household member with a higher education beside the observed household member*. The averages always refer to the households of the observed household members in the corresponding age group.

The cumulative distribution function (CDF) tells the probability that a reference person is participating in the undergraduate or postgraduate higher education. N is the number of the observed individuals in the estimated probit model. All the regression coefficients (β_i) of the corresponding explanatory variables included in the probit models are statistically significant, and they have the expected signs. The included explanatory variables are not endogenous and are not strongly correlated with each other. Considering Wald χ^2 test, which is significant at 0.000 and considering pseudo R^2, the reported probit models

proved to be the most appropriate out of all other models. Each of the presented probit models also includes a regression constant β_0.
The marginal effects in Table 1 explain the direction (the sign of the marginal effect) and the strength (the absolute value of the marginal effect) for each of the explanatory variable effect on the undergraduate or postgraduate higher education participation probability. They could be interpreted as sensibility of the undergraduate or postgraduate higher education participation probability to a particular explanatory variable unit change. For example marginal effect 0.2957 for *INTER* in model (1) tells us, that if the reference person's (the reference person is defined above) in household gets access to internet at home, the probability that such person participates in undergraduate higher education increases by 29.6 percentage points.

3.2 FINAL UNDERGRADUATE AND POSTGRADUATE HIGHER EDUCATION PARTICIPATION PROBIT MODELS

The comparison of the four probit models in Table 1 shows similarities, but also main differences, which are now discussed further. Therefore, the analysis is conducted by two age groups for each level of higher education (undergraduate and postgraduate) to point out similarities and differences between undergraduate and postgraduate level of higher education and between different age groups.

3.2.1 THE DIFFERENCE IN UNDERGRADUATE HIGHER EDUCATION PARTICIPATION DETERMINANTS BY THE AGE GROUP OF 19-25 YEARS OLD INDIVIDUALS AND 26-34 YEARS OLD INDIVIDUALS

The probit models (1) and (2) for the undergraduate higher education in Table 1 separately by the two age groups indicate that there are slight differences in the determinants of the undergraduate higher education participation determinants between these two age sub-groups.

The probit model (1) for the age group of younger individuals (who are from 19 to 25 years old) unlike the probit model (2) for the age group of older individuals (who are from 26 to 34 years old) does not include the variable "The value of own production of a household" *(*OP*). This determinant is not found significant for younger individuals.*

3.2.2 THE DIFFERENCE IN POSTGRADUATE HIGHER EDUCATION PARTICIPATION DETERMINANTS BY THE AGE GROUP OF 23-31 YEARS OLD INDIVIDUALS AND 32-49 YEARS OLD INDIVIDUALS

The probit models (3) and (4) for the postgraduate higher education in Table 1 separately by the two age groups indicate that there are some differences in the determinants of the postgraduate higher education participation determinants between these two age sub-groups.

The probit model (3) for the age group of younger individuals (who are from 23 to 31 years old) unlike the probit model (4) for the older individuals (who are from 32 to 49 years old) does not include the variable "*Net annual personal income of a household member" (*PI*). This determinant is not found significant for the younger individuals in the case of the postgraduate probit analysis.*

The probit model (4) for the age group of older individuals unlike the probit model (3) for the younger individuals does not include the variable "The presence of a personal computer in a household" *(*COMP*). All other determinants (*GENDER, AGE, INTER, HAI, *and* NHM*) behave in a similar way in the probit models (3) and (4), for both age groups.*

3.2.3 INTERPRETATION OF HIGHER EDUCATION PARTICIPATION DETERMINANTS AND THE DIFFERENCE BETWEEN UNDERGRADUATE AND POSTGRADUATE HIGHER EDUCATION DETERMINANTS

As we can see from Table 1, the most important differences between the undergraduate and postgraduate higher education participation are the following:

First, the person's gender (*GENDER*) personal characteristic is significant in the case of the postgraduate higher education regardless the age group. However, in the case of the undergraduate higher education, it is significant only for younger individuals, but not significant for older ones. The gender personal characteristic takes the third place by the size of the marginal effect among all the other determinants in the models. Females are obviously more prone to participate in the postgraduate higher education and also in the undergraduate higher education when the age group of the younger individuals is observed. This might be due to the differences in a female and male nature of employment and also due to the socio-economic changes in the last decades, resulting also in changing personal and social value-scale preferences related to education of women.

Among the explanatory determinants in the probit models, age (*AGE*) has the negative impact on the postgraduate higher education participation probability. The greater is the age of the observed household participant, the lower the postgraduate higher education participation probability. The probability of the higher education participation is the highest at the beginning of the any of the four age groups and is decreasing when the person is getting older. Age proves to be an important determinant in the undergraduate and postgraduate higher education participation regardless the age group. However, it takes the last (sixth) place by the size of marginal effect among all the other determinants in the probit models.

Net personal annual income of an individual household member (PI) plays an important role only in determining the postgraduate higher education participation probability of older individuals. This determinant is not found significant in the case of the undergraduate higher education and even not in the case of the postgraduate higher education of younger individuals. In that cases PI is found to be an endogenous variable. To the certain extend it depends on whether an individual is participating in the postgraduate higher education or not, and not vice versa. If younger people are included in the undergraduate or postgraduate higher education they are less likely to have a full time job compared to those, who are not included in higher education. Younger people, especially on the

undergraduate level – which is conducted mostly as a full time education – are choosing between job and study. If they chose to be undergraduate students, they cannot have a regular full time job. Therefore personal income is more a consequence of a postgraduate education participation status rather than its cause. However, in the case of older postgraduate students (aged from 32 to 49 years), personal income is no more endogenous variable. Older people are more likely to have a job than younger people regardless whether they are studying or not. Besides, postgraduate study is mostly conducted in such a way, which allows students to have a regular full time job and to study at the same time. Higher net personal income helps them to finance their postgraduate higher education, so they are more likely to participate in postgraduate higher education in order to strengthen their competitiveness in the labour market. The *PI* takes the second place by the size of the marginal effect among all the other determinants in the probit model for older postgraduate students.

As the most striking and important result of the four probit models is the finding that the undergraduate as well as the postgraduate higher education participation, regardless the age group, is significantly positively determined by the presence of the internet access in a household (*INTER*). The *INTER* is the absolute number for the size of the marginal effect among all the other determinants in the probit models.

Only in the case of the postgraduate higher education participation of the younger individuals, the presence of a personal computer (*COMP*) separately from home internet access plays a significant positive role in the probit model too. In the case of the undergraduate higher education regardless the age group and in the case of the postgraduate higher education of the older individuals *COMP*, they are not included in the probit models.

The internet access and the computer presence are positively correlated (Table 2). However, they do not have exactly the same meaning. Consequently, we see that they both separately play an important role in the postgraduate higher education participation of the younger individuals. In this case (model 3), the *COMP* takes the second place by the size of the marginal effect among all the other determinants in the probit models.

TABLE 2 Pearson's correlation coefficients between COMP and INTER by age groups

Age group	18 years old or less	19 to 25 years old	26 to 34 years old	35 years old or more
R	0.6275	0.6765	0.6767	0.6912

Source: Own calculations based on the HBS data collected from SORS using statistical software package STATA

Notes: COMP-presence of a personal computer in a household; INTER-presence of internet access in a household; R-Pearson's correlation coefficients between COMP and INTER

Moreover, in Table 1, especially interesting is the variable value of own production in a household (*OP*), which has no significant importance for the probability of participation in the postgraduate higher education (regardless the age groups) and in the undergraduate higher education in the case of the younger individuals. However the *OP* is significant in the model for the undergraduate higher education of the older individuals. In this case, higher value of own production means higher opportunity costs of participation in the higher education and lower relative expected benefits. They both result in lower undergraduate higher education participation. However, when analyzing postgraduate students, the value of own production is not a significant determinant, probably because, postgraduate study in Slovenia is still mostly a part-time study. That fact allows students to continue with their work at home and other activities while studying, which lowers opportunity costs of a study. In the case of the younger individuals, who may participate in undergraduate higher education, the *OP* is not significant because young are much less involved in own home production, so it is much less relevant for them, than for older individuals. In the case of model (2), the *OP* takes quite an important place (the second place) by the size of the marginal effect among all the other determinants in the models. The household net annual total assets and income, excluding the net annual personal income of the observed household member (HAI), measures a household financial capability and socio-economic standard. The net annual personal

income of the observed household member is excluded from household budget because it is mostly endogenous variable (except in the case of model 4). The higher is the value of the HAI, the higher is the undergraduate and postgraduate higher education participation probability regardless the age groups. While participating in the higher education, a household member needs to cover different kinds of study costs, which are much easily covered if the household assets and income are higher. However, the *HAI* does not play such an important role as one might expect. It only takes the fifth place – while the fourth place in the case of model (1) – –by the size of the marginal effect among all the other determinants in the probit models.

When the number of household members (*NHM*) is greater than four, this decreases the postgraduate higher education participation probability of the observed household member. This might mean that increasing the number of household members over four could result in worsening the financial capability of a household and its living standard. On another hand the decreasing postgraduate higher education participation probability might be a result of a fact that in bigger families it is more plausible that the observed household member is a bit older, because he or she already has at least one brother or sister. Obviously the probability of participation in the postgraduate higher education for older people is lower than for younger people. The *NHM* is significant and included in all four models regardless the level of education or age group of the observed individual. However, the *NHM* takes a less important fourth place – while the fifth place in the case of model (1) – by the size of the marginal effect among all the other determinants in the probit models.

Presence of at least one household member with a higher education in addition to the observed household member (HEO) is another variable which would be highly expected to determine higher education participation's probability. The HEO is a proxy measure for education of parents. In the case of the undergraduate higher education (regardless the age group) it is highly significant. A general atmosphere and a household value-scale, a way of thinking and an attitude to the higher education in a household, where there is at least one household member (especially if this is a parent), who already possesses any kind of

higher education, is such, that it stimulates higher education participation of the observed household member. But in the case of the postgraduate higher education that did not prove to play any significant role. Apparently family circumstances have weaker impact on the decisions of potential postgraduate students compared to the undergraduate students. The *HEO* takes the second place in the case of probity model (1) and the third place in the case of probity model (2) by the size of the marginal effect among all the other determinants in the models. Therefore, the HEO is quite an important determinant.

4 CONCLUSION AND IMPLICATIONS

Based on the results of the four probit models, the most important and significant determinants of the higher education participation are by the decreasing size of marginal effect: presence of internet access and presence of a personal computer in a household; *higher education of others household members measured by the presence of at least one household member with a higher education beside the observed household member;* net annual personal income of a household member; *value* of own *production of a household*; household member by gender; *number of household members; net annual total assets and income together excluding net annual personal income of the observed household member* and a household member age. These findings confirm our first research question, which are the most important and statistically significant higher education participation determinants in Slovenia.

Our second research question focuses to the differences in determinants by different levels of higher education. The most important difference in the case of the undergraduate compared to the postgraduate higher education participation is the absence of the determinants "presence of a personal computer in a household" (which is included in the probit model for the younger postgraduate higher education), "net annual personal income" (which is included in the probit model for the older postgraduate higher education), the absence of the determinants "household member gender" in the case of the older individuals (which is included in the model for postgraduate higher education regardless

the age group) and "value of own production of a household" in the case of the younger individuals (which is not included in the model for younger postgraduate higher education regardless the age group). The determinant "higher education of others with presence of at least one household member with a higher education beside the observed household member" is included in both models for undergraduate higher education but is not included in any probit model for the postgraduate higher education.

The home internet access, and in the case of model (3) also the presence of personal computer at home, has the strongest significant and positive effect on the higher education participation probability. The home internet access encourages the higher education participation because it improves availability of better, faster, more up to date and more accurate information in general (Liu et al., 2010b) and particularly about the higher education study programs, their location, duration, quality, requirements, and specific benefits resulting from the acquired higher education in terms of competitiveness on the labour market. Second, the home internet access also implies better communication possibilities. The presence of a personal computer and internet access offers numerous possibilities of fast, quality, and cheap two-way or conference communication globally through e-mail, different kinds of internet forums and blogs, chat rooms, free phones, on-line conference rooms, and video communication. Third, the computer users are also better skilled in use of several computer programs compared to those without computer at home. Therefore, the presence of a personal computer and internet access at home help at getting the best possible information when deciding for the higher education and offer an information-education tool as well as stimulate abilities which are advantages for those participating in higher education. In addition to the presence of a personal computer and internet access in the household there are also pertained some other personal and household values, culture and general attitude to education. Most probably, people with a computer and the home internet access are more likely to have finished an appropriate secondary education (and later undergraduate higher education) and are therefore more likely to enter undergraduate higher education (and postgraduate higher education). The presence of

computer and the home internet access might well be understood as a symptom of some for higher education advantageous characteristics, which are difficult to be observed directly.

The research brings a clear message. The presence of a personal computer and internet access in a household plays a very important and positive role for the higher education participation probability. This finding might also be an opportunity for the web-based and combined education, which improves a student study performance, a higher education competitiveness as well as convenience and flexibility of higher education. Information technology and internet should become more accessible for every household. This is not only a responsibility of a government, but also a responsibility of the private sector, which takes an important portion of the higher education benefits.

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