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VIII REGIONAL CONCENTRATION AND MIGRATION OF HUMAN CAPITAL IN FINLAND AND SWEDEN

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1 INTRODUCTION

Urbanisation and the increased concentration of human capital in larger and more densely populated and differentiated regional labour markets has been occurring for many years and is evident in most countries (Iammarino et al. 2018, OECD 2018). The universality and consistency of this process over time in market economies implies that strong market forces are at play. Monetary and non-monetary incentives for increased urbanisation have evidently been strong enough to offset crowding costs. Regardless of political regimes, regional policies may affect the speed and nature of urbanisation, but the long-term trend towards increased concentration of economic activity has persisted. Recent economic and political events underscore the need

for basic facts and further research on regional inequality in economic conditions.

Globalisation and technological change have long favoured regions with a highly skilled workforce. Studying long-term trends in the U.S., Moretti (2012) finds that educational attainment of labour has been the main predictor of the economic success of regions. Berry and Glaeser (2005) and Austin et al. (2018) show increasing regional differences in the proportion of college-educated labour in the United States. This divergence in skills appears to coincide with slower equalisation of regional incomes or even increased divergence in per capita incomes across U.S. regions. Similar tendencies are observed in Europe (e.g., Beyer and Smets 2015). In addition to the key role of skills for the production of goods and services, it would seem reasonable to assume that the regional concentration of skills also affects

political processes, with implications for regional development. This may be of particular importance in countries with large public sectors, such as Finland and Sweden.

In this paper, we use population data and contemporary descriptive statistics on long-term trends and recent developments in Finland and Sweden regarding the regional concentration and interregional migration¹ of human capital. We are primarily interested in the residential location and migration of the highly educated. Specifically, we address three issues: i) regional patterns in the proportion of highly educated persons in the workforce; ii) the magnitude of *changes* in the regional distribution of human capital; and iii) the role of interregional migration in changes in the geographical distribution of the highly educated.

Our comparative approach is facilitated by access to comparable, high-quality population data. Moreover, Finland and Sweden share important economic and institutional characteristics. They are open market economies strongly dependent on international trade. Both countries are welfare states with relatively large public sectors and extensive social security systems. The technological level of production is high, the workforce is well educated, and per capita income is high in both economies. Other common features are the high degree of urbanisation and concentration of population in the capitals and larger cities in the south. The same applies to time trends in the production structure from industry to services, increased shares of highly educated persons in the workforce and internal migration flows

favouring larger cities and more densely populated geographical labour markets.

The two countries differ in some respects, e.g., currency regimes, immigration and the size of labour markets. However, in the present context, the similarities outweigh the differences and our a priori expectations are that major external factors such as globalisation and technological change will generate similar patterns regarding internal migration and changes in the regional distribution of highly skilled labour.

The next section provides a short and incomplete review of findings in research regarding the selective nature of internal migration in terms of human capital. Data and definitions of variables are provided in Section 3, followed by descriptive evidence in Section 4. The final section provides a summary and discussion.

2 PREVIOUS STUDIES

Finland

After the Second World War, rapid economic development and structural changes in Finland led to the concentration of economic activity and populations; the southern and central regions of the country increased in population when people moved to the metropolitan area of Helsinki and larger towns and urban centres (Tervo 2010).² Rural out-migration was most rapid during the early 1970s. People moved from rural areas to cities and from the north to the south. Emigration to Sweden peaked. Region-

¹ In this paper, we use the term migration and moves as synonyms pertaining to migration between regional labour markets (within a country), unless specified otherwise.

² Tervo (2009) demonstrated heterogeneity in the relationships between the population growth of centres and their hinterlands; in some regions, causality goes from centres to peripheries, but also often from peripheries to centres. Furthermore, large and rapidly growing centres tend to have negative effects on the population of their hinterlands.

al agglomeration levelled out during the late 1970s and 1980s; see Tervo (2010) for more information.

After the severe recession of 1991-1993, rapid economic growth occurred in the late 1990s, which resulted in accelerated migration to the major population centres, and many of the smaller urban areas in Finland suffered from a net population loss (Tervo 2005).³ Tervo (2016a) reports on the development of interregional migration flows at the NUTS-4 level in 2010-2014. His main observation is that Finnish urban areas continue growing due to net migration, whereas rural areas are losing population. Out-migration in the urban regions is much smaller than in the rural regions. For example, the Helsinki capital region is growing today particularly because people are reluctant to migrate away from the region.⁴ High rates of migration among youth (Tervo 2016a) and the highly educated (Ritsilä and Haapanen 2003) are accelerating the urbanisation process in Finland.

Tervo (2016b) finds that jobs tend to follow highly educated people in Finland, and thus the analysis of residential moves among the highly educated is of particular importance.⁵ Regarding university graduates, Haapanen and Tervo (2012) have demonstrated that out-migration is much higher among graduates of more peripheral universities (e.g., Lappeenranta, Joensuu and Rovaniemi) than among those in the growth centres (Helsinki in particular). Haapanen and Böckerman (2017) report high but decreas-

ing migration rates for polytechnic and university graduates over time.⁶

Sweden

The broad picture of internal migration in Sweden since World War II is one of large net-migration flows from rural areas to cities, from north to south, and from inland to the coast. In later decades, the metropolitan area of Stockholm and cities with larger universities have been major destinations for movers (e.g., Borgegård et al. 1995, Eliasson and Westerlund 2018). Thus, the overall patterns of population flows have been similar in Finland and Sweden.⁷

In recent years, migration to and from university towns in Sweden has increased substantially, both in terms of numbers and as a share of total internal migration. Studies of student migration to university cities indicate positive effects of regional access on enrolment and systematic self-selectivity in ability regarding university choice (Eliasson 2007). Studies of migration/location choice after graduation also show self-selectivity in ability. Students with the highest grades (at the primary or secondary level) tend to strongly prefer locations in larger cities/metropolitan areas (Tano et al. 2018). Previous findings regarding migration among the highly educated are mainly based on micro-level information in selected sub-populations. However, given the sim-

3 Regarding the characteristics of migrants, Kauhanen and Tervo (2002) have shown that those moving to depressed areas are older and more often unemployed than those moving to other regions. On the contrary, the highly educated tend to be overrepresented among out-migrants of depressed regions.

4 Jauhianien (2008, 2011) report regional concentration of human capital and indications of over-education relative to job requirements in larger cities in Finland.

5 Also see Østbye et al. (2018) and Tervo (2018).

6 Polytechnic graduates are also more mobile than vocational school graduates (Haapanen and Böckerman 2017). Furthermore, Böckerman and Haapanen (2013) have shown that the introduction of polytechnics in Finland increased migration after high school.

7 Regarding the determinants of migration of labour, research has demonstrated that the migration propensity of individuals decreases with age and increases with educational level and previous migration experiences (see e.g. Greenwood 1997). Regional characteristics such as job and income prospects, education possibilities and amenities are also found to be important push and pull factors of migration; see Greenwood (2014) for a review; see Molinder (2018) for recent evidence for Sweden.

ilarity of the findings between studies, similar patterns should emerge from aggregate regional data.

Internal migration of labour has been replaced to some extent by longer commutes, partially due to the decreasing cost of communications and housing market conditions (Eliasson et al. 2007, Sandow and Westin 2010, Scheele and Andersson 2017).

3 DATA AND DEFINITIONS

In this paper, we utilise data on the entire populations of Finland and Sweden. The data originate from various registers administered by Statistics Finland and Statistics Sweden. For example, the data come from longitudinal population census files, employment statistics and registers of completed degrees. By matching the unique personal identifiers of individuals across the censuses/registers, the panel data sets provide a variety of reliable, register-based information regarding residents, including their educational qualifications and locations of residence and workplace. Annual data are available from 1986/7 (Sweden/Finland) to 2015. Due to data protection issues, the Finnish and Swedish registers are used in different research environments. The regional classifications available to us are from 2014 for Finland and from 2015 for Sweden.

Next, we briefly describe the regional classifications and key variables that we use in the empirical analyses. The analyses focus on the working-age population between 17 and 64 years of age. Additional sample restrictions are described below.

Regional classifications

Earlier studies of interregional migration mostly report findings for administrative (NUTS) regions. Instead, our analyses utilise *local labour market areas*

(LMAs) that are defined using commuting flows between municipalities. LMAs (travel-to-work areas) are formed by joining a central municipality and a surrounding municipality (or municipalities) from which at least 10 (7.5) per cent of the labour force commute to the central municipality, as defined by Statistics Finland (Statistics Sweden). Thus, LMAs are functional labour markets in which most people tend to both live and work.

In Finland, there were 320 municipalities in 2014. Of them, 236 municipalities form 42 travel-to-work areas. The remaining 84 municipalities that lie outside travel-to-work areas are self-contained labour market areas, each forming a separate area in this study. Thus, our analysis uses information on 126 Finnish local labour markets. Correspondingly, in 2015, 290 Swedish municipalities are aggregated to 69 LMAs (of which 46 consist of LMAs containing two or more municipalities and 23 are self-contained municipalities forming their own travel-to-work area).

In some analyses, we further aggregate the local labour market areas into three larger regions based on the population size of the LMA: i) *Large regions* (Helsinki in Finland and Stockholm, Göteborg and Malmö in Sweden); ii) *Medium-sized regions* are defined as LMAs with a minimum total population of 100,000 inhabitants; iii) *Small regions* are defined as LMAs with a population size of less than 100,000 inhabitants.

There are 10 medium-sized regions and 115 small regions in Finland and 19 medium-sized local labour markets and 47 small regions in Sweden. The medium-sized regions are typically regional administrative centres and contain universities/polytechnics located outside metropolitan regions; please see the appendix for the names of the medium-sized regions and their population size. With a few exceptions, the

small regions do not include regional administrative centres.

Graduates and completed degrees

To quantify the level of human capital in the LMAs, we use information regarding educational attainment for each individual. Long university education refers to bachelor's and master's degrees from polytechnics and universities with a programme length of at least three years of tertiary-level education. The term "university education" refers to polytechnic and university degrees. Short university education is defined as one or two years of tertiary-level education. In the Finnish context, short university degrees refer mainly to former vocational college degrees that have been replaced by polytechnic bachelor's degrees (since the mid-1990s). Upper secondary degrees are either vocational degrees or high school degrees. In some analyses, we restrict the sample to *recent* graduates, but we also report descriptive statistics by the highest completed degree for the full sample.

Location and migration

Location is defined by using information on the location of workplace or location of residence. The location of workplace is used when we discuss the regional distribution of workers, whereas the location of residence is used to illustrate migration rates across regions. We examine migration rates across local labour markets as well as long-distance migration between the three types of larger regions defined above.

We consider migration among recent graduates and the working-age population. For recent graduates, migration is defined using information on the location of the residence at age 17 relative to the

location of the residence five years after graduation. For the whole working-age population, migration is defined as a change in the location of residence between two consecutive years (e.g., the last date of 2014 vs. 2015).

4 REGIONAL DISTRIBUTION AND INTERREGIONAL MIGRATION OF HUMAN CAPITAL

Regional differences in the share of highly educated

The association between regional labour market size and the share of workers with long university education (at least three years at the tertiary level) is shown in Figure 1. Data are for local labour markets in Finland (Panel A) and Sweden (Panel B), and the regional distribution of individuals is based on the location of their workplaces. The figures are calculated for prime-aged workers between 25 and 54 years of age.

The expected positive correlation between labour market size and the share of highly educated workers is confirmed for both countries; the correlation coefficient is 0.82 for Finland and 0.85 for Sweden. Thus, highly educated workers are most concentrated in the biggest labour markets, such as Helsinki and Oulu in Finland, and Stockholm and Göteborg in Sweden. Relative to their size, some LMAs have an exceptionally large share of highly educated workers. Such local labour market areas are, for example, Jokiainen in southern Finland and Umeå in northeastern Sweden.

Figure 1 also displays a linear prediction from an OLS regression of the share of highly educated workers by labour market size (see lines in red). For Finland, the estimated slope parameter of the linear

Changes in the proportion of highly educated workers

Next, we consider whether the regional distribution of the proportion of university-educated workers has changed substantially in the last thirty years. Figure 2 demonstrates regional differences in the growth of the proportions relative to the baseline proportions in the LMAs (mid-1980s vs. mid-2010s). These figures are computed again for prime-aged workers (aged 25–54) using their location of workplace, and we also plot a linear prediction from a simple bivariate regression model.

Although the proportion of highly educated workers increased during the observation period in all LMAs in Finland and Sweden, the increase has been more substantial in some LMAs than in others. In particular, there has been a clear tendency towards regional divergence in the proportions of university-educated workers over time. The changes in the proportions have been larger in LMAs that already had a high proportion of university-educated workers, as shown by the positive relationship between the baseline proportion in 1986/7 and changes in the proportion from 1986/7 until the mid-2010s. For example, the proportion of university-educated workers in Umeå has increased from

~15 per cent to over 20 percentage points in thirty years.

The positive relationship is stronger in Sweden (where the correlation coefficient is 0.71) than in Finland (0.53). One possible explanation for the weaker relationship seen in Finland could be the recent expansion of polytechnic education in Finland, which substantially increased the level of education across the country. Also note that, unlike in Sweden, the increase in the proportion of university-educated workers in Finland has been smaller in the metropolitan area of Helsinki than in many medium-sized LMAs (such as Oulu, Tampere and Vaasa). In Sweden, the three metropolitan regions of Stockholm, Göteborg and Malmö and many of the university-dominated medium-sized LMAs have experienced substantial increases in the proportion of university-educated workers.

Finally, note the estimated linear predictions for the two countries. For Finland, the estimated slope parameter of the linear regression is 1.38 ($p < 0.001$), which means that a one percentage point increase in the initial share of university-educated workers is associated with a 1.38 percentage point increase in the share over a thirty-year period. For Sweden, the corresponding positive relationship is very similar (1.39; $p < 0.001$).

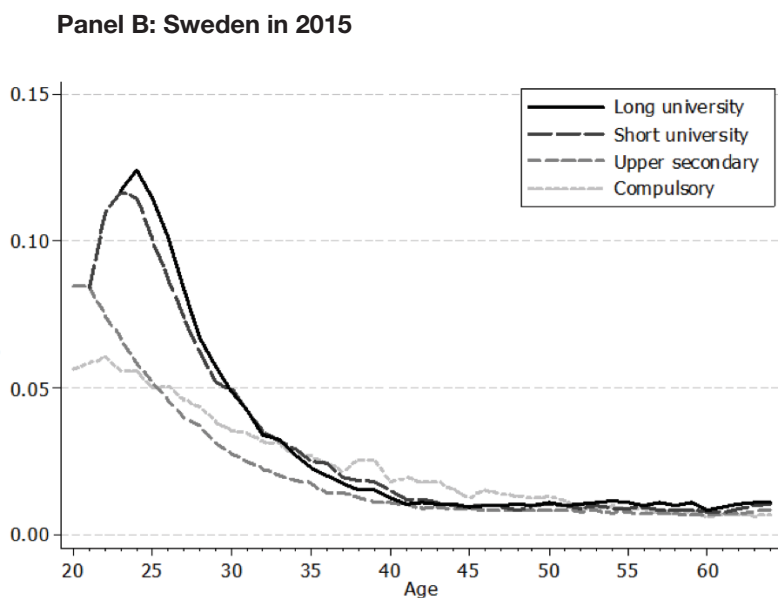
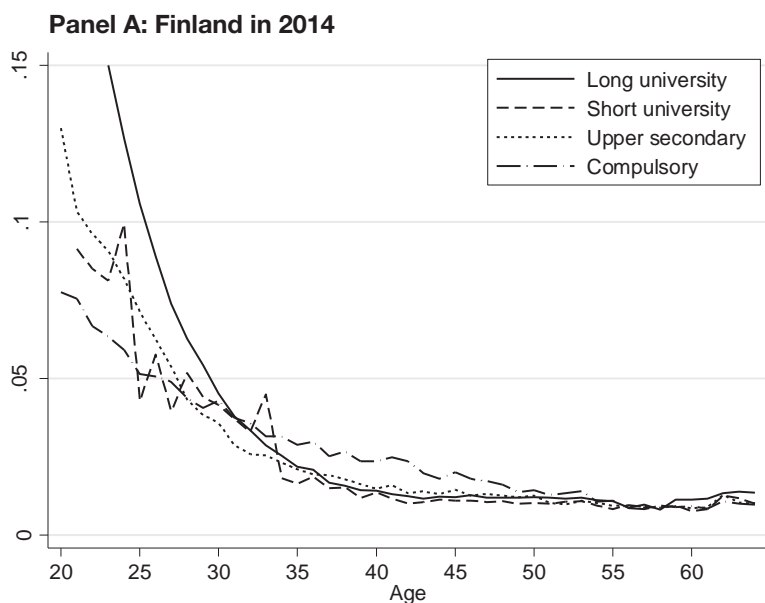


Figure 3. Migration rates across local labour markets by age and education

Notes: Data are for local labour markets and based on the location of residence. Migration rates are calculated for individuals in one-year classes in the following age groups: 20-64 (compulsory and upper secondary), 21-64 (short university), and 23-64 (long university). Short university education is defined as one or two years of tertiary-level education. Long university education is defined as at least three years of tertiary-level education (incl. polytechnic degrees in Finland).

Migration by age and education

Residential migration rates across local labour markets by age and educational level are shown in Figure 3. Consistent with human capital theory, the propensity to migrate between regional labour markets peaks at young age and decreases to a much lower level at middle age and older. Migration rates also generally increase with educational level, with the highest migration rates at the high-mobility ages up to 30-35 years of age.

Migration patterns in Finland and Sweden do not differ greatly, except that migration rates for young adults with upper secondary education are slightly higher in Finland than in Sweden. For example, approximately 5 per cent of individuals with upper secondary degrees move between LMAs in Sweden at age 25, whereas the corresponding figure for Finland is ~7 per cent.

Interestingly, in both countries, migration rates at 35-45 years of age are highest for individuals with low educational levels – instead of the highly educated at younger ages. One possible explanation for these high migration rates is that those with lower educational levels are forced to continue to search for employment and educational opportunities outside their LMA at older ages. Finally, note that there are very few graduates from short university programmes in Finland today (i.e., degrees in the population registers). Therefore, it does not make sense to compare their migration rates at young ages to those in Sweden.

Regional patterns of change in populations of university graduates and the contribution of migration

Finally, we focus on relocation patterns among recent university graduates between the regional labour markets. For this analysis, we have created data sets for Finland and Sweden that cover all individuals who have graduated from at least three years of tertiary education during the period 2001-2010 (at 32 years of age or younger). Migration is observed by comparing place of residence prior to tertiary education with post-education location.

Changes in the regional stocks of the highly educated by size of regional labour markets are presented in Table 1. Panel A at the top of the table shows figures for Finland, and Panel B at the bottom shows figures for Sweden. Column (1) presents the number of university graduates originating from the three types of regions (labelled “Starters”). Here, region of origin is determined according to the location of residence at age 17, prior to university education. Columns (2) and (3) show gross in-migration and out-migration

flows following graduation by comparing graduates’ place of origin with their place of residence five years after graduation. Column (4) reports net-migration flows, and finally, Column (5) presents the location of graduates at the end of the follow-up period (“Finishers”).⁸ We report both counts as well as shares relative to the number of starters.

The impact of interregional migration is striking. In both countries, in-migration to metropolitan areas by university graduates has been large in absolute and relative terms. Meanwhile, because their out-migration from metropolitan regions has been small, these regions have managed to increase their population of university graduates substantially, by 73% in Finland and 41% in Sweden. These findings are consistent with Tervo’s (2016a) conclusions regarding reluctant out-migration from the Helsinki region in Finland.

In-migration to medium-sized regions has been much greater in Finland than Sweden, but out-migration has been similar in both countries. Because of large in-migration, net migration to medium-sized regions in Finland has been positive (+11% relative to starters), whereas the corresponding figure is negative for Sweden (-24%).

In both countries, small regions are unable to attract university graduates. In Finland, many future university graduates originate from these regions, but relatively few decide to reside there after graduation (48% relative to starters). In Sweden, net migration of university graduates from the small regions is substantially smaller in absolute numbers, but similar in relative terms (approximately -52% in both countries). In Finland, substantially more university graduates originally (at age 17) hail from small regions than in Sweden, where far more graduates come from large metropolitan regions.

8 Note that migration from one LMA to another within a single region (e.g. from one medium-sized LMA to another) is not counted here as a move.

Table 1. Components of change in the number of university graduates by type of region, 2001–2010.

	(1) Starters	(2) In-migrants	(3) Out-migrants	(4)=(2)–(3) Net migration	(5)=(1)+(4) Finishers
Panel A: Finland					
<i>Counts</i>					
Large regions	72,244	59,544	7,334	52,210	124,454
Medium-sized regions	112,673	48,189	35,909	12,280	124,953
Small regions	125,856	10,262	74,752	-64,490	61,366
<i>Shares (in relation to starters)</i>					
Large regions		82.4%	10.2%	72.3%	172.3%
Medium-sized regions		42.8%	31.9%	10.9%	110.9%
Small regions		8.2%	59.4%	-51.2%	48.8%
Panel B: Sweden					
<i>Counts</i>					
Large regions	109,335	54,755	9,580	45,175	154,510
Medium-sized regions	97,469	19,106	42,428	-23,322	74,147
Small regions	41,670	5,150	27,003	-21,853	19,817
<i>Shares (in relation to starters)</i>					
Large regions		50.1%	8.8%	41.3%	141.3%
Medium-sized regions		19.6%	43.5%	-23.9%	76.1%
Small regions		12.4%	64.8%	-52.4%	47.6%

Notes: Data include all individuals aged 32 years or younger who graduated from at least three years of tertiary education during the period 2001-2010. The regions are aggregates of the local labour markets based on their population size (see Section 3 for details on the grouping). Migration is based on the location of residence at age 17 relative to the location of residence five years after graduation.

5 SUMMARY AND DISCUSSION

Using longitudinal population data for Finland and Sweden, we present descriptive evidence regarding the regional concentration and interregional migration of human capital.

Finland and Sweden display striking similarities regarding the concentration of highly educated workers in larger urban labour markets and some regions with relatively large universities. For both countries, there is a clear positive association between regional market size and the proportion of workers with longer university education. Moreover, changes in this concentration in recent decades demonstrate a similar pattern. The share of the highly educated workforce has increased in all regions, but the increase in recent decades correlates positively with the initial share in the mid-1980s. Thus, regional differences in the ability to attract highly educated workers have increased over the last thirty years.

We show that internal migration plays a major role in increased regional concentration of human capital in both countries. The age profiles of migration rates are quite similar in Finland and Sweden. Migration between functional labour markets peaks at young ages (~20-25 years) then declines rapidly, levelling off at 35-40 years of age. Migration rates generally increase with educational level, and university graduates are the most prone to move (at under 35 years of age).

The proportion of university graduates increased in all labour market areas regardless of population size, but the contribution of internal migration is only positive for large labour markets in Sweden and medium-sized and large labour markets in Finland. The reallocation of recent university graduates from smaller to the largest labour markets is substantial in both absolute numbers and relative terms. The net

increase of university graduates in small and medium-sized labour markets comes from internal generation of highly educated individuals (e.g., expansion of higher education) and the contributions of net migration are often negative in this context.

Interestingly, the observed pattern of skill divergence across Finnish and Swedish regions coincides with decreasing or even reversed convergence in regional per capita incomes in the last 25 years (Kangasharju and Pekkala 2004, Enflo 2014, Enflo et al. 2014, Eliasson and Westerlund 2018). Similar patterns of weakening or reversed regional income convergence in recent decades have also been found in other European countries (Rosés and Wolf 2018) and in the United States (Berry and Glaeser 2005, Ganong and Shoag 2017, Austin et al. 2018). The recent development of regional income differences is a departure from the long-run historical trend in most developed countries; regional per capita incomes have typically converged from the early 1900s up until approximately 1980.

Our findings allow for various interpretations and reflections. One is to take them as evidence of positive agglomeration economies, i.e., concentration leading to higher productivity and higher returns on investments in human capital. Concentration of economic activity increases productivity and thereby facilitates the achievement of any set of political goals, including socioeconomic cohesion.

Another interpretation may involve concern regarding potentially increasing differences in regional incomes and political power. The beneficiaries of agglomeration may not be interested in compensating victims of structural change. Discrepancies between political rhetoric and official policy goals on one hand and actual development on the other hand may spur distrust, political instability and difficulties in pursuing efficient policies in the longer term. To rephrase a citation in Storper 2018: "Region-

al inequality is proving too politically dangerous to ignore” (The Economist, December 17, 2016).

Regardless of the preferred interpretation of our findings, increased knowledge regarding changes in regional populations is of major importance for policy and planning. To the extent that education is a marker of human capital and productivity, this study has demonstrated the important role of inter-regional migration flows for changes in the production potentials of regions in Finland and Sweden.

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APPENDIX

Large- and medium-sized regions in Finland in 2014

Local labour market	Population	Number of municipalities
Helsinki	1,594,136	27
Tampere	427,178	13
Turku	353,571	19
Oulu	251,258	9
Lahti	195,187	9
Jyväskylä	184,027	9
Kuopio	157,073	10
Pori	128,293	9
Joensuu	121,296	7
Vaasa	112,824	7
Seinäjäoki	109,454	5

Large- and medium-sized regions in Sweden in 2015

Stockholm	2,633,139	36
Göteborg	1,325,949	27
Malmö	1,130,500	28
Örebro	290,116	12
Linköping	283,986	10
Västerås	240,715	7
Jönköping	218,931	7
Borås	197,362	6
Karlstad	192,691	9
Skövde-Skara	182,738	10
Norrköping	180,221	4
Kristianstad-Hässleholm	177,333	5
Luleå	174,583	6
Gävle	161,768	5
Eskilstuna	160,920	4
Falun-Borlänge	155,223	6
Umeå	151,025	6
Sundsvall	150,179	4
Växjö	137,784	5
Halmstad	131,661	3
Kalmar	126,841	6
Östersund	105,402	6