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REGIONAL CONCENTRATION OF HIGHLY EDUCATED COUPLES

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Abstract:

Individuals with higher education prefer to live in cities. This leads to a concentration of human capital in urban regions. The regional concentration of human capital can also be viewed from a family perspective. There is empirical evidence (see e.g. Costa & Kahn 2000) that the educational background of both spouses has an effect on regional concentration. A person with higher education often has a spouse who also has higher education. In this situation the family moves to a region where both spouses can find satisfying jobs. This study examines the residential choice of couples in which both spouses have higher education. In addition, families with different educational backgrounds are compared to see if education explains a family's choice of location. Micro level data is used in the empirical analysis.

Keywords: human capital, regional concentration, couples

1 INTRODUCTION

Some regions grow and undergo rapid development while others encounter unemployment and loss of population. Finland is a good example of this phenomenon. People with higher education especially prefer to live in the biggest cities, which leads to regional concentration of human capital. As human capital flows into a region, productivity rises, the labour market becomes more efficient and the flow of information and innovations increases in that region (Simon 1998; Moretti 2004).

Because human capital plays a crucial role in regional development, it is important to examine which factors affect the locational choices of individuals and families. Several studies have confirmed that highly educated labour lives in cities (Ritsilä 2001; Haapanen & Ritsilä 2003). The main reasons for this trend are the better job opportunities and higher wages that cities offer (Borjas et al. 1992). Learning opportunities and family utility have also been proposed as explanations (Glaeser 1999; Green 1997; Costa & Kahn 2000).

In choosing their spouses people do not act randomly; on the contrary, they select a spouse on the basis of particular factors. This process is called assortative mating. People with similar characteristics often marry one another. The characteristics in question can be various, such as age, religion, family background or education. (Becker 1991; Stevens-Long 1988.) The present study focuses on couples in which both spouses have higher education.

People who have invested in human capital prefer to live in cities. A person with higher education often has a spouse who has also invested in human capital. Such a couple has to take both careers into consideration when choosing where to reside. Finnish data give a true picture of this situation because the participation of women in the labour force is high. In the year 2001 approximately 63 % of Finnish women were in the labour force.

This study focuses on highly educated couples and their location decisions in the context of the types of regions in which people with different educational background live. The main idea is to find out whether spouses' level of education has an interaction effect and how the location decisions of highly educated couples affect the spatial concentration of human capital.

Regional concentration in Finland in 2001 is described with micro level register data. Multinomial logit model is used in the empirical analysis. The probabilities of living in a certain type of region are calculated for different individuals on the basis of the estimated model. Reasons for regional concentration are identified in the analysis and discussed in the conclusion.

In the next section the theoretical background to and literature on regional concentration and highly educated couples are presented and discussed. The data, method and variables are described in section three and the results are presented and analysed in section four. Section five concludes.

2 THEORETICAL BACKGROUND

2.1 Human capital, regional concentration and assortative mating

The theory of human capital (Becker 1962) forms the starting point of this study. The theory seeks to explain income differences. Human capital consists of the knowledge, skills and experience which a person can acquire. Education and job experience can thus be seen as investments in human capital. These investments are personal choices which improve the individual's future financial situation by improving his or her productivity and thus wage. (Becker 1962, 9; Becker 1993, 392-395).

People who have invested in human capital tend to move to cities because they get better return on their investment there. This concept was first introduced by Sjaastad (1962). He described migration to another region as an investment. A person compares the costs and benefits of moving and decides to move or not to move. Both the costs and benefits of migration can be financial or psychological; for example, a higher wage in the new location is a financial return and a less agreeable environment a psychological cost. This decision-making process is the theoretical foundation of the concept of the regional concentration of human capital. (Sjaastad 1962, 80-93.)

The other theoretical starting point of this study is assortative mating. Pencavel (1998) has examined assortative mating by schooling in the U.S. on several decades. In 1990 homogamy was greatest among people who had more than 12 years of education. This result is a

consequence of increased educational attainment and a rise in the age of first marriage. (Pencavel 1998, 326-327.)

From the theoretical viewpoint, highly educated individuals tend to choose a spouse who also has higher education. Both spouses have invested in human capital and seek a return on their investment. The return is higher in the biggest cities, which therefore determines their locational preference. However, to maximize their family utility the couple has to find two satisfactory jobs in the same area.

2.2 Previous studies

Haapanen and Ritsilä (2003) studied migration with Finnish micro level data. The study examined migrants and their destinations. In their study, they noted the effect of education on location decisions. A highly educated migrant had a higher probability of moving to an urban region than a migrant with less education. (Haapanen & Ritsilä 2003, 78-88.)

Human capital and its benefits, then, are key factors in location and mobility decisions. People who have invested in human capital prefer to live in cities because there they get higher return on their investment. Wages vary across regions. Skilled workers who wish to maximize their income will opt to live in a region where the return on their skills is higher than elsewhere. As a result, highly educated individuals are concentrated in the biggest cities. (Borjas et al 1992.)

In addition to higher wages, there are other reasons for the regional concentration of people with higher education. Glaeser (1999) notices that wages are higher in big cities but states that individuals value other things too. People move to cities because they learn faster there. For example, individuals who have high human capital have more opportunities in cities to meet each other, update their skills and specialise in their own field. These learning opportunities will lead to higher future wages. (Glaeser 1999, 254-261.)

Another explanation for the regional concentration of highly educated persons is family. The location and mobility strategies of dual career families have been examined qualitatively (Green 1997). Green's study is based on interviews with 30 dual career families in the UK. The study focuses on decision-making. A family maximizes the job opportunities of both

spouses although in 24 families the career of one spouse was prioritized. Usually the leading career was higher paid, locationally-constrained or more secure. Although the decision-making process was rational in many families, the following spouse might become discontented if he or she feels that his or her position in the labour market might weaken. The most common strategy is to strike a balance between both careers. Children's needs are also considered in the locational decision. Many families recognize on one hand the advantages of a large labour market and on the other hand the negative externalities of large metropolitan areas. (Green 1997, 642-655.)

Järvinen (2002; 2003) has studied dual career families by using Finnish survey data. Unsurprisingly, the main findings are that dual career families live in urban areas. For instance, 39 % of Finnish dual career families live in the metropolitan area, around Helsinki. If possible, dual career families prefer to stay in their present location and to avoid migration. However, when a dual career family decides to migrate, the job opportunities for both spouses are important. (Järvinen 2002, 1-20; Järvinen 2003, 6-13.)

Costa and Kahn (2000) studied highly educated couples from a family perspective. They discovered that the educational background of both spouses had an effect on regional concentration. A college graduate often had a spouse who was also a college graduate. These couples, who are called "power couples", prefer to live in big labour market areas. In addition to the labour market, other causes of regional concentration were discussed. College graduates might value urban amenities more than people with less education. On the other hand, unmarried people move to cities because they value the urban marriage market as this offers better possibilities of finding a spouse. (Costa & Kahn 2000, 1287-1289.)

In their study, Costa and Kahn (2000) used census data from the years 1940, 1970, 1980 and 1990. Their hypothesized that there is a colocation problem, meaning that highly educated couples need to live in an area where they can find satisfying jobs for both spouses. The researchers analysed the data with a multinomial logit model and calculated the probabilities for different households of living in an area of a certain size. They found that over the decades the regional concentration of highly educated couples had increased. The probabilities of other household types, couples and singles, had remained stable. (Costa & Kahn 2000, 1290-1303.)

The colocation problem and causes of regional concentration were tested in a study by Compton and Pollak (2004). They examined dynamic processes, i.e. educational attainment, migration, marriage and divorce, in order to find explanations for the regional concentration of power couples. Their hypothesis was that highly educated couples do not concentrate in big cities because of family's joint migration decisions. As Costa and Kahn (2000) found, the regional concentration of power couples increased from 1940 to 1990. When the year 2000 was included in the analysis, a shift in the trend is noticed. Power couples were less concentrated in metropolitan areas in 2000 than they were in 1990. In addition to a longer time period, the dynamic causes of concentration were examined. The researchers found that power couples did not concentrate in metropolitan areas because of migration. Educational attainment, highly educated singles and assortative mating in big cities were the explanations for regional concentration. (Compton & Pollak 2004, 1-19.)

Several studies have noted that individuals with higher education prefer to live in big cities. Bigger and more efficient labour markets are the most obvious reason for this concentration. Higher education graduates find satisfying jobs and get better wages in big cities. Other proposed reasons are learning opportunities and the utility of the whole family.

3 DATA AND METHODS

3.1 Data description

Finnish micro level data is used in the empirical analysis. The data are a 7 % random sample drawn from the Finnish census in 2001. Information from labour registers and municipal and regional statistics is combined with the census data. These data contain information about place of residence, family, education and work from the year 1975 to 2002. The basic unit of sampling is the individual but basic variables of parents and spouse are included in the data. Spouse's variables are crucial in enabling this study.

The labour force in 2001, i.e. employed and unemployed, was extracted from the original data for this study. Because the focus is on couples and singles, children living with their parents were excluded from the data. The final sample consists of 165 130 individuals.

In this study, families, instead of individuals, are regarded as decision-makers. The data contains information about the different kinds of families (table1). First of all, 72 % of individuals have a spouse and 28 % are singles. Couples are either married or cohabiting. Half of the individuals have a child or children. The most common family type is a couple with children.

TABLE 1 Family types in the sample

type	**%**
couple with child(ren)	44,3
couple without child(ren)	28,3
single parent	5,6
single	21,8
all	n = 165 130

Individuals are divided into two groups by education. People who have completed basic or secondary education are in the first group and those with higher education in the second. All individuals who have either low tertiary education or bachelor's, master's or post-graduate degree are defined as having higher education. In the year 2001 two thirds of the sample individuals had basic or secondary education and one third higher education.

Assortative mating is an important factor in this study. People do not choose their spouse randomly and the data shows that assortative mating by schooling is strong. In year the 2001, 58 % of higher education group had a spouse who also had higher education.

The main interest of this study lies in comparing individuals who have different educational backgrounds. Individuals are grouped, first into those who have a spouse and singles and, second according to education (table 2). Couples in which both spouses have basic or secondary education form the biggest group. Couples in which both spouses have higher education account for 15 % of all households.

TABLE 2 Educational background and family type in the sample

family	**education**	**%**
couple	higher and higher	14,8
couple	higher and basic/secondary	21,2
couple	basic/secondary and basic/secondary	36,0
single	higher	7,9
single	basic/secondary	20,0

3.2 Variables and model

The empirical analysis utilizes multinomial logit model. Variables for the year 2001 are used in the analysis. Region category is the dependent variable. There are several independent variables and two interaction terms in the model. Coefficients are estimated and the probabilities of living in a specific category of region are calculated from the estimated model.

There were 85 regions in Finland in 2001. These regions are divided into four groups based on their size and type (figure 1). Hence, the dependent variable has four values. The first group, the metropolitan area, consists of the Helsinki region and the three smaller neighbouring regions. In 2001 approximately 1,39 million people lived in the metropolitan area. The second group consists of the big university cities. The largest region in this category is Tampere with over 300 000 inhabitants and the smallest is Vaasa with 88 000 inhabitants. The remaining urban regions belong to group three of which the largest region is Lahti with 168 000 inhabitants. The regions in fourth group are mainly rural or sparsely populated.

category	number of regions	% in the sample
1 metropolitan area	4	29,8
2 university cities	7	23,7
3 other cities	25	28,1
4 small regions	49	18,4

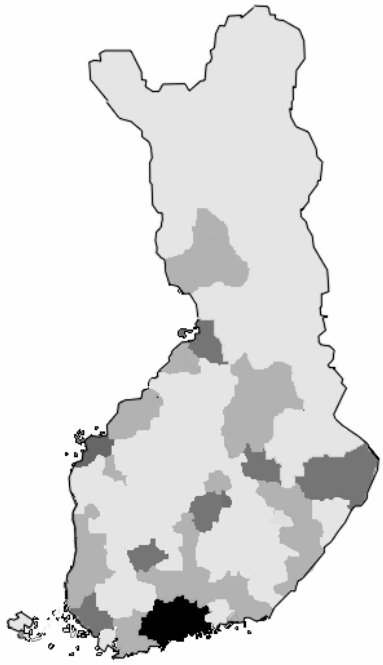

FIGURE 1 Region categories

Four categories have chosen for the dependent variable because it is known in advance that the highly educated are concentrated in the large labour markets. Therefore, to take account of this factor urban regions have to be subdivided.

The explanatory variables describe either the observed individual or his or her spouse (table 3). The variables sex, language and having children provide essential background information. Individuals' and their spouse's education are important variables and have a marked effect on locational choice, as previous studies have shown (Haapanen 2003). There is a further variable which identifies couples and singles. Finally, spouse's characteristics are described by several variables, such as labour market status.

TABLE 3 Explanatory variables, their values and sample means

variable	min / max	mean
woman	0 = man 1 = woman	0,50
Swedish-speaking	0 = Finnish or other 1 = Swedish	0,05
education	0 = basic or secondary 1 = higher	0,34
unemployed	0 = employed 1 = unemployed	0,12
children 8-18 years	0 = no children 1 = children	0,22
children 0-7 years	0 = no children 1 = children	0,19
single	0 = has a spouse 1 = single	0,28
education (spouse)	0 = basic or secondary / no spouse 1 = higher	0,25
employed (spouse)	0 = not employed / no spouse 1 = employed	0,57
unemployed (spouse)	0 = not unemployed / no spouse 1 = unemployed	0,05
student (spouse)	0 = not a student / no spouse 1 = student	0,02
age	min 15 max 74	41,8 (11,0)
age²		
education * education (spouse)		
woman * single		

Two interaction terms are included in the model. The first interaction term is individual's and his or her spouse's education which is the main question addressed in this study. In other words, this term reveals the joint effect of couple's higher education. Single women are also

included in the model as an interaction term. This is of interest because the regional concentration of single women and single men differs.

4 RESULTS

4.1 Main findings

The multinomial logit model is the method of estimation. The variables for the year 2001 are used and the sample comprises 165 130 individuals. The dependent variable is region category. Reference category is the group four, i.e. small regions. The estimated coefficients are presented in table 4.

Most of the coefficients are statistically significant at the 0,05 level. In the small cities category, group three, coefficients for unemployment and spouse's unemployment do not reach statistical significance. Spouse's unemployment is also insignificant in the category of big cities. Also language is insignificant in group two.

TABLE 4 Coefficients

	metropolitan area	**university cities**	**other cities**
intercept	1,951***	2,163***	1,245***
	(0,113)	(0,116)	(0,114)
woman	- 0,052***	-0,061***	-0,043**
	(0,018)	(0,018)	(0,017)
language	0,541***	0,053	0,486***
	(0,036)	(0,040)	(0,036)
education	0,549***	0,473***	0,211***
	(0,021)	(0,022)	(0,021)
unemployed	-0,671***	-0,124***	-0,028
	(0,024)	(0,023)	(0,022)
children 0-7 years	-0,455***	-0,396***	-0,233***
	(0,023)	(0,024)	(0,023)
children 8-18 years	-0,486***	-0,327***	-0,182***
	(0,021)	(0,022)	(0,020)
single	0,442***	0,200***	0,099***
	(0,036)	(0,038)	(0,035)
education (spouse)	0,442***	0,337***	0,144***
	(0,026)	(0,027)	(0,025)
employed (spouse)	0,170***	0,126***	0,085***
	(0,028)	(0,029)	(0,027)
unemployed (spouse)	-0,517***	0,005	-0,006
	(0,044)	(0,041)	(0,038)

student (spouse)	0,197***	0,538***	0,175***
	(0,065)	(0,063)	(0,064)
age	-0,064***	-0,083***	-0,036***
	(0,006)	(0,006)	(0,006)
age²	0,0005***	0,0007***	0,0003***
	(0,0000)	(0,0000)	(0,0000)
education*education (spouse)	0,163***	0,187***	0,027
	(0,0374)	(0,039)	(0,038)
woman*single	0,470***	0,454***	0,266***
	(0,035)	0,037	(0,036)
log likelihood (unrestricted)	- 221239,66		
log likelihood (restricted)	- 226275,84		
LR χ^2, df = 45	10072,37		
LR index (pseudo R^2)	0,0223		

statistical significance:* 0,10; ** 0,05; *** 0,01

The estimated coefficients have the expected signs. An individual's and his or her spouse's education are major factors in locational choice. In addition, both spouses' education shows a significant interaction effect. This result confirms that the joint educational profile is a relevant predictor of regional concentration.

The marginal effects were calculated for the whole sample (table 5). The marginal effect of education shows that highly educated individuals are concentrated in the metropolitan area and the university cities. The effect of spouse's education is smaller but still positive in the regional groups one and two.

The marginal effects show that singles are mainly concentrated in the metropolitan area. The effect is strong and reveals that singles prefer the metropolitan area more than couples. The possible reasons for this difference could be urban amenities and seeking for a possible spouse.

Marginal effects of other variables also give interesting information. If an individual has children, the regional concentration in the metropolitan area and university cities is lower. Unemployment and spouse's unemployment has a negative effect on concentration in the metropolitan area. Age also influences choice of location; younger people are more concentrated in metropolitan area and university cities than older people.

TABLE 5 Marginal effects for the whole sample

	metropolitan area	**university cities**	**other cities**	**small regions**
woman	- 0,0028	- 0,0045	- 0,0002	0,0076**
language	0,0660***	- 0,0604***	0,0460***	- 0,0515***
education	0,0626***	0,0319***	- 0,0369***	- 0,0576***
unemployed	- 0,1151***	0,0207***	0,0547***	0,0397***
children 0-7 years	- 0,0467***	- 0,0252***	0,0159***	0,0560***
children 8-18 years	- 0,0609***	- 0,0146***	0,0246***	0,0509***
single	0,0708***	- 0,0031	- 0,0316***	-0,0361***
education (spouse)	0,0562***	0,0190***	- 0,0320	- 0,0432***
employed (spouse)	0,0191***	0,0051	- 0,0055***	- 0,0187***
unemployed (spouse)	- 0,0962***	0,0346***	0,0372***	0,0244***
student (spouse)	- 0,0166	0,0788***	- 0,0221*	- 0,0402***
age	- 0,0044***	- 0,0082***	0,0038***	0,0088***
age²	0,00003*	0,00007***	- 0,00002*	- 0,00007***
education*education (spouse)	0,0180**	0,0208***	- 0,0211***	- 0,0177***
woman*single	0,0418***	0,0302***	- 0,0191***	- 0,0529***

statistical significance:* 0,10; ** 0,05; *** 0,01

4.2 Probabilities

Probabilities clarify the differences between individuals. Example probabilities for women are given in figure 2. Specially, probabilities are for a woman who is not Swedish-speaking, is employed, has 8 to 18-year-old child(ren) and is 35 years old. Examples one and two have a spouse who is employed and has the same educational level. Examples three and four are singles.

The probabilities show that singles are more concentrated in big cities. A highly educated single, example three, has the highest probability of living in the metropolitan area. Probabilities in the first column are for a highly educated woman whose spouse also has higher education. In this case, the difference between an individual who has a spouse and a single is slight. When individuals with basic or secondary education are considered, the probability of living in metropolitan area is clearly higher for singles than couples.

The probabilities differ more clearly when individuals with different educational level are compared. Examples one and three have higher probability of living in the metropolitan area than their less educated counterparts, examples two and four. These considerable differences indicate that education is a strong determinant of location decision.

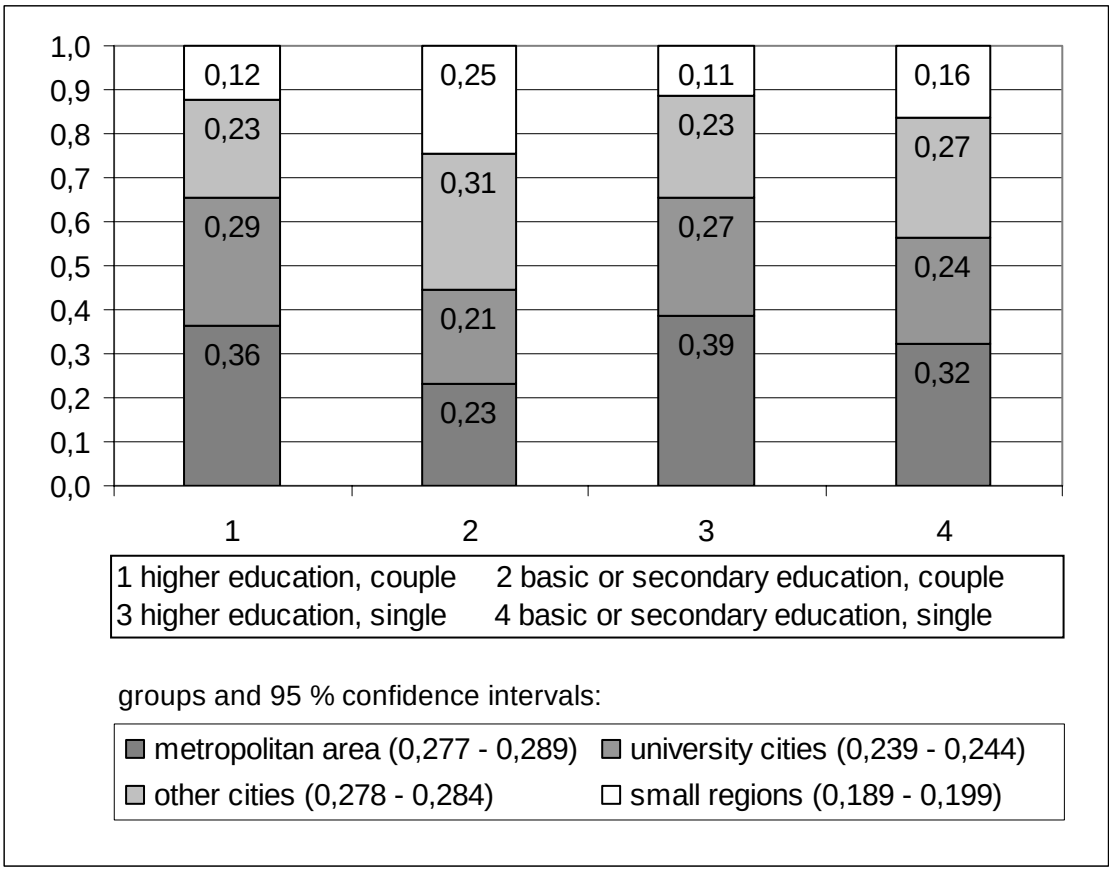

Figure 2 Example probabilities for women

5 CONCLUSION

The results show that education has an effect on the locational choices of individuals. Spouse's educational background is also a factor. When both spouses have higher education, the locational choice constitutes a special research problem. The results of this study indicate that both spouses' educational level has an interaction effect. These couples are concentrated in the metropolitan area and the university cities. With highly educated couples, human capital concentrates too.

Costa and Kahn (2000) present the colocation problem as one describes the situation as a couple's common decision. However, the situation might be more complicated than this. Compton and Pollak (2004) describe the underlying dynamic processes. In their approach, locational choice is not a joint decision. The empirical framework of the present study, however, does not reveal the cause of regional concentration in the case of highly educated couples.

This study showed that there is an interaction effect between spouses' education. Further research is needed to examine the reasons for the regional concentration of highly educated couples. The dynamic processes, for example migration, should be investigated. The effect of university location on the locational choices of the highly educated is also an interesting theme for further research.

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