WHERE TO STUDY? CHOICE BEHAVIOURS OF UNIVERSITY STUDENTS[1]

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ABSTRACT

Universities are considered to be an important factor of regional development as they contribute to human capital accumulation in the economy. However regional rates of return from higher education crucially depend on the migration behaviour of university students. Those regions, which attract a number of non-local students and retain majority of university graduates benefit from their investments in higher education and boost future growth. To understand the impact of universities on the development of the host region, it is important to explore the selection process of applicants for university studies and subsequent employment and housing decisions of university graduates. In this paper, we examine factors that influence the decision of applicants to study either in domicile region or in other regions. The main determinants include individual characteristics of applicants, socio-economic characteristics of the domicile and university region and institutional characteristics of the university. In our analysis we use cross-section data of 40.000 students in Slovakia; about 50% of them studied in the domicile region. We employ logistic regression to determine the main factors of choosing to study outside the domicile region rather than in it.

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INTRODUCTION

Universities are considered to be a key institution of human capital formation in the economy. However the distribution of human capital gains across the economy is affected by the spatial structure of higher education and migration decisions of students and graduates. There is growing empirical literature that deals with the interrelationship of universities, human capital and migration. Existing research can be divided into three approaches. First group of authors explore the migration decision of students in choosing higher education (SA et. al 2004; FAGGIAN et. al 2007b; SUHONEN, 2014). Second group of authors model the decision of graduates when choosing a place of work after graduation (FAGGIAN ET. AL 2007a; VERHORST ET AL. 2010; DOTTI ET. AL. 2013; CARREE KRONENBERG 2014). And finally third group of authors combine these approaches and test the sequential migration hypotheses (FAGGIAN et. al 2007b).

Slovakia is an appropriate country for studying the migration behaviours of potential higher education students. The higher education system undertook important structural changes in recent years with the aim to increase the education level in Slovakia. The number of higher education institutions increased from 16 to 36 during last 25 years. This led to higher regional accessibility of higher education and more varied supply of study programs in regions. However the economic transformation brought about rapid increase of regional disparities. Students nowadays have more opportunities to study in the domicile region, but at the same time more incentives to search for better job opportunities after graduation in non-domicile regions.

The aim of this paper is to explore determinants of choice behaviours of university students, more precisely, migration decisions of students in choosing higher education. In the first part we describe conceptual approaches and results of empirical research from different countries. Then we introduce the utility concept using the spatial discrete choice model. Our empirical research explores the determinants of choice behaviours of 39078 university students in Slovakia using logistic regression model.

1 DETERMINANTS OF THE STUDENT MIGRATION

There are two main methodological approaches in exploring the migration between the domicile and university region. Within he first approach researchers is usually based on individual

micro data. It explores individual migration factors and the role of individual characteristics of a migrant. The purpose of the second approach, which is based on spatial interaction models, is to identify determinants and rate of migration and to estimate the size of student flows.

A large part of the discussion focuses on the explanation the role of distance to the university. According to SUHONEN (2014), students from the peripheral regions in Finland face barriers when choosing a college. His research for example showed that an increase in distance to the nearest high school by 100 km results in 15 percent decrease in the likelihood of selecting the university. However, there are differences between the study programs. FAGGIAN et. al (2007b) compared the probability of migration for studies outside the home region between students from Scotland and Wales. The difference is the result of dissimilarities in the system of higher education, geographical characteristics of the regions and cultural differences. An empirical analysis in Italy by AGASISTI and DEL BIANCO (2007) also confirmed a deterrent role of distance to higher education. The results also show that the number of faculties, the resources invested in student aid, and the socio-economic conditions of the area have a positive impact on the attractiveness of a university. SÁ et. al (2004) using the gravity model found that the selection of higher education in the Netherlands is determined by the distance from the place of residence. However, they also noted the negative impact of the rent in the university region and the positive impact of regional amenities. An interesting finding was the negative impact of the quality of higher education institution, which was opposed to expectations. This could be explained by minor differences in the quality of higher education in the Netherlands and also by consumption motives rather than motives related to the investments in human capital. However, results by CIRIACI (2014) indicate that both university research and teaching quality influence migration choices of students in Italy.

2 MODELLING UNIVERSITY CHOICES

If we assume that transportation costs, information accessibility and family ties play inhibiting role, then the migration decision is subject to distance deterrence effect. We build our research on the utility concept using the spatial discrete choice model (PELLEGRINI, FOTHERINGHAM, 2002). The migration destination choice problem is the selection of one option (destination) from a finite, discrete set of alternatives (PELLEGRINI, FOTHERINGHAM, 2002). In this framework a potential utility function of the i-th individual moving from L location to location j can be describe as:

$$U_{ij}^{*} = U_{ij}\left(\mathbf{A}_i,\, p_{ij},\, d_{Lj}\right)$$

A_i vector of personal human capital characteristics

p_{ij} expected returns to education of individual *i* at location *j*

d_{Lj} distance between domicile region *L* and university location *j*

Utility has a deterministic portion $V_{ij}\left(\mathbf{A}_i,\ p_{ij},\ d_{Lj}\right)$, which is observable utility and an error term e_{ij} which accounts for unobservable determinants of utility. Therefore we can write:

$$U_{ij}^{*} = V_{ij}\left(\mathbf{A}_i,\ p_{ij},\ d_{Lj}\right) + e_{ij} \qquad j \in J$$

Potential migrant does not have perfect information about all possible locations, however he has relatively complete information on the location of its domicile and location of higher education. At the beginning migrant compares utility in the domicile location with other locations (*departure choice*). If he decides to leave domicile region in the second phase he selects among other locations in order to maximize its utility (*destination choice*). In the face of uncertainty we are able to make probabilistic assessment of an individual choice behaviour. On the observable characteristics at the two locations we model the decision whether to stay in the domicile region ($m \in J_D \subset J$) or to move in the other region in order to study elsewhere ($k \in J_{ND} \subset J$). If V_{ik} is higher than V_{im} than alternative *k* has higher probability to be selected than *m*.

$$P(M_{Lk}) = prob\left[V_{ik}\left(\mathbf{A}_i,\ p_{ik},\ d_{Lk}\right) + e_{ik} > V_{im}\left(\mathbf{A}_i,\ p_{im},\ d_{Lm}\right) + e_{im}\right]$$
$$m \in J_D \subset J, k \in J_{ND} \subset J, J_{ND} \neq J_D$$

3 DATA AND METHODS

In this study we use cross-section data; our sample consists of 39078 individuals. These are residents in Slovakia who have university education as reported in Census 2011, which was conducted by Slovak Statistic Bureau. Each individual holds bachelors degree or higher. They are between 21 and 26 years of age. Based on the education system in Slovakia and years of education required before enrolling for the university these students started their university studies between 2003-2008. Slovakia consists of 8 regions and the study uses this geographic structure. Table 1 provides an overview of regional migration between the eight regions.

Table 1 Regional migration matrix of university students

		Domicile region							
		BA	TT	TN	NR	ZA	BB	PR	KE
University region	BA	**88%**	41%	33%	29%	24%	21%	16%	8%
	TT	8%	**37%**	15%	10%	8%	7%	4%	2%
	TN	0%	1%	**14%**	1%	2%	1%	1%	0%
	NR	2%	16%	15%	**53%**	8%	11%	5%	5%
	ZA	1%	2%	13%	2%	**39%**	7%	6%	3%
	BB	1%	2%	9%	5%	15%	**45%**	7%	4%
	PR	0%	0%	0%	0%	2%	2%	**32%**	13%
	KE	0%	0%	0%	0%	2%	6%	30%	**63%**

Source: own computation

Students from Bratislava region (BA) migrate the least, only 12%. Next region is Kosice (KE) where 37% of students enrol for university outside their domicile region. The highest proportion of students (86%) migrates from Trencin region (TN). Presov region (PR) has the second highest migration with 68% of students choosing their school in other Slovak regions. The highest proportion of migrating students from each region chose Bratislava region as their destination.

In the regression models we use individual characteristics, characteristics of the school and characteristics of the region to explain the variations. Possible set of explanatory variables of migration is described in the table 2. Individual characteristics and information about the filed of study come from Census 2011. Characteristics of the region come from national statistics of the Slovak Statistic Bureau.

Table 2 Possible set of explanatory variables

Characteristics	**Variable**
Individual characteristics	Gender
	Age (21-26)
Characteristics of the school	Field of study (9 fields)
Characteristics of region (8 regions) Domicile region = push factor Region of study = pull factor	Number of faculties
	Wage of university graduate (Bc. and above)
	Density of population
	Job opportunities for university graduates

Source: own computation

Wage of university graduate is calculated as an average wage of university graduates in the period 2003-2008 in the given region. Density of population is also an average of the years 2003-2008. Job opportunities for university graduates are calculated for each region as the number of employees with university education per capita, an average of the years 2003-2008.

Fields of study are pooled into 9 groups:

1. Natural science (including Physics, Geology, Geography, Chemistry, Biology, Environment)
2. Technical science 1 (Mining, Metalurgy, Engineering, Informatics, Electrotechnics, Applied Chemistry, Food)
3. Technical science 2 (Textile, Wood, Leather, Polygraphy, Architecture, Contruction, Transportation, Automatisation and others)
4. Agriculture, Forestry and Veterinary
5. Medical science
6. Social science 1 (Philosophy, Economics, Political, Law)
7. Social science 2 (History, Journalism, Philology, Sports, Pedagogy, Psychology)
8. Culture and Arts
9. Military and Police

4 LOGIT MODEL ESTIMATION RESULTS

We use a general migration probability model in the design of logit model in order to determine the key factors of students' migration. Dependent variable set to 0 if study region is the same as domicile region; otherwise set to 1. Slovakia consists of 8 regions and the study uses this geographic structure. We use two different model specifications. One specification is the model for Slovakia. The other specification is the model accounting for heterogeneity of domicile regions.

There is a strong correlation between each pair of variables describing characteristics of the region. That is the reason for estimating 4 separate models with each of the variables respectively. Estimation results are summarized in the table 3.

When we look at individual characteristics female and younger students migrate more on average. When comparing the field of study then Agriculture, Forestry and Veterinary field is the strongest factor. The second strongest factor is Culture & Arts. The students of Natural and

Technical Science migrate on average less than Social Science students. When comparing characteristics of regions each indicator is a significant determinant. Domicile region impact is stronger than other regions across all indicators (number of faculties, wage, population density, job opportunities).

Table 3 Estimation results of logit model (model specification for Slovakia)

Model	(1)	(2)	(3)	(4)	(5)
	logit	logit	logit	logit	logit
Female	0.0333	0.0532**	0.0858***	0.0701***	0.0767***
	(1.48)	(2.11)	(3.48)	(2.81)	(3.09)
Age	-0.0274***	-0.0169*	-0.0191**	-0.0211**	-0.0196**
	(-3.27)	(-1.80)	(-2.06)	(-2.29)	(-2.13)
Natural	-0.131***	-0.216***	-0.198***	-0.178***	-0.144***
	(-3.00)	(-4.71)	(-4.34)	(-3.77)	(-3.04)
Technical 1	-0.236***	-0.358***	-0.316***	-0.314***	-0.283***
	(-7.42)	(-10.29)	(-9.37)	(-9.26)	(-8.23)
Technical 2	-0.128***	-0.281***	-0.214***	-0.228***	-0.216***
	(-3.26)	(-6.56)	(-5.09)	(-5.39)	(-5.10)
Agricult forest vet	0.268***	0.340***	0.540***	0.509***	0.519***
	(4.69)	(5.54)	(7.98)	(7.58)	(7.75)
Medical	0.0616	-0.0465	-0.0979	-0.0773	-0.0307
	(0.90)	(-0.59)	(-1.33)	(-1.06)	(-0.41)
Social 2	-0.0361	0.0423	0.0670**	0.0601*	0.0839***
	(-1.33)	(1.33)	(2.12)	(1.93)	(2.74)
Culture arts	0.133**	0.166**	0.211***	0.211***	0.212***
	(2.03)	(2.18)	(2.78)	(2.74)	(2.87)
Military police	-0.234***	-0.343***	-0.455***	-0.346***	-0.291***
	(-2.80)	(-4.38)	(-5.75)	(-4.17)	(-3.40)
Faculties study region		0.0965***			
		(48.02)			
Faculties domicile		-0.173***			
		(-51.97)			
Wage study region			0.00734***		
			(56.64)		
Wage domicile			-0.0105***		
			(-63.48)		
Density study region				0.0128***	
				(56.17)	
Density domicile				-0.0204***	
				(-56.93)	

Opportunities study region					26.02***
					(53.07)
Opportunities domicile					-43.04***
					(-52.43)
Constant	0.239***	0.959***	2.416***	0.771***	0.865***
	(3.44)	(11.69)	(22.78)	(9.60)	(10.75)
Observations	39078	39078	39078	39078	39078
McPh_R_squared	0.00281	0.228	0.176	0.178	0.177
Migrated	20090	20090	20090	20090	20090
Non_Migrated	18988	18988	18988	18988	18988
AUC	0.536	0.832	0.767	0.767	0.759

*Source: own computation. Robust estimations, z statistics in parentheses, * p < 0.10 , ** p < 0.05, *** p < 0.01*

The results of the second model (the model specification accounting for heterogeneity of domicile regions) are presented in table 4. Abbreviations are used to indicate domicile region of students as follows: BA – Bratislava region, TT – Trnava region, TN – Trencin region, NI – Nitra region, ZI – Zilina region, BB – Banska Bystrica region, PR – Presov region, KE – Kosice region.

Table 4 Estimation results of logit model (8 model specifications for each of 8 domicile regions)

Model	BA	TT	TN	NI	ZI	BB	PR	KE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logit	logit	logit	logit	logit	logit	logit	logit
Female	0.226**	-0.0778	-0.133	-0.325***	0.630***	0.0416	-0.395***	0.0771
	(2.42)	(-0.80)	(-1.18)	(-3.64)	(6.97)	(0.39)	(-6.06)	(1.17)
Age	-0.0761**	0.118***	0.00109	-0.0925***	0.0740**	-0.0245	0.0577**	-0.0459*
	(-2.18)	(3.23)	(0.03)	(-2.62)	(2.26)	(-0.61)	(2.38)	(-1.86)
Natural	-1.643***	0.476**	2.970***	-1.063***	1.338***	-0.368*	-0.0346	-0.739***
	(-5.91)	(2.03)	(5.06)	(-5.24)	(5.10)	(-1.69)	(-0.26)	(-5.91)
Technical 1	-0.770***	-0.824***	0.192	0.00828	-2.111***	1.823***	0.0717	-1.482***
	(-4.55)	(-6.78)	(1.44)	(0.07)	(-17.29)	(11.74)	(0.78)	(-15.28)
Technical 2	-0.619***	0.176	0.332**	0.850***	-1.915***	1.550***	0.934***	-1.360***
	(-3.31)	(0.92)	(2.02)	(3.64)	(-13.27)	(8.75)	(5.95)	(-11.27)
Agricult forest vet	2.031***	3.301***	2.840***	-1.828***	2.224***	-0.0825	2.069***	0.777***
	(8.25)	(7.94)	(4.80)	(-9.06)	(5.71)	(-0.56)	(5.29)	(4.44)
Medical	-0.215	-0.792***	0.162	0.198	-1.173***	1.189***	-0.412***	-0.0170
	(-0.72)	(-3.47)	(0.57)	(0.69)	(-5.10)	(2.59)	(-2.61)	(-0.10)

Social 2	0.344***	-0.190*	2.525***	-0.851***	-0.338***	0.700***	-0.825***	1.018***
	(3.44)	(-1.69)	(10.44)	(-8.36)	(-3.12)	(4.83)	(-11.89)	(12.35)
Culture arts	-0.337	0.973***	1.763***	-0.831***	0.197	-0.253	0.489**	1.091***
	(-1.41)	(2.82)	(3.76)	(-3.15)	(0.75)	(-0.93)	(1.97)	(5.14)
Military police	-0.762	0.681	2.227**	0.512	-2.688***	0.920**	4.051***	-1.871***
	(-1.04)	(0.80)	(2.15)	(0.88)	(-7.87)	(2.24)	(4.03)	(-7.98)
Wage study region		0.0104***	0.00301***	0.0173***	0.0266***	0.0706***		0.000352
		(31.07)	(16.60)	(25.43)	(25.65)	(15.61)		(0.95)
Constant	-1.769***	-9.766***	-1.271***	-13.80***	-21.66***	-55.36***	1.186***	-0.455
	(-6.02)	(-21.08)	(-3.14)	(-21.04)	(-25.55)	(-15.93)	(5.91)	(-1.19)
Observations	5718	3549	3780	4610	5088	4219	6250	5864
McPh_R_squared	0.0536	0.266	0.115	0.443	0.460	0.651	0.0780	0.144
Migrated	682	2222	3248	2151	3091	2326	4232	2138
Non_Migrated	5036	1327	532	2459	1997	1893	2018	3726
AUC	0.656	0.766	0.682	0.867	0.891	0.960	0.676	0.744

*Source: own computation. Robust estimations, z statistics in parentheses, * p < 0.10 , ** p < 0.05, *** p < 0.01*

There are some differences when looking at specifics of domicile regions. When compared to results of the model for whole Slovakia we find out that female from Nitra and Presov regions migrate less than male. Contrary to results for Slovakia older students from Trnava and Zilina regions migrate more. Average wage of university graduate is a significant factor in all regions besides Kosice region. There are some differences in the impact of the field of the study across all regions; one of the important factors would be availability of the study filed in the domicile region.

CONCLUSION

Our study comes from the premise that universities are one of the determinants of the migration of higher educated individuals. Results suggest that more developed regions attract more students (pull factor) and at the same time less developed regions repel students (push factors). On the supply side the spatial structure if universities matters as well as the structure of study programmes in the region. Individual characteristics (gender and age) matter as well, although there are important regional differences. The results provide a signal for higher education policy making and particularly in discussion about downsizing the number of universities in Slovakia. In our opinion it is crucial to coordinate education policy and labour

market policy on the regional level; specifically to focus on the labour market policies and quality of life.

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