University Graduate Migration in Finland

Authors

Niina Kotavaara^a, Ossi Kotavaara^a, Jarmo Rusanen^a, Toivo Muilu^b

Affiliations

^aGeography Research Unit, University of Oulu, P.O. Box 8000, 90014 University of Oulu, Finland

^bNatural Resources Institute Finland, Paavo Havaksen tie 3, 90014 University of Oulu, Finland

E-mail addresses

niina.kotavaara@oulu.fi (N. Kotavaara), ossi.kotavaara@oulu.fi (O. Kotavaara), jarmo.rusanen@oulu.fi (J. Rusanen), toivo.muilu@luke.fi (T. Muilu)

Corresponding author

Niina Kotavaara

Geography Research Unit, University of Oulu

P.O. Box 8000, 90014 University of Oulu, Finland

niina.kotavaara@oulu.fi

+358408283940

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Abstract

A high level of human capital is considered as an essential precondition for economic performance and regional competitiveness. However, university regions do not always manage to take advantage of the full potential of local higher education, as they are not always able to retain university students after graduation. Previous studies have presented remarkable regional differences concerning the share of graduates who remain in their university region after graduation. Hence, this paper has focused on geographical distribution and inter-regional mobility of university graduates in Finland. Long-term migration behaviour of all university graduates who completed their master's or equivalent degree in 2000–2015 was analysed using geographic information systems (GIS). The main finding of the paper is that university graduates in Finland are rather immobile, as the most active mobility takes places when transitioning from university to their first job. After that, the geographical distribution of the graduates is rather stable, which contradicts the general assumption of high mobility of university-educated people. Further, the migration flows are directed mainly towards the four largest city regions of the country, especially to the capital city region. Cross-migration between city regions with similar population sizes and population growth rate is marginal, and it seems that the difference in the population size and growth between the graduation region and the destination region has to be large enough to exceed the threshold for migration. Retaining university graduates seems to be especially challenging for the smallest and declining university regions.

Key words: Human capital, University graduates, Graduate migration, City Regions, GIS, Finland

1. Introduction

Developed societies have become increasingly aware of the importance of higher education and human capital to the economic performance of countries and regions (e.g. Abel, Deitz, 2012, Faggian, Comunian et al., 2014, Faggian, McCann, 2009a, Fratesi, 2014, Krabel, Flöther, 2014). Higher levels of human capital have been linked to, for example, increases in population and employment growth, income level, innovation activity, long-run economic growth and regional productivity (Abel, Deitz, 2012, Benneworth, Herbst, 2015, Ciriaci, 2014). Regions are thus expected to benefit from investments in higher education, presupposing that highly educated people stay in university regions and enter local labour markets after graduation, increasing human capital levels of the regions (Abel, Deitz, 2011, 2012, Krabel, Flöther, 2014).

The migration behaviour of university graduates has become an increasingly important study subject of economic geography and economics. As the research literature related to the theme is limited, albeit growing, the previous studies do not yet offer a sufficient overall picture of the migration of university graduates. However, regardless of the country, there seems to be a general agreement that university graduates seem to flow towards economically growing regions and factors related to labour market characteristics of a region, as availability of jobs in the field of occupation, employment rate or wage level, seem to be key determinants affecting migration decisions of university graduates (e.g. Carree, Kronenberg, 2014, Ahlin et al., 2014, Venhorst et al., 2011, Di Cintio, Grassi, 2013, Dotti et al., 2013, Faggian, Corcoran, McCann, 2013, Krabel, Flöther, 2014).

In the Nordic context, migration of university graduates has been studied by, e.g. Ahlin, Andersson and Thulin (2014), Baltzopoulos and Broström (2015) and Tano (2014) for Sweden and Haapanen and Tervo (2012), Jauhiainen (2010), Kurikka (2008), Ritsilä and Haapanen (2003) and Suhonen (2013) for Finland. In Nordic countries mobility of highly educated people seems to be lower than assumed in mainstream theories of human capital, which is, at least partly, explained by the specific features of the countries. For example, Nordic welfare policy aims at ensuring equal living and housing environments and equal living standards for people regardless of place of residence (Raunio, 2001, Andersen et al., 2010). In the case of unemployment, Nordic states provide financial support for unemployed people to maintain a minimum standard of living

(e.g. Asheim, Hansen, 2009). In addition, there is a long tradition of working women in Nordic countries, and the education and employment rates of women are high. Two wage earners in a family can be expected to lower mobility (Asheim, Hansen, 2009).

Finland has succeeded excellently in international rankings of global competitiveness, and its competitiveness is eminently based on the high quality of know-how and skills of the workforce and higher education that is among the best in the world (Schwab, 2016, Williams, Leahy et al., 2016). Finland differs remarkably from many European countries because, together with France and Norway, it has the densest university network covering the whole state territory (Neave, 2011). The establishment of the regional universities has been seen, above all, as an important means to promote economic development outside the core regions in Finland (Dhondt, Nevala, 2015). As a result of tightening international competition, economic restructuring and recent economic downturn, the Finnish government has cut investments in education and research. At the same time, the geographically dense university network has faced pressures to concentrating university education into fewer places. Investment cuts and shutting down of university units have raised critical discussion about their effects on the human capital level and the development of the competitiveness of the country, which underlines the importance of studying the mobility of the country's university-educated people.

Consequently, this paper contributes to the need in economic geography to expand and deepen the understanding of mobility of university graduates, by producing empirical evidence on the long-term, inter-regional migration behaviour of university graduates in Finland. Especially, the paper adds to knowledge on the migration behaviour of university graduates in the Nordic context, where the conditions of mobility are different than in other countries, as earlier described. Particular attention is given to the differences between city regions in attracting university-educated people and the effectiveness of university regions in retaining their graduates and, hence, producing a highly educated work force for the local labour market.

The article is structured as follows. Chapter 2 reviews the previous results concerning the mobility of highly educated people, focusing especially on university graduates. Chapter 3 introduces the university education system in Finland. The data and the methods of the article are described in Chapter 4. After that, in Chapter

5, the results are presented. In the concluding Chapter 6, results are discussed regarding the migration pattern of university graduates and regional effectiveness of the universities in Finland and, further, how the results can be used to develop the knowledge-based regional competitiveness of the city regions in Finland.

2. Mobility of university graduates

While the migratory decisions of individuals, in general, is a well-studied theme, less is known about the migration behaviour of recent university graduates (Carree, Kronenberg, 2014). The university graduate migration has been studied especially in European countries (Kazakis, Faggian, 2016), whereas corresponding literature in U.S. (e.g. Abel, Deitz, 2011, 2012, Kazakis, Faggian, 2016, Kodrzycki, 2001, Whisler et al., 2008) is still less developed (Kazakis, Faggian, 2016). Some studies on the mobility of university graduates have appeared also in Asia (e.g. Ma et al., 2017 for South Korea and He et al., 2016 for China and Japan) and in Australia (e.g. Corcoran et al., 2010).

The research literature is still limited and therefore does not yet offer a sufficient overall picture of the migration behaviour of university graduates. Many of the previous studies concentrate, for example, on the time-period from graduation to first employment, on a specific group of university graduates (e.g. a specific region or a specific field), on specific indicators or on the impact of personal characteristics such as gender, age or ethnic group on migration decisions, and many of these studies have also been constrained by lack of high-quality data (Abreu et al., 2015, Faggian, Comunian et al., 2014, Haapanen, Tervo, 2012, Krabel, Flöther, 2014). In addition, Faggian, Corcoran and McCann (2013) point out, that most of the empirical indicators used in labour migration research have been either zero- or one-dimensional studying migration probabilities, linear distance measures or gravity model flows of labour, not taking into account that graduates move in geographical space between two particular places.

Despite above mentioned limitations, there is a common agreement among migration researchers that human capital, which is usually measured in the form of education, increases the probability of migrating (e.g. Belfield, Morris, 1999, Faggian, Comunian et al., 2014, Faggian, McCann, 2009a, Kodrzycki, 2001).

Therefore, university graduates are considered highly mobile, and migration seems to play an important role in the geographic distribution of university graduates (Abel, Deitz, 2011, 2012, Faggian, McCann, 2009b). Further, Faggian and McCann (2009b) have found empirical evidence supporting the mobility of British university graduates by studying average moving distance from the university to the area of first employment, which, according to their results, is equivalent to moving across three or four travel-to-work areas. However, Faggian and McCann (2009b), as well as Belfield and Morris (1999), report significant regional differences in graduate mobility in the U.K.

Respectively, another part of the literature has found empirical evidence for showing that all university graduates are not mobile (e.g. Belfield, Morris, 1999 for U.K., Krabel, Flöther, 2014 for Germany, Haapanen, Tervo, 2012 for Finland). For example, the results of Belfield and Morris (1999) point to a remarkable group of British university graduates that never moves and to another group that moves back home after graduation. Krabel and Flöther (2014), in turn, consider German university graduates rather immobile, since about two out of five graduates, who finished their studies in 2007, remained in the university region. However, the share of stayers varied in different regions, as graduates of rural, urban and agglomeration regions were significantly more likely to leave the university region after graduation than graduates of metropolitan areas.

Haapanen and Tervo (2012) found evidence supporting immobility of Finnish university graduates. Their statistical analysis of long-distance inter-regional migration of university graduates in Finland was based on samples from 13 cohorts of graduates between 1991 and 2003. The data consisted of 4,373 graduates with a follow-up period until a graduate moves away from the region of studies, the last year of observation being 2004 and the maximum observed duration being 16 years. The analysis showed that most of the Finnish university graduates do not move from their region of studies within 10 years after graduation. The most active mobility takes place in the graduation year and following year, which is in line with the results of Hansen and Nedomysl (2009) concerning the migration activity of Swedish university-educated people.

Further, Haapanen and Tervo (2012) noticed higher out-migration, a so-called brain drain, in the more peripheral university regions than in the growth centres, especially in the capital city region. Respectively, by

studying register data on graduates in Sweden in the year 2000, Ahlin, Andersson and Thulin (2014) found that almost two out of three graduates move after graduation to the three largest urban regions in Sweden. Similar migration flows of university graduates towards growth centres were found also in Italy (e.g. Ciriaci, 2014, Di Cintio, Grassi, 2013, Dotti et al., 2013, Fratesi, Percoco, 2014), in the Netherlands (e.g. Venhorst et al., 2010) and in U.K. (e.g. Faggian, McCann, 2009b).

Ahlin et al. (2014) point out two main arguments explaining the concentration of the highly educated workforce. The first argument emphasizes lifestyle amenities, such as cultural and recreational amenities (e.g. pubs, restaurants, theatres, museums, opera houses) or quality of social life (e.g. social diversity, openness, tolerance), offered by large city regions as key attractors for human capital (e.g. Florida, 2002a, 2002b, Glaeser, Gottlieb, 2006). Another argument supports the view that good employment opportunities are the most important factors affecting migration decisions of human capital (e.g. Nedomysl, Hansen, 2010, Scott, 2010, Storper, Scott, 2009).

Authors such as Carree and Kronenberg (2014), Ahlin et al. (2014), Venhorst et al. (2011), Di Cintio and Grassi (2013), Dotti et al. (2013), Faggian, Corcoran and McCann (2013), and Krabel and Flöther (2014), have found empirical evidence for the latter argument by studying university graduates. They have shown that factors related to labour market characteristics of the region, such as regional economic growth, job availability, employment rate or wage level, affect the migration decisions of university graduates. Further, Faggian and McCann (2009a) particularize that, as a two-dimensional phenomenon, the migration is always related to the economic attractiveness of the destination region *in comparison* to the origin region. Nifo and Vecchione (2014), however, remind that objectives behind migration decisions of university graduates are more complex than only ensuring a higher income and better job opportunities. The graduates search for higher ‘quality of life’ consisting of a mix of economic, social and cultural factors related to economic welfare, job opportunities and social mobility.

In addition to the importance of economic and labour market-related characteristics of the university regions in attracting a university-educated workforce from elsewhere, the results of Krabel and Flöther (2014) underline their influence on the ability of the university regions to retain their students after graduation. As

Venhorst et al. (2011: 75) puts it “regions that are doing relatively well economically are more likely to retain local graduates”. Faggian and McCann (2009b) made the same observation as they found that the strength of local labour market spillovers of the British universities was largely dependent on the strength of the local economy. Consequently, policies that aim at increasing the human capital level of a region should focus both on supply and demand of university-educated people in the local labour market (Abel, Deitz, 2012, Faggian, McCann, 2009b).

3. University education in Finland

Finland has some 5.5 million inhabitants, of which 45 % live in the four largest city regions (Statistics Finland 2016). Finland has experienced a trend of urbanization since the 1950's, several decades later than other Europe. However, the urbanization process has been fast due rapid change of economic structure and growth of labour markets in cities. The capital region is the only city region in Finland with more than one million inhabitants (1.5 million); 27 % of the population of the country live in the area. The other three biggest city regions have less than 400 000 inhabitants (Statistics Finland, 2016). The country is sparsely populated, cities are relatively small and they are mainly located far from each other.

Regardless of the above-mentioned facts, Finland has succeeded excellently in international global competitiveness rankings. Despite that Finland has experienced a decline in its competitiveness during recent years, it is still 10th in the World Economic Forum global competitiveness ranking 2016–2017. One part of the foundation of Finland's competitiveness, according to the World Economic Forum, is a higher education and training system that is among the best in the world (Schwab, 2016). Respectively, Universitas 21, a global network of research-intensive universities, ranked Finland's national system of higher education the sixth best in the world, in the annual ranking 2016, of 50 national systems in four areas: resources, environment, connectivity and output (Williams, Leahy et al., 2016).

In Finland, higher education is free of charge and equal access to higher education is ensured in many ways (e.g. student financial aid). Together 43 % of the 25–64-year-old population has a tertiary education, which

is above the OECD (Organisation for Economic Co-operation and Development) average (OECD, 2016).

The Finnish system of higher education consists of 14 universities, six university consortiums (Figure 1) and 26 universities of applied sciences. Based on statistics of 2014, there is some 302 000 university students in Finland, of which 54 % studied at universities and 46 % at universities of applied sciences (Statistics Finland, 2015). Universities and universities of applied sciences produce an average of 52 000 people with higher education degrees every year (Statistics Finland, 2015).

As part of the European trend, Finland expanded its university network from the 1950's to 1980's and Finland was one of the European countries where quantitative development of universities was remarkable (Neave, 2011). The number of university students expanded after the Second World War from about 10 000 to about 180 000 students during the millennium (Salo, 2015). Finland, together with France and Norway, has a university network that most densely covers the entire state territory in Europe (Neave, 2011). Establishment of "provincial" universities was an important means in promoting regional development outside the core regions of the countries (e.g. Dhondt, Nevala, 2015). Unlike, for example Sweden and Norway, which invested in polytechnics/regional colleges, Finland invested in science universities (Kohvakka, 2013).

The university sector consists of multi-faculty universities, universities of technology, business schools and art academies. Two of them are foundations and the rest are public corporations. In addition, university-level education is provided at the Military Academy, the National Defence University, which is part of the Defence Forces. Although, the universities have independent legal status and they have been separated from the state since 2010, the state is still the primary financier of the universities and direct government funding covers about 60% of university budgets. In addition, universities need to acquire private donations (Eurydice, 2017). Based on the legislation (Ministry of Justice, 2014), field-specific educational responsibilities of the universities are defined by the decree of the Ministry of Education and Culture (2014) which has been prepared in collaboration between the ministry and the universities. On the basis of the negotiations, the universities then decide on their student intake in agreed educational fields (Eurydice, 2017).

As a result of tightening international competition, economic restructuring and recent economic downturn, the Finnish government recently cut investments in education and research. At the same time, the geographically dense university network has faced pressures to concentrate university education into fewer places. Investment cuts and shutting down of university units have raised critical discussion about their effects on the human capital level and the development of the country's competitiveness, which underlines the importance of studying the mobility of Finland's university-educated people.

[FIGURE 1 ABOUT HERE]

4. Material and methods

Analyses of this study are based on the individual-level rasterized locational data of university graduates, which is designed in cooperation and produced by Statistics Finland. In addition, the open source GIS data of population and population change, the administrative Finnish city regions and the city centre points, as well as the road network in Finland were applied. A coordinated dataset of university graduates is compiled by Statistics Finland on the basis of three different datasets: 'Education Statistics Locational Data', 'Register of Completed Education and Degrees' and 'Population Structure'. Geographical distribution of university graduates and its temporal change are analysed by forming spatial aggregations at the 5×5 km grid cell level and at the city region level and by counting the cumulative sum of the degrees by road distance to graduation city region (Figure 2).

[FIGURE 2 ABOUT HERE]

The university graduation data includes those who completed their master's or equivalent degree (ISCED 2011) in Finland between years 2000–2015, excluding graduates who migrated internationally. First, the graduation data is connected to the locational information of the graduation universities. The data covers all of the country's university units apart from those university consortiums which provide only small-scale education (around 0.5 % of the original data). Second, the graduation data is connected to the residential history of university graduates after one, five and ten years of graduation and in 2015. The spatial accuracy

of residential information is generalized to the resolution of 5×5 km grid cells. One year after graduation represents migration from the graduation university to the first employment opportunity following graduation. A more stable housing pattern is already apparent five and ten years after graduation in relation to the job markets in Finland. The graduates without locational information on their residential history were excluded. Therefore, the final data cover 202 783 degrees, i.e. 98.7 % of the university graduates in 2000–2015 residing in Finland (Table 1).

[TABLE 1 ABOUT HERE]

Due to Finnish privacy protection legislation regulating availability of public register records, information related to individual citizens or individual educational units is not allowed to be published. Hence, the privacy protection of the university graduates and the university units is conducted in two phases. First, Statistics Finland has recoded the person-specific information to randomized table key and the university unit-specific information to the anonymous university unit data with municipal-level locational information. Second, the results have to be aggregated to 5x5 km grid cells and at the city regional level by the graduation city regions and the residential city regions classified according to the population (Table 2) and the population change (Table 3), by using the open source GIS data of Statistics Finland and the data of Finnish Environmental Institute.

[TABLE 2 ABOUT HERE]

[TABLE 3 ABOUT HERE]

To explore the spatial distribution of the university graduates on a more accurate scale, but still following privacy protection restrictions, the cumulative sum of university graduates, which are aggregated at the city regional level, is calculated in relation to the road distance between the residential location in 2015 and the centre of the graduation city region (Figure 2). In the distance estimation, the Finnish road network data, Digiroad (Finnish Road Administration), and the indicative city centre points obtained from the Geographic Location Name dataset (NLS, National Land Survey of Finland) were applied.

5. Results

5.1. Degree production and the net migration of university graduates

Regardless of the territorially dense and decentralized university network, the migration pattern of university graduates has evidently a centralized form in Finland. Like highly educated people in general, the university graduates in 2000–2015 are mainly concentrated in the largest city regions of the country. Around 66 % of the university graduates who completed their master's or equivalent degree in 2000–2015 lived in the four biggest Finnish city regions (Helsinki, Tampere, Turku and Oulu) one year after graduation and, moreover, a majority of them lived in the capital city region (Table 4, Figure 3).

[FIGURE 3 ABOUT HERE]

[TABLE 4 ABOUT HERE]

It is highly noteworthy that the biggest city regions' shares of housing of all the university graduates did not decrease remarkably within five or ten years after graduation, which refers to a rather stable migration pattern. Further, even though Finland is often described as “a rural or sparsely populated country”, only a minor share (5 %) of the graduates live outside administrative city regions. This finding pertains to the housing pattern of university graduates at all points of time after graduation (Table 4, Figure 3).

As city regions are competing for human capital, it is notable that the capital city region gains nine percentage points more university-educated people than it produces, when considered by the net migration at the national level. The capital city region produced 33 % of the country's university graduates in 2000–2015, but after graduation around 42 % of all the university graduates lived in the capital city region. Hence, the capital region benefits remarkably from the higher education institutions of the other regions. Whereas the capital city region wins university graduates from the other city regions, and especially the large ones lose university graduates when compared to degree production. The large city regions produced 34 % of all the university graduates in 2000–2015, but after five years of graduation only 23 % of all the graduates lived in the regions (Table 4).

5.2. *Retaining university graduates*

For regional competitiveness it is, however, important that the region is able to retain its university graduates after graduation (e.g. Abel, Deitz, 2011, 2012, Krabel, Flöther, 2014). In Finland about half of the university graduates stay in the same city region as the university after graduation, and the migration pattern seems to be rather stable. The share of the stayers was 55.3 % after one year and still 49.0 % after ten years. The results do not show signs of re-migration to the graduation city regions afterwards. Thus, once the university graduates are lost, they rarely later move back to the graduation city regions. On this basis, the most critical moment for the city regions, in competing for locally educated university graduates, seems to be immediately after graduation.

However, there are significant differences between different types of city regions, and retaining university graduates seems to be especially challenging for the other city regions than the capital city region, which is economically the most diverse and the fastest growing city region of the country, and also the only net winner of the university graduates in the country. In the capital city region more than 80 % of university students still lived in the region one year after graduation, and almost 80 % of the university educated people, that graduated in the capital city region ten years ago, were still there (tables 5–6). In other words, those who go to the capital city region to study are likely to stay there at least ten years after graduation.

For the other city regions the maximum share of stayers was a little over half of the graduates, and the larger the city region and the faster the population growth, the larger the share of the stayers. The smallest city regions, as well as the declining city regions, lost about 80 % of their university graduates or even more. The temporal inspection shows that for all the city regions the greatest outflow happens at the time of the first employment and the outflow after that is substantially weaker. This proves, again, the importance of the ability of the city region to retain its university graduates immediately after graduation (tables 5–6). What is noteworthy is that having a university in the city region is not a sufficient precondition for obtaining a highly educated workforce.

[TABLE 5 ABOUT HERE]

[TABLE 6 ABOUT HERE]

5.3. *Inter-regional cross-migration of university graduates*

Accordingly, the results show that the cross-migration between the same-sized city regions or between the city regions with same population growth rate is rather low and it seems that the difference in the size and the growth rate between the graduation city and the destination city region has to be large enough to exceed the threshold for migration of university graduates. For instance, only some of the graduates move between the city regions of Oulu, Tampere and Turku (i.e. large city regions), since the most common choice of university graduates in the large city regions is to stay in the same city region or, as a second common option, to move to the capital city region. The same applies to the moderately and slowly growing city regions (tables 5–6). In other words, it seems that the graduates do not move to a city-region that is only a little bigger or grows a little faster than the city region where they studied. Instead, they prefer moving to a city-region that is significantly bigger or grows significantly faster. Generally speaking, in this sense, they jump over one city-regional level in the categorizations of this study.

Within the medium-sized city regions and the declining city regions, the share of university graduates who move to the capital city region is even larger than the share of the stayers. What is noteworthy is that the graduates do not move from the medium-sized city regions to the large city regions. Correspondingly, university graduates do not move from the small city regions to the middle-sized city regions. Instead, within the small-city regions the most common choice is to move to the large city regions or, almost as common, to the capital city region or to stay in the graduation city region. Further, university graduates rarely move from the declining city regions to slowly growing city regions, as the more common choices are moving to the capital city region or to moderately growing city regions or staying in their graduation city region (tables 5–6).

The middle-sized and the small city regions gains most of their university graduates from other regions, as the local university education is often too specialized to meet local labour needs. The share of the regionally produced graduates is 38.3% in the middle-sized city regions and 30.8 % in the small city regions. The share

of the regionally produced graduates is largest one year after graduation, and after ten years, for example, in the small city regions only every fourth (24.7 %) university graduate is regionally produced. The share is largest in the large city regions where about three out of four (75.3 %) university graduates are regionally produced one year after graduation. In the capital city region the share is smaller (64.8 %), but the difference becomes more even in time.

The small city regions gain university-educated people rather evenly from the large city regions, the middle-sized city regions and their own university units, but for the first two mentioned the outflow to the small city regions is, relatively speaking, insignificant (Table 5). The declining and the slowly growing city regions get their university graduates from their own university units or from the moderately growing city regions. For the moderately growing city regions, the outflow to the declining and the slowly growing city regions is, however, only about five percent or less of the graduates (Table 6).

The city regions which do not have university units or they provide only small-scale university education, gain a rather minor share of all university graduates. Their university-educated people have, measured in absolute numbers, mainly graduated in the middle-sized and moderately growing city regions. However, relatively speaking, moving to ‘other city regions’ is most common for university graduates who graduated in the middle-sized or small city regions that are growing slowly or declining (tables 5–6).

The areas located outside the administrative city regions (i.e. small towns and rural areas) are, in getting a university-educated workforce, dependent mainly on the large and middle-sized city regions and the city regions that are moderately growing. However, moving outside the city regions was, relatively speaking, most common among the university graduates who graduated in the small city regions and the city regions which are mainly slowly growing (Table 5).

5.4. Spatial (im)mobility and moving distances of university graduates

Finally, the strength of the city regions’ attraction is considered on the basis of the share of the university graduates accumulating in relation to road distance between the centre of the graduation city region and year

2015 residential locations at a scale of 5×5 grid cells. Each city region is represented by the core point of its dominant city. Due to privacy protection, city regions are aggregated into four classes. In general, the average distance between a residential place of graduates and graduation city is 132.8 km with a standard deviation of 169.6 when the minimum is 0.1 km (small values are highly biased or inaccurate due to the grid cell resolution) and maximum is 1316.0 km (Figures 4–5).

[FIGURE 4 ABOUT HERE]

[FIGURE 5 ABOUT HERE]

However, as Figure 4 shows, in the capital city region and the large city regions, a remarkable share of the graduates are residing within the core and the suburbs of the dominant city. For example, 69.6 % of the graduates from the capital city region live within 20 km of the city centre, while 44.4 % of the graduates from the large city regions live within the same distance. The middle-sized city regions and the small city regions have clearly a much more dispersed migration pattern of university graduates due to out migration. Within the same 20 km distance, the middle-sized city regions contain 11.9 % of graduates and the small city regions 14.8 %. In this respect, the attractiveness of the capital city region is thoroughly more intense than of the other city regions in Finland.

When distances between residential places and graduation cities of university graduates is viewed as cumulative shares of university graduates of different types of city regions within all university graduates (all observations), the actual volumes of the city regions become more visible (Figure 5). The volumes and the migration patterns of the capital city region and the large city regions are mainly similar. However, the capital city region has attracted a great deal of university graduates from the large city regions, which is visible as clear drops in the curve of the large city regions. In the national framework, the small city regions produce a relatively small share of university graduates, and they are strongly dispersed around the country. Half of these graduates reside within 210.4 km from a graduation city centre.

6. Conclusions

A high level of human capital is considered as an essential precondition for economic performance and regional competitiveness. However, university regions do not always manage to take advantage of the full potential of local higher education, as they are not always able to retain university students after graduation. Previous studies have presented remarkable regional differences concerning the share of graduates who remain in their university region after graduation. In the Nordic context, due to limited research literature, a wider understanding of migration behaviour of university graduates is still insufficient.

Hence, this paper has focused on geographical distribution and inter-regional mobility of the university graduates in Finland. Long-term migration behaviour of all the university graduates who completed their master's or equivalent degree in 2000–2015 was analysed using GIS. Particular attention was given to the differences between city regions in attracting university-educated people and the effectiveness of the university regions in retaining their graduates and, hence, producing a highly educated work force for the local labour market.

Finnish university graduates seem to be rather immobile, as about half of the university graduates stay in the region where they studied. Basically, the larger the city region and the faster the population growth, the larger the share of the stayers. Given the research time points of this study, the mobility of the graduates is highest during the first year after graduation and the geographical distribution of the graduates seems to be quite stable by the end of the first year.

The results contradict the general assumption of high mobility of university-educated people, but on the other hand, they are in line with the previous results of Haapanen and Tervo (2012) concerning university graduates in Finland. In general, the results confirm a less visible view in the literature that all university graduates are not mobile. There are some contextual factors that explain the immobility of the university graduates in Finland, e.g. small number of cities that the graduates can move between, national welfare policy that aims, for example, to lower regional differences and ensure equal living standards in every region, as well as provide financial support for unemployed people, and high share of dual career families.

The results also emphasize the importance of the ability of a university region to retain its university graduates immediately after graduation, as underlined in the literature (e.g. Abel, Deitz, 2011, 2012, Krael, Flöther, 2014).

In accordance with the ongoing urbanization process of the country and the international trend of human capital flowing towards economically diverse and successful regions with better employment opportunities, university graduates are mainly (66%) concentrated in the four largest city regions (Helsinki, Turku, Tampere and Oulu) of the country and, moreover, a majority (a little over 40 %) of them end up in the capital city region, which is economically the most diverse and the fastest growing city region of the country, and the only net winner of the graduates. Moreover, those who go to the capital city region to study seem to be likely to stay there, with the retention rate of the capital city region being about 80 %. Surprisingly, the cross-migration between the biggest city regions, except for the capital city region, is marginal. Explaining the phenomenon needs further research.

Retaining and attracting university graduates seems to be especially challenging for the smallest and declining university regions. Thus, having a geographically dense and decentralized university network is not a sufficient precondition for providing a highly educated workforce for regions. Based on previous studies, retaining university graduates requires also availability of jobs and good regional economic performance.

In their study on the migration of Finnish university graduates, Haapanen and Tervo (2012) asked an important question concerning the ability of regions without a university to attract graduates. Based on the results of this paper, the regions which do not have university units gain only a minor share of all university graduates. However, except for the most rural areas, compared to the smallest and demographically declining university regions, they manage to attract graduates relatively well. As the results are on an aggregated level, further research is needed in order to clarify regional differences concerning effects that concentrating university education into fewer places would have on human capital stocks of those regions which would lose their university unit. As the outflow of university graduates is partly based on field-specific educational responsibilities of universities, defined by the state government, additional research is also needed concerning the effects of out-migration on the compatibility of university education and field-specific human

capital stocks in the regions that are net losers of university graduates, i.e., all regions except for the capital city region.

The key benefit of analysing migration patterns of Finnish university graduates with the coordinated data and GIS framework, was the ability to identify and scrutinize in and out migration patterns of the graduates with origin and destination locations. Due to the comprehensive data, migration flows were distinctly measured. Recognizing and explaining causalities behind the observed trends were left for further research. This, however, will be a highly complicated task as various pushing and pulling factors simultaneously influence migration decisions. In addition, whereas this study analysed graduates as a homogenous group, further research that takes into account heterogeneity of university graduates is needed. For example, the differences in migration behaviour of the graduates in different fields are unavoidable, as some degree programmes are arranged in several universities, whereas some degree programmes are available only at a single university. The scientifically produced information on the above-mentioned differences would have a high practical value when applied to developing the field-specific educational responsibilities of the universities. Although this study considered only the subnational migration of university graduates, international migration flows of university-educated people, moving in and out of Finland, constitutes an additionally relevant research theme, to which the methodology of this study could be applied directly.

Finally, some important policy implications can be derived from the key findings of the study. First, the results reinforce the policy implications of Haapanen and Tervo (2012) concerning the consequences of concentrating university education into fewer places. As they consider, this might lead towards more centralized economical structures. This kind of policy would be in clear contradiction with traditional Finnish policies of ensuring equal regional development. Second, policies aimed at raising regional human capital levels by a geographically dense university network are not sufficient in providing a highly educated workforce for regions. Policies should, instead, focus on supporting and developing both supply and demand of university graduates. Third, the marginal cross-migration of the graduates between the regions with similar population size and population growth rate should be taken into account in the defining of field-specific educational responsibilities of the university regions. Fourth, the immobility of university graduates, after their first employment, emphasizes that a university region should be able to retain its university

students immediately after they graduate. This could even be summarized as follows: “Once they’re gone, they’re lost”.

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Figure captions

Fig. 1. Location of Finnish university units. Finland's 14 universities have campuses in 11 city regions. In addition, other university units operate in nine city regions that do not have their own universities.

Fig. 2. Schematic work flow of the data sources, the data management, the key analyses and the results.

Fig. 3. Geographical distribution of the university graduates, who completed their master's or equivalent degree between the years 2000–2015, in 2015 ($N = 203\,865$).

Fig. 4. Cumulative share of university graduates within aggregation groups in relation to the distance between the residential location in 2015 and the centre of the graduation city.

Fig. 5. Cumulative share of university graduates by aggregation groups within all observations in relation to the distance between the residential location in 2015 and the centre of the graduation city.

Table 1.

Number of university graduates who completed their master's or equivalent degree in 2000–2015.

All university graduates 2000–2015	University graduates with locational data 2000–2015	University graduates with locational data 2000–2015, university consortiums providing small-scale education excluded	University graduates 2000–2014 with locational data, 1 year after graduation	University graduates 2000–2010 with locational data, 5 years after graduation	University graduates 2000–2005 with locational data, 10 years after graduation
205 539	203 865	202 783	187 968	135 642	67 791

Table 2.

The classification of the data according to the size of the city region. Source (population): Statistics Finland (2016).

Classification by the size of the city regions	Population 31.12.2015	City regions	All university graduates 2000–2015	University graduates with locational data 2000–2015	Share (%) of all university graduates 2000–2015
Capital city region	1.4 million	Helsinki	67 360	66 500	32.8
Large city regions	200 001 – 400 000	Tampere, Turku, Oulu	69 914	69 468	34.0
Middle-sized city regions	100 000 – 200 000	Jyväskylä, Pori, Kuopio, Joensuu, Saimaa, Vaasa	55 225	54 911	26.9
Small city regions	less than 100 000	Hämeenlinna, Rovaniemi, Rauma, Kajaani, Savonlinna	11 958	11 904	5.8

Table 3.

The classification of the data according to the growth of the city region. Source (population): Statistics Finland (2016).

Classification by the growth of the city regions	Population change 2000–2015	City regions	All university graduates 2000–2015	University graduates with locational data 2000–2015	Share (%) of all university graduates 2000–2015
Capital city region	over 200 000	Helsinki	67 360	66 500	32.8
Moderately growing city regions	25 000 – 62 000	Tampere, Turku, Oulu, Jyväskylä	90 068	89 494	43.8
Slowly growing city regions	3000 – 12 000	Kuopio, Vaasa, Hämeenlinna, Joensuu, Rovaniemi	33 036	32 874	16.1
Declining city regions	-2000 – (-6000)	Saimaa, Rauma, Kajaani, Pori, Savonlinna	13 993	13 915	6.8

Table 4.

City regions' shares of the production of university graduates (master's or equivalent degree) and the shares of all the university graduates between 2000–2015 living in the city regions 1, 5 and 10 years after graduation.

	Share (%) of the production of university graduates 2000–2015	Share (%) of university graduates after 1 year	Share (%) of university graduates after 5 years	Share (%) of university graduates after 10 years
Capital city region	32.8	42.3	42.3	41.3
Large city regions	43.8	24.1	23.3	23.1
Middle-sized city regions	16.1	14.3	13.6	13.4
Small city regions	6.8	3.9	3.9	4.0

Table 5.

The migration flows (%) of the university graduates who completed their master's or equivalent degrees during 2000–2015, between the graduation city regions and the destination city regions where they live after graduation. The city regions are classified according to their population.

		Destination city regions					
		Capital city region	Large city regions	Middle-sized city regions	Small city regions	Other city regions**	Outside city regions***
After 1 year	Graduation city regions						
	Capital city region	83.9*	3.5	2.8	1.3	6.4	2.0
	Large city regions	20.6	53.1 (49.7)*	5.5	3.7	8.8	4.9
	Middle-sized city regions	25.2	8.8	32.0 (23.9)*	3.2	16.1	6.5
After 5 years	Graduation city regions						
	Capital city region	80.3*	4.4	3.4	1.4	8.0	2.5
	Large city regions	22.7	48.3 (44.2)*	6.0	3.9	9.8	5.3
	Middle-sized city regions	26.2	10.0	28.1 (19.7)*	3.5	17.3	6.4
After 10 years	Graduation city regions						
	Capital city region	77.3*	4.9	4.1	1.6	9.1	3.0
	Large city regions	23.1	45.9 (41.4)*	6.2	4.0	10.5	5.8
	Middle-sized city regions	25.3	10.8	25.9 (16.9)*	3.7	18.4	6.9
	Graduation city regions						
	Small city regions	17.9	21.7	12.3	15.4 (13.3)*	19.4	11.1

* The share (%) of the university graduates who stayed in the graduation city region, ** 'Other city regions' refers to the city regions which do not have university units or they provide only small-scale university education, *** 'Outside city regions' refers to the areas located outside the administrative city regions (i.e. small towns and rural areas).

Table 6.

The migration flows (%) of the university graduates who completed their master's or equivalent degree during 2000–2015, between the graduation city regions and the destination city regions where they live after graduation. The city regions are classified according to their population change.

		Destination city regions					
		Capital city region	Moderately growing city regions	Slowly growing city regions	Declining city regions	Other city regions**	Outside city regions***
After 1 year	Capital city region	83.9*	3.5	2.1	1.3	6.4	2.0
	Moderately growing city regions	21.4	54.7 (48.7)*	4.9	3.5	10.2	5.4
	Slowly growing city regions	22.4	13.3	36.1 (30.9)*	4.6	15.5	8.2
	Declining city regions	26.9	13.4	6.0	27.7 (22.3)*	19.5	6.5
After 5 years	Capital city region	80.3*	4.4	2.5	1.5	8.0	2.5
	Moderately growing city regions	23.2	50.7 (43.8)*	5.2	3.7	11.4	5.7
	Slowly growing city regions	23.3	14.4	33.1 (27.9)*	4.8	16.4	8.0
	Declining city regions	27.9	14.1	6.9	24.5 (18.8)*	20.2	6.3
After 10 years	Capital city region	77.3*	4.9	2.9	1.7	9.1	3.0
	Moderately growing city regions	23.4	48.7 (41.3)*	5.3	4.1	12.2	6.3
	Slowly growing city regions	22.5	15.4	30.8 (25.4)*	5.0	18.1	8.1
	Declining city regions	26.2	16.1	7.1	23.3 (17.0)*	20.8	6.6

* The share (%) of the university graduates who stayed in the graduation city region, ** 'Other city regions' refers to the city regions which do not have university units or they provide only small-scale university education, *** 'Outside city regions' refers to the areas located outside the administrative city regions (i.e. small towns and rural areas).

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