

Stambol, Lasse Sigbjorn

**Conference Paper**

## Education and Income Dynamics in Urban and Regional Labour Market Mobility

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Stambol, Lasse Sigbjorn (2006) : Education and Income Dynamics in Urban and Regional Labour Market Mobility, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/118508>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# Education and Income Dynamics in Urban and Regional Labour Market Mobility

By  
Lasse Sigbjørn Stambøl

*Statistics Norway*  
*Research department*  
*P.O.Box 8131, Dep. 0033 Oslo, Norway*  
*lss@ssb.no*

## Abstract

Well-functioning local labour markets are expected to become net receivers of labour from other regions. In addition these regions are also expected to attract the most qualified labour and thus be the winners in the competition for the best human capital. For an examination of the two concepts "brain-gain" (a relative gain of qualified persons) and "brain-drain" (a relative loss of qualified persons), we do introduce a concept of average education based on the number of years each person have been in education altogether. There are thus reasons to expect that the regions with the highest net in-migration to job also benefit from a "brain-gain" through the migration process and vice-versa that regions experiencing a strong net loss through the migration process also suffer from a "brain-drain" in this respect. Some regions may, however, compensate a negative net-migration with a "brain-gain" through the migration process, whilst some regions may experience a "brain-drain" through migration in spite of positive net in-migration. The "brain-gain"/"brain-drain" approach poses also important questions in terms of intra- and interregional competitiveness of human capital across the different industrial sectors, which is also taken into consideration in the analysis.

We have as well put forward hypotheses expecting that employed persons that add to their highest formal education another year of formal education also will have a growth of income above the average increase of income. On the other hand, the most qualified labour expects to achieve as much return on their human capital investment as possible, pushing their careers in direction of those regions and those sectors of the economy that actually give the best return. The final section of the paper is thus stressing two main aspects of these topics, first, analysing the relative growth of income among employed persons changing their educational level, and second, analysing the return to human capital by help of changes in personal income in different person groups by industrial sectors, regional typologies and local labour markets.

Paper presented at the 46<sup>th</sup> Congress of the European Regional Science Association,  
30. August - 3. September 2006, Volos, Greece

## 1. Background and challenges

Efficient matching of local demand and supply of labour at different qualification levels is considered to be an important prerequisite both for economic growth and social cohesion in every region. Hence, more or less explicitly, regional development programmes are designed to improve the performance of functional local labour markets. This is e.g. based on analyses of structural change towards the knowledge society and the mobility of human capital. The levels of education as well as the return to education vary across different cities and regions. Attractive urban regions are expected to improve its human capital even more through geographical mobility of high-qualified labour. Infrastructure like location of higher education institutions, business services and transport systems as well as the institutional frameworks is also expected to be of immense importance for urban and regional growth.

Use of annual gross-flow labour market statistics is very relevant in these analyses. Such data may allow multidimensional analysis of labour market mobility, i.e. in geographical terms as well as between sectors and according to the qualifications of the labour force. Theoretical considerations may be taken from e.g. the human capital theory and theories of segmented labour markets and regional division of labour, but also from more modern theories that apt to explain structural change and new forms of transitions in the regional labour markets. The labour market mobility is partly considered to be associated with differences in supply and demand of labour both at the local and regional level, differences that create various forms of unemployment and vacancy formations. Persons are expected to move from low paid to better paid jobs, from unemployment to jobs, from decreasing and stagnated sectors to growing sectors and thus from stagnated and backwards cities and regions to more prosperous, expanding and dynamic cities and regions with surplus of working places. According to human capital theory, it is the most highly educated persons that are considered to benefit most from mobility due to an expectation of higher return of education among higher educated. Inter-sector mobility is also expected to be more frequent among younger people, who have not yet embedded branch-specific knowledge through a long professional career.

The main purpose of the article is here to analyse the mobility performance and competitiveness of cities and regions and sectors in terms of growth of employment and especially focusing on the number and quality of the persons that enter and leave the local labour markets. Second, we do examine differences in income growth among employed persons changing their educational level, and if they are labour market mobile or not. Finally we do analyse if the regions with the highest growth of income/and highest level of income also will be most attractive for in-migrants, immigrants and for other entries to the labour markets. As a point of departure cities and regions is first classified into different categories according to a set of production conditions and secondly into more aggregated regional typologies.

In Statistics Norway we have in co-operation with researchers from other Nordic countries analysed labour market mobility among persons with different qualification levels. More especially we have established methods for analysing vacancy formations within and between regional labour markets based on the whole population in working age. We have also established indexes that illuminate the gross (and thus also net) demand for labour in regional labour markets and sectors and differing between business cycles, as well as analyses of regional performances of recruitment to jobs within and between the local labour markets (see e.g. Edvardsson et al., 2000, 2002, Heikkilä et al., 1999a,b, Heikkilä and Stambøl, 1999,

Johansson et al.,1997, Persson ed. 2001, Stambøl, 1999,2000, 2001, 2002 and Stambøl ed..1996,1997,1999).

This analysis gives qualitative results illuminating the "brain-gain"/"brain-drain" competition across typologies of regions and different sectors of the economy and ends with some descriptive analysis of income change and education change within and between urban and regional labour markets.

## **2. Theoretical foundation, hypotheses and policy**

Long distance migration of labour has for a long time been considered as a necessity. For several years labour market policies have encouraged the unemployed to search for jobs outside their local labour markets, e.g. by including the whole country as an arena of supply and giving some economically support for necessary migration to job. Labour market policies have as well gently advocated the importance of intersectional mobility. The expectation is that higher mobility of the labour force should increase the general level of employment, e.g. due to relatively high gross demand of labour and the problems of matching-time to fill in the vacancies. Moreover, increased total labour mobility is seen as a tool for reaching the goals of the labour market policy, employing as large as possible part of the labour force into ordinary employment. Furthermore high mobility is expected to satisfy the employer's claim of filling in the vacancies with suitable labour as quickly as possible in a flexible labour market in continually structural change.

In theory, most long distance migration is considered to be associated with regional imbalances between supply and demand of labour (see e.g. Greenwood, 1985). Through rational decisions, labour is supposed to move from regions with a limited number of well-paid jobs, high unemployment and an overrepresentation of decreasing industrial branches, to expansive regions with a surplus of jobs. The rate of migration is partly decided by demographic factors: younger persons and especially those with higher education dominate migration (see e.g. Stambøl et al, 1998). These are considered to benefit more from migrating, since their investments in formal education have to be paid off. Furthermore, their investments in housing and real estate as well as in social networks in a given locality are generally less than for older persons. Individuals, which have not yet formed a family of their own, have less personal restrictions to move to another region (for an overview of these processes, see e.g. Milne, 1991, Stark, 1991, Champion and Fielding, 1992).

In particular, highly educated people are as well much more sensitive to environmental factors such as the spatial concentration on high-skilled jobs and career possibilities. As such, in the "knowledge society" factors like amenities, the existence of a good environment and accessibility are also important location factors with respect to highly educated people (Kontuly, 1998, Harris and Becker, 2001).

It is generally accepted that economic upswings stimulate long-distance migration, while downswings have the opposite effect (e.g. Pissarides and Wadsworth, 1989, Milne, 1991). The causes for this can primarily be found in the increased mobility of the labour force during good times, when "pull" factors are especially pronounced. In worse times people are likely to place more interest in those jobs that exist and are less likely to move or change jobs without fixed plans.

The matching in regional labour markets is also of a different kind compared with the situation some years ago. The problem today is the existence of both shortages and surpluses of labour within the same companies, branches, and commuting regions. The reason for this is that the labour market has become more segmented regarding competence levels. A segmented labour market consists of a number of sub-markets, which are more or less separated from one another by various obstacles, resulting in a heterogeneous and unsubstitutable labour force. These sub-markets have their own supply and demand situations, their own wage structures and their own surpluses or shortages of labour. Mobility between segments is low, while it is high within individual segments. Segmentation of the labour force with regard to the supply side corresponds to its segmentation with regard to the demand side. The mismatch on the labour market seems to have been accentuated during the structural transformation in the past decades (for a mismatch overview, see e.g. Padoa Schioppa, 1990).

Different regions have differently composed labour markets. The labour required by the urban labour market today is also different from the last decades. The regional division of labour has been more important, with an accentuated regional polarisation and specialisation as one result (Massey, 1995, Johansson, 1996). "Rural push" has declined as an activating force, and it seems that "urban pull" has come to dominate migration from old factory towns or rural areas to metropolitan areas and regional service centres. There is thus expected to be certain interdependence between the labour force and the structural transformation of the economy with the labour force being complementary to the new technology. This interdependence also seems to have been accentuated during the transfer from the industrial to the post-industrial society. This implies that the decreasing substitutability between different kinds of labour and that the structure of the economy regulates the kinds of labour demanded in a given branch or region. This phenomenon is also valid with regard to the relations between different regions (Massey, 1995, Johansson, 1996, Johansson and Persson, 1999).

Mobility is, however, not only associated with migratory movements. Instead most of the mobility in the labour market is a consequence of the fact that people change jobs without any geographical mobility. Here, we usually differ between labour mobility – that is the same as moving in or out or between jobs - and different kinds of job mobility. In this analysis the focus is primarily put on the labour mobility, thus making theories dealing with flows of labour somewhat more relevant compared with job mobility theories dealing with closures of old jobs and establishment of new jobs. Flows of jobs are, however, closely related to flows of labour, e.g. that both closures of jobs and establishment of new jobs necessarily generate flows of labour. Closures of complete firms or divisions within firms and companies are giving rise to involuntarily flows of labour. Labour mobility is, however, much more comprehensive than the job mobility suggests. All kinds of mobility are, however, dependent of the labour market situation and the transformation of this (see e.g. Burda and Wyplosz, 1994, Burgess, Lane and Stevens, 1996, Davis and Haltiwanger, 1998).

At the demand side the more modern industries require local supply of a committed labour force, at the same time as new generations of ICT (Information and Communication Technology) and global "high-tech" industrial networks diffuses the physical concept of a work-place and require highly specialized labour with up-to-date training. As van der Laan (2001) points out, there are conflicting and complementary theories explaining the location in space of workplaces in the new economy, from traditional agglomeration and more recent and fashionable cluster theories, to theories of indifference. The latter meaning that new economic activities are increasingly independent on any place-specific characteristics and that regional

growth is to a large extent a matter of coincidence (Curran and Blackburn, 1994). Accordingly, there are different strategies stressed in territorial industrial and innovation policy.

Knowledge intensive business services (KIBS), are often seen as an important characteristic of the new, more knowledge based economy, since they are concerned with the supply and management of new knowledge and intangible assets (so called ‘knowledge-about-knowledge’). The new economy is used as a term to understand the current global social and economic changes, linked to the increased use of information and communication technologies and to the growth of new ways of organising industrial activity (post-fordist principles). These trends seem to appear early on in KIBS in city areas, as postulated by Storper and Scott (1990) more than a decade ago. Efficient sharing and transferring of knowledge is central, and KIBS play an important role in these learning and transaction processes. It is thus of importance to analyse KIBS’ role as a competitive base of larger cities in Norway, e.g. by studying the competitiveness of cities and regions in terms of growth of employment, and particularly focus on the mobility of the persons that enter and leave the KIBS sectors. Mobility is important for the knowledge transaction process of an economy, and KIBS employees are said to have an important role as knowledge diffusers in the economy since the sector is characterised by modern education, intra- and interregional as well as international networking, dynamism and flexibility. Mobility of workers is of particular importance in KIBS as ‘the core competence of professional service firms is the expertise, experience and reputation of their staff, the asset base is knowledge and the competitive advantage is reputation’ (Bryson et al. 2004: 87). Labour mobility within this sector may also act as a pre-requisite for what may be expected to form the future labour mobility structures of the society, in line with the argument by Storper and Scott (1990).

More generally other hypotheses put forward that functional labour markets can only be understood within the context of a systematic framework. Employment systems are defined as the set of policies and institutions influencing interaction between the production systems and the labour market systems (Schmid, 1994). Another hypothesis is the emerging of the transitional labour market. It is based on the observations that the border between the labour market and other social systems, like e.g. the educational system, the private household economy etc. are becoming increasingly blurred, and thus increase transitions between formal employment and productive non-market activities. Each transition, such as those from school to job and vice versa, from parental or sick leave to job, from unemployment to job etc. can be temporary and repetitious. Transition itself is also enforced by policy intervention to encourage temporary leave for life-long learning periods and parental leave. This transition can be viewed as a supplementary dimension to that usually described as labour mobility, i.e. qualification or de-qualification careers, inter-sector mobility and inter-regional or international migration (for more discussions: see e.g. Schmid and Gazier, 2002).

### **3. Urban and regional classifications, data, definitions and methods**

An important aspect in this analysis of regional labour market mobility and migration is the classification of individuals according to their labour market status; e.g. employed, unemployed, under education and the remaining population outside the labour force. In this analysis one aim is to analyse the change of labour market status, sector and segment connected to the migrants and the migration processes as well as investigating how these transitions are operating within different and similar local labour markets. In such case, it is

important to compare changes in labour market statuses among migrants and non-migrants, investigating the local labour market's inter- and intra-regional transition rates. Necessary gross-flow data for all individuals of working age are therefore established. The data cover whole populations, collected from individual register-based data sources at Statistics Norway.

In the analysis the comparison of the inter- and intra-regional labour market transition is based on changes in two-year periods (following each individual from a year  $t$  to another year  $t+1$ ) during the time period 1994-1999. Mostly the analysis is here based on results from the upswing period of 1997-1998.

### ***Urban and regional classifications***

The analysis is based on 86 local labour markets in Norway, which mainly correspond to a classification of economic regions used by Statistics Norway (see Hustoft et al., 1999). The regions are basically classified by commuting figures, and should thus represent functional local labour markets. The regions are, however, classified so that they don't cross any county borders, thus making some few neighbour regions to be part of the same functional labour market. Most obviously this is the case in the Oslo region, which may consist of the capital region of Oslo and four economic regions in the surrounding county of Akershus. In this analysis these five regions are aggregated to one region: Oslo and Akershus.

We have as well included a more aggregated classification where all 86 local labour markets in Norway are grouped by 7 typologies of regions including a regional hierarchical division from the most central region of Oslo and Akershus to the smallest and more peripheral micro labour areas (See e.g. Persson et al (2004)). The 7 main typologies of regions are shown in figure 3.1.

Figure 3.1. Classification by 7 typologies of regions.

1. The capital region
2. Regional metropolises
3. Regional centres with university
4. Other regional centres
5. Medium-sized towns and regions
6. Small labour areas
7. Micro labour areas

### ***Definitions of some central variables:***

- Internal migration: Migrants are defined as individuals settled in different towns and regions in the first and second year of each two years period. The analysis will partly be focusing on internal migration.

- Immigrants/new recruits and emigrants/dead persons: The analysis also comprises the marginal status group of immigrants/new recruits and emigrants/dead persons. These are individuals only obtainable in the labour force the first or the second year in each two-years investigation period. The first group (present only the first year) consists mainly of employed who have emigrated from the first to the second year of each period, but comprises as well employed who died or left the working age the second year. The majority of the second group (present only the second year) consists of individuals who have immigrated and obtained a job in the second year of each period, but comprises as well a minor group of young individuals entering the working age in the second year of each period as employed.

- *Labour market statuses*: Definitions of labour market statuses includes 1) employed, 2) unemployed, 3) persons under education and 4) others outside the labour force. Different status in year t and year t+1 defines the labour market status change.

- *Regional labour market mobility*: The total regional labour market mobility is defined as changes of status to and from employment, mobility among employed between 28 economic sectors (cross sector exchange), migration to and from jobs between regions, immigration/new recruitment to job and emigration/death from job.

- *Age*: The analyses comprise all persons in working age, which here means 16-74 years.

- *Education*: The skill dimension in the analysis is recognized by each person's highest formal education. All persons are further classified by lower education (compulsory school), middle education (secondary education) and higher education (post-secondary education). In addition to these three main groups by education, we have introduced a concept of average education, measured as the average of each person's number of years under education.

- *Income*:

The income is measured as each person's personal annual income before taxes, which basically covers annual wages among employees and wages among self-employed persons. In all analysis concerning income, we include only those persons that is classified as full time employed in the employment registers and show an annual income above NOK 100 000,-. We do, however, inform that this definition is not so precise that it grasp eventually changes in the exact number of annually man-hour worked, and thus the effect may be somewhat stronger than if we also could include and control for detailed changes of annually man-hour worked among the full time employed.

- *Income change controlled for change in education*: In the final analyses we introduce a concept measuring the income change in relation to changes of educational level. The average change of annual income by gender, age group, education group, nationality group, and sector and region is measured in relation to the total average change of number of years in education and further divided by the same relation at the national level. Or expressed as follows:

$$\text{Index of income change/education} = \frac{((I_r t+1 - I_r t)/I_r t)/((E_r t+1 - E_r t)/E_r t)}{((I_n t+1 - I_n t)/I_n t)/((E_n t+1 - E_n t)/E_n t)} * 100$$

where:

I = the average annual income within each group of persons

E = the average number of years in education within each group of persons

r = regional level

n = national level

t = year

### ***A composition of specific and total local labour market mobility indexes***

A total mobility index is composed of a set of different mobility rates derived from both internal gross streams to and from jobs within the local labour markets as well as through interregional and international labour market mobility to and from jobs. The purpose of this total index is to illuminate how each region, and typology of regions, performs with respect to total gross labour mobility, while the underlying structure of this total mobility is to be found in each specific transition segment.

Each individual in the local labour force (16–74 years) is classified according to their highest formal education: (1) Primary, (2) secondary and (3) post secondary. Each individual is also classified in terms of careers to employment status year t+1 from either of the following status



year t: (1) Employed, (2) unemployed, (3) in education and (4) others outside the labour force. Hence, the total mobility index is partly a description of the *rate of activation of twelve pools* of labour force within the local labour market (see figure 2). In addition in-migration careers leading to employment as well as immigration leading to a job is related to the size of the regional employment. As the figure shows the activation rates to job are thus measured for six main groups (A-F) broken down by three educational levels. In the analysis each rate is measured separately, but in relation to somewhat different populations. The rate of (A), still in job in the same local labour market, (E) in-migration to job and (F) immigration to job are all measured in relation to total employment by education the first year. The transition rates (B) from unemployment to job, (C) from education to job and (D) from other persons outside the labour force to job, are measured in relation to the number of unemployed, the number of persons in education and the number of persons outside the labour force respectively.

The total labour market mobility index is also taking into consideration the deactivation rate from job, measured by (G) gross out-migration as well as by (H) gross emigration/death from jobs. All the rates are here measured by total employment by education the first year. The transition from job within the local labour markets is indirectly measured by the rates (A) still in job within the local labour market. The lower "survival-rates" in job within the local labour market, the higher transition from jobs within the same local labour markets.

To reach the final total index of mobility in each region, all rates are weighted by the percentage each rate represents of the total stream of gross mobility to and from jobs in the local labour markets. For to express the mobility as a relative concept in relation to the mobility at the national level, the corresponding national rates are subtracted from the regional rates for all 24 transitions showed in figure 3.2.

This expression secure that positive indexes (higher than the national average) for the segments A-F gives positive contributions to the total mobility performance index, while the opposite is the case for negative values for each segment. On the other hand positive indexes for the segments G and H give negative values to the total performance index while negative indexes here give positive values correspondingly.

Figure 3.2. Composition of a total local labour market mobility performance index (LLMMPI). Rates of activation and deactivation in twenty-four pools of labour force.

Status year t	Status year t+1: Employed /or out-migrated,emigrated/dead		
Education:	Primary	Secondary	Post secondary
A. Employed in region r	A1. Still in job in region r	A2. Still in job in region r	A3. Still in job in region r
B. Unemployed in region r	B1. Unemployed to job in region r	B2. Unemployed to job in region r	B3. Unemployed to job in region r
C. Under education in region r	C1. From education to job in region r	C2. From education to job in region r	C3. From education to job in region r
D. Others statuses in region r	D1. From others to job in region r	D2. From others to job in region r	D3. From others to job in region r
E. Any status in other regions. In-migrants	E1. In-migrants to job in region r	E2. In-migrants to job in region r	E3. In-migrants to job in region r
F. Any status in other countries. Immigrants/ New recruits	F1. Immigrants/New recruits to job in region r	F2. Immigrants/New recruits to job in region r	F3. Immigrants/New recruits to job in region r
G. Employed in region r	G1. Out-migrants from job in region r	G2. Out-migrants from job in region r	G3. Out-migrants from job in region r
H. Employed in region r	H1. Emigrated/dead from job in region r	H2. Emigrated/dead from job in region r	H3. Emigrated/dead from job in region r

## 4. Empirical results

The performance of regional labour markets measured by gross labour mobility across different dimensions has been the main approach of this analysis. The analysis presents first some qualitative results illuminating the brain-drain/brain-gain processes within and between regions. The second part show some descriptive analysis of income and education change within and between urban and regional labour markets featuring an analysis of the correspondence between annual income change and different types of gross mobility, as well as the relationship between the level of income and gross mobility segments.

### 4.1 "Brain-gain" or "brain-drain" in the regional labour market mobility.

In this section we examine the "qualitative" impacts of labour mobility between regions and sectors. As has already been illustrated, well-functioning regions are expected to become net receivers of labour from other regions. In addition these regions are also expected to attract the most qualified labour and thus be the winners in the competition for the best human capital. For an examination of the two concepts "brain-gain" (a relative gain of qualified persons) and "brain-drain" (a relative loss of qualified persons), we have introduced a concept of average education (for definition see section 3 above). As described in Stambøl (2002), it was a clear tendency to increase the educational level of the population in all regions during the 1990s, and especially then for the number of people with higher education.

The "brain-gain"/"brain-drain" approach poses important questions in terms of regional competitiveness across the different sectors. What then are the net effects of the "brain-gain" and "brain-drain" processes across the sectors? The table 4.1 illustrate the intra-regional competitiveness of qualified persons between sectors as an average for the period 1994-1999. The table shows the net effects of "brain-gain"/"brain-drain" processes among cross sector mobile employed and persons changing their labour market status within the local labour markets.

Within the local labour markets, the most pronounced "brain-gain" sectors were found in telecommunication, printing and publishing and higher educational institutions, whilst the sectors which predominantly experienced "de-qualification" through local cross sector mobility were pharmaceutical production, hotel and restaurant and retail, recreation, culture and sport (table 4.1). Nevertheless, it was plain to see there were different regional effects of these processes at work. The strong "brain-gain" sector of telecommunication showed, however, a strong "brain-gain" within all regional typologies. The most pronounced "brain-gain" sector at the regional level was renting of office machinery in medium-sized towns and regions and regional metropolises. This may however be seen in light of the relatively low number of employed in this sector making the potential educational change effect from gross mobility somewhat higher. Other strong "brain-gain" sectors at the regional level were ICT-manufacturing in micro labour areas, electro (electric and electronic manufacturing) in the capital region and medium sized towns and regions, printing and publishing in small and micro labour areas, energy in medium sized towns and regions, pharmaceutical production in medium sized towns and regions, small labour areas and micro labour areas, financial intermediation in other regional centres and research and development in medium sized towns and regions and micro labour areas. On the other hand the most typical "de-qualification" sectors from gross labour mobility within the local labour markets were pharmaceutical production in regional centres with university and other regional centres, retail, recreation,

culture and sport in the capital region, hotel and restaurant in the capital region, regional metropolises and small labour areas and renting of office machinery in small labour areas and micro labour areas.

It is, however, important to note a certain divergence of education improvement by labour mobility within the local labour markets totally, showing a "brain-gain" in all regions except from the capital region. This may be seen in light of a very tight labour market in the capital region in this period forcing the employers to search for labour among more marginal parts of the labour force, but partly also due to the fact of strong "brain-gain" effects through the migration processes, which are described in more detail below.

Table 4.1. Average education level of entries to job versus exits from job within the local labour markets 1994-1999 by sector and typology of region. Index: The average education level of exits from job is set at 100.

Typology of region:	Capital region	Regional metropolises	Regional centres with university	Other regional centres	Medium-sized towns and regions	Small labour areas	Micro labour areas	Norway
Sectors:								
1. Primary/mining	99,8	99,2	100,6	100,7	101,2	100,1	100,9	100,5
2. Manufacturing/Raw material	101,4	101,1	106,5	102,1	102,2	101,6	101,8	101,5
3. Manufacturing/Labour intensive	100,2	101,4	100,8	101,1	101,6	101,2	101,5	101,2
4. Machine and transport production	102,7	101,0	99,5	101,2	101,5	101,4	100,6	101,1
5. ICT-Manufacturing	101,8	100,8	101,9	100,8	102,2	98,1	103,4	100,9
6. Electro	103,1	99,4	100,7	101,9	103,2	98,3	102,8	101,5
7. Printing and publishing	101,3	102,6	99,4	102,3	101,1	104,4	103,9	102,0
8. Energy	101,1	100,9	100,1	100,8	103,4	102,6	102,6	101,5
9. Pharmaceutical production	97,0	101,1	80,7	97,9	104,1	103,5	103,8	97,4
10. Construction	98,1	99,8	100,1	100,1	100,3	100,2	101,1	99,9
11. Retail, recreation, culture and sport	97,5	98,6	99,5	98,9	99,5	99,3	100,0	98,7
12. Hotel and restaurant	97,3	97,6	98,0	98,0	98,2	97,9	99,0	97,9
13. ICT-Wholesale	99,1	100,3	99,7	99,5	100,5	99,0	101,5	99,5
14. Other Wholesale	99,9	100,6	100,8	100,0	100,1	99,4	100,5	100,0
15. Transport	99,1	100,3	100,8	100,4	101,4	100,8	101,2	100,3
16. Post and courier activity	100,7	101,1	100,6	100,3	101,2	101,7	102,6	101,1
17. Telecommunication	103,0	105,2	103,9	105,3	105,6	104,7	105,4	105,4
18. Activities auxiliary to financial intermediation	101,2	102,7	98,8	103,6	99,1	98,0	100,2	101,4
19. Finance	101,5	101,4	101,8	101,3	101,5	100,8	101,7	101,4
20. Renting of office machinery and equipment	98,5	106,0		98,4	111,2	94,4	94,5	99,6
21. Information technology	100,3	101,8	101,0	100,5	99,8	99,9	99,7	100,6
22. Research and develop.	99,8	99,6	102,7	98,7	103,1	99,0	105,0	99,9
23. Other business activities	99,2	99,6	98,2	100,1	101,0	99,4	100,1	99,6
24. Membership organisations and others	99,8	99,8	99,4	99,7	99,5	99,4	101,1	99,7
25. Basic education	98,1	99,9	99,0	100,4	99,3	100,6	100,6	99,8
26. Higher education	101,2	102,0	100,3	102,8	102,1	101,9	102,7	101,7
27. Health and social work	98,8	99,4	98,9	99,7	100,3	100,0	100,9	99,6
28. Public administration	99,6	99,1	98,8	98,8	100,6	100,1	100,6	99,7
All sectors	99,7	100,3	100,3	100,4	100,8	100,6	101,3	100,4

Table 4.2 shows the total annual net effect of "brain-gain" and "brain-drain" through the migration process between regions 1994-1999. The total figures pronounce a strong "brain-gain" effect in the capital region through inter-regional migration with a certain increase in the

Table 4.2. Average education level of in-migrants to job and out-migrants from job 1994-1999 by typology of region. Index: The education level of out-migrants from job is set at 100.

Region of origin:	Periods	Capital region	Regional metropolises	Regional centres with university	Other regional centres	Medium-sized towns and regions	Small labour areas	Micro labour areas	Total
Region of destination:									
Capital region	1994-95	-	100.6	96.5	102.2	103.9	102.3	103.1	102.6
	1995-96	-	101.6	95.6	102.4	105.3	101.4	103.0	102.9
	1996-97	-	102.2	101.4	102.6	106.4	103.6	102.6	103.7
	1997-98	-	100.5	101.5	102.1	104.8	103.6	103.4	103.0
	1998-99	-	101.0	99.8	102.3	105.1	103.4	103.2	103.1
Regional metropolises	1994-95	100.0	101.1	96.8	100.9	100.5	101.7	103.7	100.3
	1995-96	98.8	100.5	102.3	100.0	100.7	102.0	103.2	99.9
	1996-97	98.6	100.0	98.1	101.0	102.2	102.9	103.7	100.2
	1997-98	99.5	99.9	98.6	99.4	101.5	100.0	101.7	99.3
	1998-99	99.5	100.1	99.2	101.3	100.6	100.2	102.3	99.9
Regional centres with university	1994-95	101.0	100.6	-	102.0	99.0	95.5	102.4	100.2
	1995-96	102.8	97.9	-	102.7	95.2	104.8	101.5	99.9
	1996-97	98.3	103.0	-	97.9	101.8	106.4	102.2	99.2
	1997-98	98.0	100.2	-	97.4	98.6	98.1	98.4	97.6
	1998-99	98.4	98.7	-	98.6	97.3	98.4	101.8	98.9
Other regional centres	1994-95	97.9	100.2	99.4	99.8	101.3	101.9	101.9	99.5
	1995-96	98.2	100.7	96.7	100.3	101.8	104.0	100.9	99.8
	1996-97	98.0	100.0	102.8	100.3	99.1	100.0	102.0	99.4
	1997-98	98.6	99.8	101.2	100.0	99.8	100.9	101.4	99.6
	1998-99	98.2	99.4	102.5	100.4	101.8	100.2	102.5	99.7
Medium-sized towns and regions	1994-95	97.5	99.9	101.4	99.3	99.8	99.1	101.8	99.3
	1995-96	95.7	98.6	101.2	98.4	99.8	102.3	101.7	98.2
	1996-97	94.9	99.2	98.3	101.2	100.2	98.0	102.6	98.5
	1997-98	96.1	98.8	100.9	100.5	100.0	101.8	101.2	98.7
	1998-99	95.7	100.0	103.1	99.1	100.3	106.9	103.6	98.8
Small labour areas	1994-95	98.6	100.1	108.6	98.9	101.6	100.1	102.2	99.7
	1995-96	98.4	98.8	97.3	97.8	97.9	100.1	102.6	98.6
	1996-97	97.2	97.5	93.2	100.2	103.0	100.6	101.7	99.1
	1997-98	97.3	100.2	98.9	99.1	96.5	100.7	99.5	98.7
	1998-99	97.0	100.0	105.1	100.3	95.3	99.7	101.7	99.3
Micro labour areas	1994-95	98.0	97.9	99.6	99.4	98.0	97.5	99.9	98.5
	1995-96	98.4	98.0	98.1	99.2	98.7	98.0	100.6	98.7
	1996-97	98.5	97.6	97.9	98.7	97.7	98.8	100.0	98.4
	1997-98	97.2	99.0	101.3	99.1	99.6	100.9	100.5	99.1
	1998-99	98.3	99.3	100.5	98.7	97.8	98.8	100.4	98.8
Norway	1994-95	-	-	-	-	-	-	-	100.3
	1995-96	-	-	-	-	-	-	-	100.3
	1996-97	-	-	-	-	-	-	-	100.4
	1997-98	-	-	-	-	-	-	-	100.2
	1998-99	-	-	-	-	-	-	-	100.4

last years of the investigation period. All other regional typologies mostly show a "brain-drain" through the migration processes with an exception of regional metropolises in 1994-1995 and 1996-1997 periods and in regional centres with a university in the very beginning of the period. The strongest "brain-drain" through the migration processes is observed in medium-sized towns and regions, in small labour areas and in micro labour areas. The national figures indicate, however, that the net effects of all gross labour migration within the country contributed to an education improvement of the employment in all the years of the investigation period. More detailed the table 4.2 shows that the capital region generally had a "brain-gain" in all regional migration interactions except from regional centres with university in parts of the period. Most pronounced was the "brain-gain" effect in the migration interactions with medium-sized towns and regions. The strongest "brain-drain" effect of migration interactions was, as we could expect, from all other regional typologies to the

capital region, but the "brain-drain" effect is also strong in the migration from micro labour areas to most other regional typologies, from small labour areas to other regional centres and medium-sized towns and regions, from medium-sized towns and regions to regional metropolises and partially from regional centres with university to other regional centres, medium-sized towns and regions and small labour areas.

Finally we have briefly investigated how the "brain-drain"/"brain-gain" process through migration correspond to the net effects of migration to job. There are reasons to expect that the regions with the highest net in-migration to job also benefit from a "brain-gain" through the migration process and vice-versa that regions experiencing a strong net loss through the migration process also suffer from a "brain-drain" in this respect. Some regions may, however, compensate a negative net-migration with a "brain-gain" through the migration process, whilst some regions may experience a "brain-drain" through migration in spite of positive net in-migration. Figure 4.1 illustrates the relationship between net migration to job and average net change of education for 86 local labour markets in Norway in the period 1994-1999.

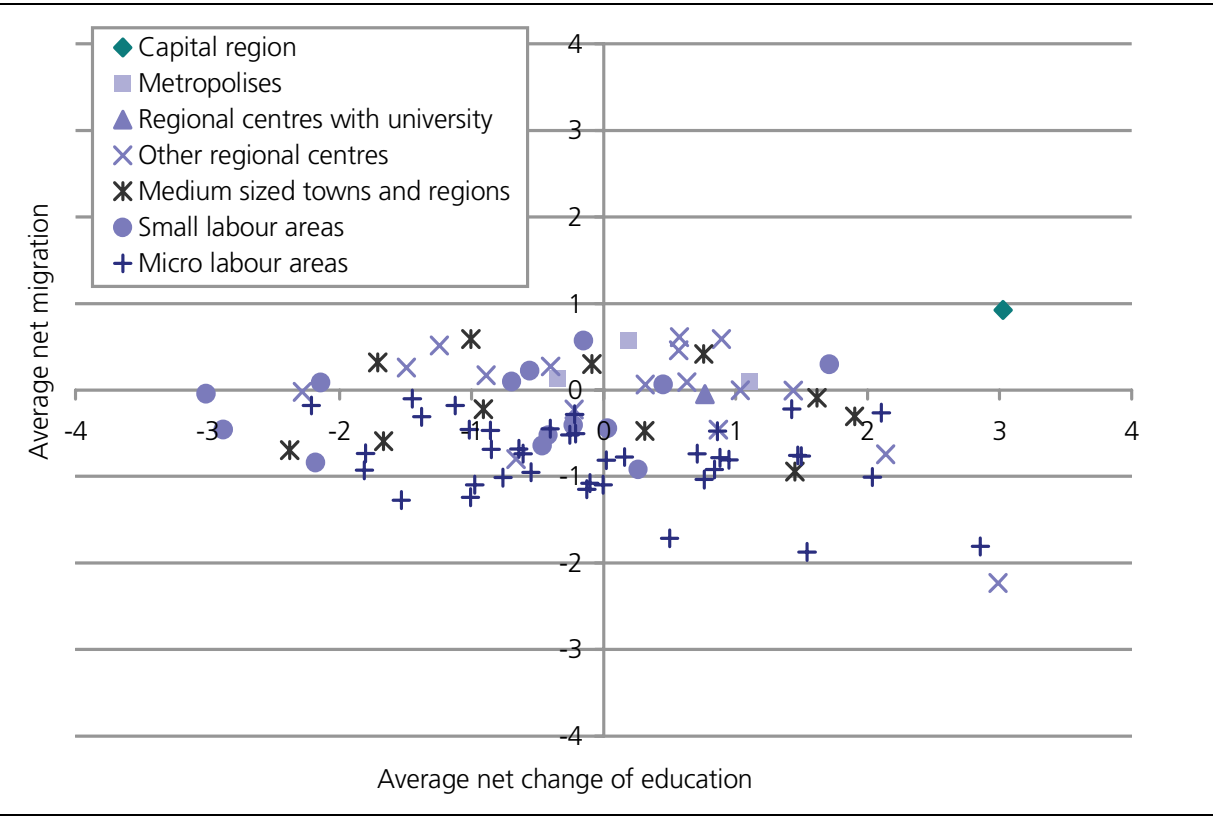
There are only 12 of these regions that experienced a positive net-migration and a positive "brain-gain" effect revealing higher average education level of in-migrants to job compared with out-migrants from job. Not surprisingly it is the capital region that shows the strongest net in-migration as well as the highest "brain-gain" through the migration processes. Two other regions also perform better than the national average on both variables. The first region is classified amongst other regional centres and the second one amongst small labour areas. Altogether the capital region, 2 regional metropolises, 6 other regional centres, 1 medium sized town and region and 2 small labour areas are found among these regions.

Another 12 regions show positive net in-migration to job but suffer from negative education improvement through migration due to the fact that out-migrants from job had a higher average education level than their corresponding in-migrants to job. The regions showing negative net change in education but positive net-migration to job are distributed between 1 regional metropolis, 4 other regional centres, 3 medium-sized towns and regions and 4 small labour areas.

Furthermore, 27 regions show negative net-migration to job, but partly compensate for this by a "brain-gain" through the migration processes. The strongest educational compensation effect was observed in the region of Vadsø, which also showed the highest negative net migration from job within this category of regions. Vadsø is classified amongst other regional centres. Altogether this category of regions compensating their negative net-migration to job by a "brain-gain" through the migration processes is distributed between 1 regional centre with university, 4 other regional centres, 4 medium-sized towns and regions, 2 small labour areas and 16 micro labour areas. The relatively high numbers of micro labour areas here indicate, however, an educational compensation of negative net-migration in certain parts of the more remote areas.

The remaining 35 regions experienced both negative net-migration to job as well as a "brain-drain" through the migration processes. This category of regions is further distributed between 3 other regional centres, 3 medium sized-towns and regions, 6 small labour areas and 23 micro labour areas.

Figure 4.1. Average net effects of migration to job and average net "brain-gain" through the migration processes 1994-1999 by 86 Norwegian regions. Index: The average level of out-migration to job and the average education level of out-migrants from job are set at 0.



**4.2 Income change by education and regional labour market mobility.**

We have put forward hypotheses expecting that employed persons that add to their highest formal education another year of formal education will have an income growth above the average increase of income. On the other hand, the most qualified employed expects to achieve as much return on their human capital investment as possible, pushing their careers in direction of those regions and sectors that actually give the best return. This section is thus stressing two main aspects of these topics. First, analysing the relative rise of income among employed persons changing their education level, and second, analysing the return to human capital by use of changes in personal income in different person groups by regional typologies, sectors and local labour markets.

The table 4.3 describes income change by different mobility groups where the average annual income change is measured by an index in relation to the average annual income change of all employed persons in Norway. The analysis comprises only those employed persons working full time with at least NOK 100 000 in annual personal income. All results are derived from the change of income and change in education in the upswing years 1997-1998. For definitions of income change and change in education see section 3.

In table 4.3 the income change among employed persons is broken down by labour market mobile and non-labour market mobile, and furthermore, by those adding another year of

education to their highest formal education and those employed that do not change their level of education. The national figures indicate a clear tendency that non-mobile employed had weaker income growth compared with employed persons that were mobile within or between the regional labour markets. This supports the conclusion in Stambøl (2002) based on an analysis of some other time periods. This reveals the expectation that when employed persons choose to change their jobs, they mostly do so when achieving a higher income. Furthermore, the results reveal a remarkable higher income growth among those employed increasing their level of education from 1997 to 1998 independent of whether they are labour market mobile or not. The highest income growth is thus found among employees who are mobile and increase their education level.

This pattern is also true at the regional level. Not surprisingly the highest income growth is found in the capital region. Somewhat more surprisingly, small labour areas also experienced income growth above the national average, partly due to a relatively high index score among non-mobile employed that changed their education level. Employees both education mobile and labour market mobile generally have the highest income growth in all regional typologies. The highest increase is found in regional centres with a university.

Table 4.3. Average income change of employed broken down by labour mobile/non labour mobile and education mobile/non education mobile 1997-1998 by typology of region. Index: The average income change of all employed in Norway is set at 100.

Typology of regions:	Labour market mobile			Non labour market mobile			All employed		
	Edu- cation mobile	Non edu- cation mobile	All labour market mobile	Edu- cation mobile	Non edu- cation mobile	All non labour market mobile	Edu- cation mobile	Non edu- cation mobile	All em- ployed
Capital region	115,6	104,9	105,0	108,7	100,0	100,1	110,1	100,7	100,7
Regional metropolises	116,6	103,1	103,3	105,0	99,3	99,4	106,4	99,7	99,8
Regional centres with university	120,8	103,4	103,7	106,1	98,6	98,7	107,9	99,1	99,2
Other regional centres	110,0	102,4	102,6	103,8	99,4	99,4	104,5	99,7	99,7
Medium-sized towns and regions	109,5	102,2	102,3	103,6	99,3	99,4	104,2	99,6	99,7
Small labour areas	110,5	102,4	102,5	105,2	99,7	99,8	105,9	100,0	100,1
Micro labour areas	108,7	102,4	102,6	103,1	99,1	99,2	103,8	99,4	99,5
Norway	112,4	103,3	103,5	104,8	99,5	99,6	105,8	99,9	100,0

#### 4.3. Average income change controlled for change of education.

The results above reveal a clear correlation between income change and the level of education, and that employed persons adding another year of education to their formal education increases their income mostly. In this section the average income change controlled for change in education of all employed persons in Norway working full time is recognized by an index set at 100. The controlled income changes in each group are measured in relation to this national average index. The analysis is made as a weighted average of income growth and education change during the period 1994-1999. In the tables 4.4 and 4.5 all change of

annual income are controlled for change in education. For definitions of income, income change and change of income controlled for change in education, see section 3.

Table 4.4 shows the average income change controlled for change in education for job-to-job mobile within the local labour markets. There are small or no variations by gender, whilst the income growth is disproportional with age and proportional with level of education. Non-Western citizens show a higher income growth than other national groups even after controls for change in education. The capital region shows the strongest income growth, whilst small labour areas show the lowest income growth, although still above the general level of income change for all employed in Norway. Except from the oldest age groups the income change controlled for education is mostly above the national average for local cross-sector mobile employed.

Table 4.4. Average income change controlled for change of education of employed job-to-job mobile within local labour markets 1994-1999 by gender, age, education, nationality and regional typology. Index: The average income change controlled for change of education of all employed in Norway is set at 100.

Typology of region:	Capital region	Regional metropolises	Regional centres with university	Other regional centres	Medium-sized towns and regions	Small labour areas	Micro labour areas	Norway
1. Gender:								
Men	104	102	103	102	102	101	102	103
Women	104	103	102	102	102	102	102	103
2. Age group:								
16-24 years	112	111	108	111	110	110	110	111
25-44 years	105	103	103	103	103	102	102	104
45-59 years	100	99	101	98	99	98	100	99
60-74 years	95	96	100	94	94	97	96	95
3. Education group:								
Low education	102	100	102	100	100	100	99	100
Middle education	103	102	102	102	102	102	102	102
High education	105	104	103	103	103	101	103	104
4. Nationality group:								
Norwegian citizens	104	102	102	102	102	101	102	103
Other Nordic citizens	102	101	102	101	99	101	104	102
Other Western citizens	103	103	110	102	97	100	101	102
Non Western citizens	109	108	114	111	116	108	112	110
All local job-to-job mobile	104	102	103	102	102	101	102	103

Table 4.5 shows similar results for job-to-job mobile in-migrants. The income growth controlled for change in education is generally higher for male than female in-migrants to job. The income growth is also here clearly disproportional with the age and proportional with level of education. As for local job-to-job mobile, non-Western citizens show the highest income growth at the national level. The capital region also has the strongest income growth after controls for education, whilst other regional centres, medium-sized towns and regions and small labour areas had the lowest income growth.

An indication of differences in regional income changes controlled for change in education is shown in Stambøl (2005), indicating the change of income across different sectors within each typology of regions in 1994-1999. For Norway as a whole, those employed that left the



Table 4.5. Average income change controlled for change of education of employed job-to-job mobile in-migrants 1994-1999 by gender, age, education, nationality and regional typology. Index: The average income change controlled for change of education of all employed in Norway is set at 100.

Typology of region:	Capital region	Regional metropolises	Regional centres with university	Other regional centres	Medium-sized towns and regions	Small labour areas	Micro labour areas	Norway
1. Gender:								
Men	109	105	105	103	102	103	103	105
Women	108	104	104	101	100	101	102	103
2. Age group:								
16-24 years	119	115	113	111	108	112	112	114
25-44 years	109	105	104	103	102	102	103	104
45-59 years	99	98	99	97	97	97	97	97
60-74 years	99	81	89	92	87	92	90	92
3. Education group:								
Low education	101	99	98	98	97	97	97	98
Middle education	107	103	102	101	101	101	101	102
High education	111	107	106	104	104	105	106	106
4. Nationality group:								
Norwegian citizens	109	105	104	102	102	102	103	104
Other Nordic citizens	114	101	105	101	100	105	107	105
Other Western citizens	108	110	107	105	106	100	101	106
Non Western citizens	106	111	108	114	113	111	120	112
All employed in-migrants	109	105	105	102	102	102	103	104

sectors of pharmaceutical production, renting of office machinery, information technology and other business activities with the purpose of entering another sector experienced the strongest annual income growth after controlled for change in education. Vice versa job-to-job mobile employed entering the sectors of renting of office machinery, telecommunication, financial intermediation and electro (electric and electronic manufacturing) showed the strongest annual income growth in this respect. There is a clear tendency that those who left the non-market services increased their income more than those who entered these sectors. The dominating position of the capital region with respect to annual income growth is visible in several of the sectors and most pronounced in entries to the electro sector. The income growth among local cross-sector mobile was, with very few exceptions, higher than the national average for all employed working full time.

Similar results are presented for in- and out-migrants between regions and sectors (See Stambøl (2005)). There is a clear tendency that sectors such as financial intermediation, renting of office machinery, information technology and ICT-manufacturing showed the highest growth of income both among those who out-migrated from and in-migrated to these sectors. Furthermore, the capital region showed a much higher income growth among those who in-migrated compared to those who out-migrated in most of the sectors. Especially those who out-migrated from some of the distribution services in the capital region experienced a rather low growth of income, far below the national average. On the other hand, sectors like financial intermediation, finance, renting of office machinery, information technology, other business activities, ICT-manufacturing, ICT-wholesale and pharmaceutical production predominantly contributed the most to the very high income growth amongst in-migrants to the capital region after controlling for change in education. Furthermore, a very high income growth was observed

among those who out-migrated from ICT-manufacturing and ICT-wholesale in regional centres with a university and from financial intermediation and information technology in most regional typologies outside the capital region. Otherwise, a strong income growth was observed among those who in-migrated to ICT-manufacturing in regional centres with a university, regional metropolises and small labour areas, printing and publishing in regional centres with a university and renting of office machinery in regional metropolises. In the same manner as the tendency to higher income growth amongst those who in-migrated to jobs in the capital region in relation to those who out-migrated from jobs, the opposite phenomenon took place in the more peripheral typologies of regions.

#### **4.3. The relationship between average income change/income level and specific and total labour mobility indexes.**

We put forward the hypothesis that regions with the highest income growth also would be attractive for in-migrants, immigrants, and other entries to the labour market. We also put forward the hypothesis that regions with the highest income level will be attractive for different entries to the local labour market. While the annual change in income may vary across regions over time we expect that the different levels of income are more stable across regions. The analysis is made so that the regional change of income and the regional level of income are used as dependent left hand side variables, while specific and total regional mobility indexes are used as independent variables. The estimations are made simultaneously for the specific mobility indexes, but partially for the total mobility index.

Table 4.6 shows the correlation results of the relationship between average income change and different types of gross mobility to and from job in altogether 86 Norwegian local labour markets in the strong upswing period of 1997-1998.

A positive but not significant relationship between the ability to stay in job in the regions and change of income for employed with low and high education has been observed. This relationship is negative but not significant for employed with middle education. The relationship between income change and mobility from the educational system is rather weak for low educated persons, somewhat higher but not significant for middle educated and negative but not significant for persons with high education. The relationship between income change and recruitment from unemployment indicate negative correlation for low and middle educated persons and positive correlation for high-educated persons, but without any significance. The ability to increase the transitions from other persons outside the labour force by income change in an upswing period is definitely stronger for high-educated persons compared to low and middle educated. Whilst this correlation is positive but not significant for low and middle educated, the correlation is strong, positive and significant for high-educated persons. The relationship between recruitment to job from internal in-migration and income change is positive and significant only for high-educated persons. Income change and immigration are rather weakly correlated with negative but not significant parameters for all education groups. Out-migration from job seems to be more sensitive to income change, and are highly but negatively correlated for high-educated persons, negative with a certain significance for low educated persons and negative but not significant for middle educated persons. Job leaving through emigration shows no significance, but a positive correlation for low and middle educated persons, but negative for high-educated persons. When all the mobility measures are weighted together by the number of persons within each mobility

group, the relationship between income change and total mobility is strong, positive and significant for high-educated persons, but rather weak for low and middle educated persons.

Table 4.6. The relationship between average income changes controlled for change of education and gross labour mobility expressed as specific and total index of mobility performance. By type of mobility and education 1997-1998: Basis: 86 Norwegian regions

Type of mobility	Lower education	Middle education	Higher education
Still in job locally	0,225 (0,88)	-0,098 (-0,34)	0,107 (0,20)
To job from education locally	0,006 (0,06)	0,057 (0,75)	-0,027 (-0,28)
To job from unemployment locally	-0,500 (-0,73)	-0,002 (-0,03)	0,034 (1,03)
To job from others outside the labour force locally	0,174 (0,52)	0,056 (0,46)	<b>0,295***</b> <b>(2,81)</b>
To job from internal in-migration	0,394 (0,63)	-0,383 (-0,85)	<b>0,724*</b> <b>(1,78)</b>
To job from immigration	-0,071 (-0,20)	-6,275 (-0,80)	-1,269 (-0,40)
From job to internal out-migration	<b>-1,152*</b> <b>(-1,77)</b>	-0,092 (-0,42)	<b>-0,843***</b> <b>(-2,84)</b>
From job to emigration	0,934 (0,57)	2,257 (0,83)	-0,633 (-0,28)
Adjusted R <sup>2</sup>	-0,02	-0,04	0,10
Weighted average	0,901 (0,49)	0,157 (0,47)	<b>5,846***</b> <b>(3,03)</b>

Level of significance: 99%\*\*\*, 95%\*\* , 90%\*. (t-values in brackets). Number of observations=86)

Table 4.7 shows correlation results of the relationship between average income level and different types of gross mobility to and from job in the same 86 Norwegian local labour markets used in the analysis above.

A positive and significant relationship has been observed between the ability to stay in job in the regions and the level of income for employed with low and high education. The relationship between income level and mobility from the educational system is positive and highly significant for middle educated employed. The relationship between income level and recruitment from unemployment shows no significance with negative correlation for middle and high educated, but a positive correlation for low educated persons. The ability to increase the transitions from other persons outside the labour force is positively correlated to the income level for all educational groups, but none of the parameters are significant. The relationship between recruitment to job from internal in-migration and income level is positive and significant only for high-educated persons. Income level and immigration are positively correlated for all educational group, but only significant for low and high educated employed. Out-migration from job seems to be the type of mobility that is most sensitive to income level, and the correlation is highly and negatively correlated for all educational groups, and especially strong for the high educated employed. Job leaving through emigration is only significant for high educated employed, although positively correlated.

When all the mobility measures are weighted together by the number of persons within each mobility segment, the relationship between income level and total mobility is strong, positive and significant for low and middle educated persons, but somewhat surprisingly not significant for high educated employed.

Table 4.7. The relationship between average income level and gross labour mobility expressed as specific and total index of mobility performance. By type of mobility and education 1997-1998:  
Basis: 86 Norwegian regions

Type of mobility	Lower education	Middle education	Higher education
Still in job locally	<b>52,592***</b> (3,59)	24,110 (1,28)	<b>95,108**</b> (2,27)
To job from education locally	-4,355 (-0,78)	<b>17,898***</b> (3,53)	0,636 (0,09)
To job from unemployment locally	0,718 (0,18)	-3,500 (-0,75)	-2,960 (-1,15)
To job from others outside the labour force locally	18,779 (0,98)	8,045 (0,98)	5,018 (0,61)
To job from internal in-migration	25,783 (0,72)	16,506 (0,55)	<b>65,619**</b> (2,07)
To job from immigration	<b>62,027***</b> (3,05)	652,525 (1,25)	<b>584,716**</b> (2,34)
From job to internal out-migration	<b>-107,138***</b> (-2,89)	<b>-65,091**</b> (-2,15)	<b>-113,236***</b> (-4,89)
From job to emigration	-8,425 (-0,09)	150,006 (0,83)	<b>320,601*</b> (1,79)
Adjusted R <sup>2</sup>	0,27	0,39	0,43
Weighted average	<b>335,054***</b> (2,84)	<b>140,265***</b> (5,70)	312,679 (1,59)

Level of significance: 99%\*\*\*, 95%\*\* , 90%\*. (t-values in brackets). Number of observations=86)

There is, however, a stronger general effect of labour mobility on regional job growth than on regional income change and regional income level when we compare these results of income and mobility with previous results of employment growth and mobility (see Stambøl (2005)). There is especially a stronger correlation between regional net job growth and in and out-migration and others to job locally compared with regional income change and regional income level. On the other hand there is, however, a stronger correlation between immigration to job and the regional income level than between immigration and regional net job growth.

## 5. Main findings

### The dynamics of "Brain gain" and "brain-drain" in the regional labour market mobility:

- The most pronounced "brain-gain" sectors within the local labour markets were found among telecommunication, printing and publishing and higher educational institutions, whilst the sectors which predominantly experienced "de-qualification" through local cross-sector mobility were pharmaceutical production, hotel and restaurant and retail, recreation, culture and sport.
- There was a certain divergence of education improvement by labour mobility within the local labour markets totally, showing a "brain-gain" in all regions except from the capital region. This may be seen in light of a very tight labour market in the capital region forcing the employers to search for labour among more marginal parts of the labour force, but partly also due to a "brain-gain" effects through the migration processes.
- The results support a very strong "brain-gain" effect in the capital region through inter-regional migration. All other regional typologies show mostly a "brain-drain" through the migration processes. The strongest "brain-drain" through migration was observed in medium-sized towns and regions, small labour areas and micro labour areas. The national figures indicate, however, that the net effects of all gross labour migration within the country

contributed to an education improvement of the employment in all years of the investigation period.

- There were only 12 out of 86 regions that experienced a positive net-migration to job and a positive "brain-gain" effect through migration. Another 12 regions had positive net in-migration to job, but suffered all from negative education improvement through migration. Furthermore, 27 regions showed negative net-migration to job, but partly compensated this by a "brain-gain" through the migration processes. The relatively high numbers of micro labour areas in this group indicate, however, an educational compensation of negative net-migration in certain parts of the more remote areas. The remaining 35 regions experienced both negative net-migration to job as well as a "brain-drain" through the migration processes.

*The dynamics of income change in the regional labour market mobility:*

- The results indicate a clear tendency that non-mobile full time employed had a weaker income growth compared with employed persons that were mobile within or between the regional labour markets. Furthermore, the results reveal a remarkable higher income growth among those employed increasing their level of education irrespective of whether they are labour market mobile or not.
- There are small or no variations by gender in income growth controlled for education among cross-sector mobile employed within the local labour markets.
- Mobile non-Western citizens showed higher income growth than other national groups both within and between regions, although from a lower than average income level.
- The capital region shows the strongest income growth of local mobile, whilst the small labour areas show the lowest income growth, although still above the general level of income change controlled for education for all employed in Norway.
- The income growth controlled for change in education is generally higher for male than female in-migrants to job. The capital region has also the strongest income growth of in-migrants when controlled for education, whilst other regional centres, medium-sized towns and regions and small labour areas had the lowest income growth in this respect.
- The highest income growth was observed among out-migrants from medium-sized towns and regions and from micro labour areas. Out-migrants from the capital region had the lowest income growth when controlled for education, and especially among women.
- There is a clear tendency that those who left the non-market services increased their income more than those who entered these sectors.
- The dominating position of the capital region with respect to annual income growth among local cross-sector mobile is visible in quite many of the sectors.

*Relationship between the change and level of income and regional labour market mobility:*

- Measured as total gross mobility by education, there was a much higher correlation between annual income change and gross labour mobility for the high educated employed compared with middle and low educated labour. The strongest and most positive and significant correlation between income change and labour mobility among high-educated persons was found in local mobility to job of persons outside the labour force and for in-migration to job, while the strongest negative correlation was found for internal out-migration from job.
- For low and middle educated persons the relationship between the level of income and gross labour mobility was remarkably higher than for income change and mobility. For high-educated labour the mobility seems to be more sensitive to differences in the annual change of income.
- The strongest, most positive and significant correlation between regional income level and labour mobility was found in the ability to stay in job within the local labour markets for low

educated labour, the ability to turn from education to job in the local labour markets among middle educated labour and for immigration to job among low educated persons. The strongest negative correlation was found in internal out-migration from job for all educational groups and especially then among high educated employed.

- Compared with previous studies, there is a stronger general effect of labour mobility on regional job growth than on regional income change and regional income levels.

## References

Bryson, J. R., R. W. Daniels and B. Warf (2004), *Service Worlds. People, Organisations, Technologies*. Routledge, London and New York.

Burda, M. and C. Wyplosz (1994): Gross worker and job flows in Europe. *European Economic Review*, 38: 1287-1315.

Burgess, S., J.I.Lane and D.W.Stevens (1994): Job Flows and Worker Flows; Issues and Evidence from a Panel of US Firms. In R. Schettkat (ed.), *The Flow Analysis of Labour Markets*, London and New York, Routledge, 96-114.

Champion, T. and T. Fielding (eds.), (1992): "Migration Processes & Patterns". Volume 1. *Research Progress & Prospects*. Belhaven Press.

Curran, J. and R. Blackburn (1994): Small firms and local economic networks. The death of the local economy? London, Paul Chapman Publishing

Davis, S.J. and J.C.Haltiwanger (1998): Measuring Gross Worker and Job Flows. In Haltiwanger, J.C, M.E.Mansner and R.Topol (eds.) *Labor Statistics Measurements Issues*. Chicago: University of Chicago Press, 77-119.

Edvardsson, I.R, E.Heikkilä, M.Johansson, L.O.Persson and L.S.Stambøl (2000): *Competitive capitals - Performance of Local Labour Markets - An International Comparison based on Gross-stream Data*. Working Paper 2000: 7, Nordregio, Stockholm.

Edvardsson, I.R, E.Heikkilä, M.Johansson, L.O.Persson and L.S.Stambøl (2002): "The performance of metropolitan labour markets. A comparison based on gross-stream data" In *Jahrbuch für Regional Wissenschaft*, Heidelberg.

Greenwood, M.J. (1985): "Human Migration: Theory, Models and Empirical Studies". *Journal of Regional Science*, 25.

Harris, C. and D. Becker (2001): Amenity or Extraction-Based Rural Economics? The Role of Tourism and other Resource-Based Industries in Inland Northwest Towns. Paper at the WRSA-meeting in Palm Springs, 2001

Heikkilä, E., M. Johansson, L.O. Persson and L.S. Stambøl (1999a): Interregional labour market mobility through regional vacancy chains - a comparative international approach. Paper presented at "the 39th. Congress of the European Regional Science Association", in Dublin, Ireland, 23-27 of August 1999.

Heikkilä, E., M. Johansson, L.O. Persson and L.S. Stambøl (1999b): Regional labour mobility in Finland, Norway and Sweden. In *North*, The Journal of Nordregio, no. 6, 1999, Scandinavian University Press.

Heikkilä, E. and L.S. Stambøl (1999): Regional labour force migration: A Finnish-Norwegian Experience. In A. Alanen, H. Eskelinen, J. Mønnesland, I. Susiluoto and H. Tervo (eds.): *"Structures and Prospects in Nordic Regional Economics"*. Nordregio Report 1999:5, Stockholm

Hustoft A.G., H. Hartvedt, E. Nymoen, M. Stålnacke and H. Utne (1999): *Standard for økonomiske regioner*, Reports no. 6, 1999, Statistics Norway.

Johansson, M. (1996): "Flexibility, Rigidity, and Innovation Diffusion – the Case of Northern Sweden". In Johansson, M. and L.O. Persson (eds.): *Extending the Reach. Essays on Differing Mobility Patterns in Sweden*. Fritzes.

Johansson, M., L.O. Persson, E. Rissanen and L.S. Stambøl (1997): Interregional labour market mobility patterns in rapidly changing Nordic welfare states - a comparative analysis. Paper presented at the 37th European Congress of the Regional Science Association in Rome, Italy, 25-29 August 1997.

Johansson, M. and L.O. Persson (1999): "Mobile Unemployment in a Post-industrial Society: The Case of Sweden". In Crampton, G.R. (ed.): *European Research in Regional Science*, Vol 9. Pion Limited.

Kontuly, T. (1998): "Contrasting to Counter-urbanisation Experience in European Nations". In Boyle, P. and K. Halfacree (eds.) *Migration into Rural Areas, Theories and Issues*, John Wiley and Sons. Chichester.

Massey, D. (1995): *Spatial Division of Labour. Social Structures and the Geography of Production*. Mac Millan.

Milne, W. (1991): "The Human Capital Model and its Econometric Estimation". In Stilwell J. and P. Congdon (eds.) *Migration Models, Macro and Micro Approaches*. Belhaven Press. London and New York.

Padoa Schioppa, R. (ed.), (1990): *Mismatch and Labour Mobility*. Cambridge University Press.

Pissarides, C.A. and J. Wadsworth (1989): "Unemployment and the Inter-Regional Mobility of Labour", *Economic Journal*, 99.

Persson, L.O. (ed.) (2001): Local labour market performance in Nordic countries. Report 2001/9, Nordregio, Stockholm.

Persson, L.O. (ed), I.R. Edvardsson, E. Heikkilä, M. Johansson, S. Korkalainien, T.D. Schmidt and L.S. Stambøl (2004): *Economic renewal and demographic change. An evaluation of local labour market performance in the Nordic countries*. Report 2004:8, Nordregio, Stockholm

Schmid, G., 1994.: Labour Market Institutions in Europe. *A Socioeconomic Evaluation of Performance*, Armonk, NY: M.E. Sharpe

Schmid, G. and B. Gazier, (eds.) 2002: *The Dynamics of Full Employment - Social Integration Through Transitional Labour Markets*, Edward Elgar Publishing, UK and USA.

Stambøl, L.S. (1991): "Migration Projection in Norway: A Regional Demographic-Economic Model". In Stilwell, J. and P. Congdon (eds.) *Migration Models, Macro and Micro Approaches*. Belhaven Press. London and New York.

Stambøl, L. S. (1999): Interregional labour force mobility in Norway, *Economic Survey*, no. 2, 1999, Statistics Norway.

Stambøl, L. S. (2000): Regional arbeidsmarkedsmobilitet i Norge - Bruttostrømsanalyser og etterspørselsbetraktninger i de regionale arbeidsmarkedene, *Økonomiske analyser*, no. 4, 2000, Statistics Norway.

Stambøl, L. S. (2001): Local labour market performance through different activation rates, input and economic returns to human capital. Paper presented at the 41th European Congress of the Regional Science Association in Zagreb, Croatia, 29 August - 1 September 2001.

Stambøl, L. S. (2002): Qualification, mobility and performance in a sample of Norwegian regional labour markets. Reports 2002/6, Statistics Norway.

Stambøl, L. S. (2005): Urban and regional labour market mobility in Norway. Social and economic studies 110, Statistics Norway.

Stambøl, L. S. (ed.), E. Heikkilä, M. Johansson, H. Jussila, L.O. Persson and the Danish Ministry of Finance (1996): *Flytting og arbeidsmarked i nordiske land - Et forprosjekt*. TemaNord 1996:576. Nordic Council of Ministers. Copenhagen.

Stambøl, L. S. (ed.), M. Johansson, L.O. Persson and E. Rissanen (1997): *Flytting og sysselsetting i nordiske land - Bruttostrømsanalyser og tilbudsidentifikasjoner i de regionale arbeidsmarkedene*. TemaNord 1997:599. Nordic Council of Ministers. Copenhagen.

Stambøl, L.S., N.M. Stølen and T. Åvitsland (1998): "Regional Analyses of Labour Markets and Demography - A Model Based Norwegian Example". *Papers in Regional Science*, The Journal of the RSAI, vol 77, 1, 37-62, Regional Science Association International, Illinois, USA.

Stambøl, L. S. (ed.), E. Heikkilä, M. Johansson, O. Nygren and L.O. Persson (1999): Regional arbeidsmarkedsmobilitet i nordiske land - Bruttostrømsanalyser og etterspørselsbetraktninger i de regionale arbeidsmarkedene. TemaNord 1999:551. Nordic Council of Ministers. Copenhagen.

Stark, O. (1991): *The Migration of Labor*. Basil Blackwell.

Storper, M. og A. J. Scott (1990), Work organisation and local labour markets in an era of flexible production. *International Labour Review*, 120, 5: 573 – 591.



van der Laan, L. (2001): *Knowledge economies and transitional labour markets; new regional growth engines*, Rotterdam School of Economics, Rotterdam University.