

*Lasse Sigbjørn Stambøl*

**Qualification, mobility and  
performance in a sample of  
Norwegian regional labour  
markets**

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# Abstract

*Lasse Sigbjørn Stambøl*

## **Qualification, mobility and performance in a sample of Norwegian regional labour markets**

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This report presents an analysis of structural change and differing performance of local labour markets in Norway in the 1990s broken down into two periods representing recession and economic upswing respectively. The performance of regional labour markets is basically analysed in three settings. Firstly performance is investigated through the ability of the local labour market to adapt to and facilitate structural change in the local economy by use of some specified labour market mobility measures. Secondly the ability to increase the input of, and the returns to human capital investments in different sectors of the regional economy is analysed by using changes in average educational levels, and changes in incomes. Finally we discuss how the local labour markets perform through different activation rates to employment, both from gross streams within the local labour markets, and through job recruitment from net internal migration. Most local labour market mobility measures are compared with their corresponding national average measures. The analysis is limited to a sample of nine Norwegian labour market regions.

Gross labour market mobility and local cross sector exchange generally grew from the trough of recession years at the beginning of the 1990s up to a peak during the economic upswing period of 1996-97. Whilst central regions experienced a "brain-drain" through the migration process during the recession period, this situation was clearly reversed during the upswing period. The local mobile employed exhibited a significantly higher income growth compared with the non-mobile employed, and employed migrants showed an even higher increase in income than the local mobile employed. The analysis does not reveal a clear tendency of better general local performances within larger regional labour markets compared to that of medium sized and smaller regional centres. This is due to the fact that highly competitive job-migrants contributed significantly to total regional labour market performance, and particularly in some of the most central regions.

**Acknowledgement:** The analysis represents Norwegian contributions to a Nordic co-operation project investigating regional labour market performances by use of gross-flow data. The current project has been directed by Nordregio (Nordic Centre for Spatial Development), and financial support is provided by the Ministry of Labour and Government Administration, Nordregio and Statistics Norway.



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# 1. Introduction

In an economy where education and knowledge becomes more and more important, efficient and instant matching of demand and supply of competent labour is one of the most important elements in territorial competitiveness. In this report, we analyse structural change and differing performance of local labour markets in Norway in the 1990s broken down into two periods representing recession and economic upswing respectively. The purpose is to explore, describe and to some extent analyse the gross flows of labour within and between some chosen local labour market areas.

The performance of regional labour markets is basically analysed in three settings. Firstly performance is investigated through the ability of the local labour market to adapt to and facilitate structural change in the local economy by use of some specified labour market mobility measures. Secondly the ability to increase the input of, and the returns to human capital investments in different sectors of the regional economy is analysed by using changes in average educational levels, and changes in incomes. Finally we discuss how the local labour markets perform through different activation rates to employment, both from gross streams within the local labour markets, and through job recruitment from net internal migration. Most local labour market mobility measures are compared with their corresponding national average measures.

The analysis of labour market mobility is limited to a sample of nine Norwegian labour market regions. The regions are aggregated into three main categories representing different local labour markets within the nation according to size and structure of the regional economy. The three regions in each of the three main categories show to a certain extent some structural similarities. The three main categories of regions are chosen to consist of the three main conurbation regions of the nation, the three main regional centres including higher educational facilities as well as research institutes, and finally three regional centres in smaller regions. The basic hypothesis is that some similarities should exist in labour market performance between

regions showing a certain extent of structural conformity in size and diversification of production, whilst labour market performance in this respect is expected to diverge across more heterogeneous regions.

Labour market mobility is analysed by using recently established mechanisms for measuring regional labour market change (see e.g. Stambøl et al.(1999)). The analysis goes beyond the traditional means of measuring net employment change by using gross-flow analysis both for the supply side, and for uncovering different possibilities on the demand side. This has enabled investigation of gross-flows in and out of different sectors and segments, and to what extent and in which way vacancies are opened up and filled in the regional labour markets, i.e. a so-called "vacancy-account". The leaving processes of the regional labour markets, i.e. the vacancy chains, are also to a certain extent taken into consideration. In part this is a consequence of geographical mobility, i.e. resulting when employed move and leave behind vacancies in the labour markets. But the exit from specific jobs also differs and is connected to uneven employment changes in different sectors and segments as well as exits through demographic processes.

The second section gives an overview of data, definitions and methods used in the analyses. A description of the local regional labour markets involved, stressing population, labour markets and educational facilities, is presented in section three, whilst the empirical results of the analyses are documented in the fourth section followed by some concluding remarks in the final section.

## 2. Data, definitions and methods

The analysis is mainly based on a sample of nine Norwegian regions, partly derived from a classification of economic regions used by Statistics Norway (see Hustoft et al.(1999)). Earlier investigations of geographical mobility in Norway have shown that the labour market and the level of education have a tendency to become increasingly important factors in explaining migration at a higher geographical level (see e.g. Stambøl, 1991,1994, Stambøl et al. 1998). In this analysis we use, however, somewhat more disaggregated regional levels classified on the basis of what may be identified as functional regions.

Another important aspect in the analysis of labour market mobility is the classification of individuals according to their labour market status; e.g. employed, unemployed, under education or outside the labour force. In earlier migration analyses we used this division first on cross-sectional data (Stambøl 1995a,b), followed by investigations stressing supply-side adjustments and demand-side considerations in the regional labour markets where the propensity of change in the labour market status of each individual was analysed using gross-flow data (see e.g. Johansson et al.1997, 1998, Heikkilä et al.1999, Heikkilä and Stambøl 1999, Stambøl ed. 1996,1997,1999 and Stambøl 1998, 1999, 2000a,b). In this analysis the aim is primarily to analyse the change in labour market status, sector and segment connected to the migrants and the migration processes, as well as investigating how these transitions operate within different and to a certain extent similar local labour markets. It was 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. The necessary data for all individuals of working age was therefore established. The data, which covers whole populations, was collected from register-based data sources at Statistics Norway.

The end of the 1980s and the first years of the 1990s represented a clear cyclical downturn in the Norwegian economy, though the nation experienced a recovery during 1993 followed by significant economic growth in the period 1994-1998. In the analysis put forward

here the comparison of the inter- and intra-regional labour market transition is based on changes over two two-year periods, where 1990-91 is chosen to represent a recession period and 1996-97 represents a period with strong growth in the national economy.

Migrants are defined as individuals living in different regions in the first and second year of each period. The analysis focuses predominantly on internal migration in Norway, that is to say, migration between regions within the country. To some extent the analysis also encompasses the marginal status groups such as immigrants and emigrants/dead persons etc. These are individuals that were only obtainable for the first or the second year of each investigation period. Those obtainable only for the first year consist mainly of employed persons who had emigrated between the first to the second year of each period, but also consists of those employed who died or left the working population. The majority of those obtainable only in the second year consists of individuals who have immigrated and obtained a job in the second year of each period, but also encompasses a minor group of young individuals entering the working age cohort in the second year of each period as employed.

The status groups are defined as follows: *Employed persons* are individuals included in a set of different register-based labour market data sources. *Unemployed persons* are individuals included in the unemployment register with at least one month of unemployment during the year of investigation. *Persons under education* are individuals who have completed one exam during the year and/or are included in the register of persons under education on the 1<sup>st</sup> of October in each year of investigation. *Other persons outside the labour force* are all other individuals of working age not included in any of the above mentioned registers.

Problems of status occur, however, when individuals are found in more than one of these registers. It is possible that one person may be included in all registers mentioned, e.g. partly employed, partly unemployed and partly under education in the same year. To solve this problem in the classification of

individuals into status groups we have made following suppositions: Employed also registered as unemployed are defined as employed if the period of unemployment did not exceeds six months; otherwise they are defined as unemployed. Employed also included in the register of persons under education are defined as employed. Persons under education also registered as unemployed are defined as under education if the period of unemployment did not exceeds six months; otherwise they are defined as unemployed.

Definitions of changes in labour market status follow similar patterns as the definitions of migrants, where the Norwegian data shows the labour market status of each individual in the first and second year of each period. A definition of socio-economic and socio-demographic groups includes the variables gender, age, education and in some cases also the annual income level and the annual change in income. Individuals of working age are defined as persons within the 16-64 age cohort. This age group was chosen because of Nordic comparisons, though it differs somewhat from the normally used definition of working age in Norway, namely people from 16-74 years of age. Education is basically divided into three main categories: low, intermediate (upper secondary) and higher (post secondary) education. A concept of "average educational level" is however introduced, calculating the average level of education in regions, sectors and among stayers and movers on the basis of the educational level in the Standard Classification of Education (one-digit-level). Following the classification of education each individual employed is given a "score" for the educational level as follows:

Compulsory education	= 2 points
Upper secondary school (second stage I)	= 3 points
Upper secondary school (second stage II)	= 4 points
Post secondary education (Higher education)	(1-2 years) = 5 points
Post secondary education (Higher education)	(3-4 years) = 6 points
Post secondary education (Higher education)	(5 years and more) = 7 points
Post secondary education (Doctoral degree)	= 8 points

This means that the points are given in accordance with the educational level in the standard classification at one-digit-level. Making aggregations of the points for all kinds of groups divided by the number of employed in each group makes the average educational level for that group.

Labour market mobility is defined as changes of status to and from employment, mobility among employed between twenty-one economic sectors and one unspecified sector (the inter sector exchange, see e.g. the sectors in table 4.1 in section 4) and/or migration between regions. As mentioned above, the definition encompasses in some context international migration,

ageing and death. A definition of twenty-one economic sectors certainly underestimates the job-to-job mobility. On the other hand however, a more disaggregated division would be more vulnerable to the statistical replacements and misplacements of employed persons between sectors. In section 4.2 we have, however, included local job-to-job mobility within each main sector.

Traditional labour market statistics operates with the number of employed, unemployed and individuals outside the labour force, where the annual differences express the net change of all gross-streams at the labour market. Consequently full knowledge of the gross-streams will also give full knowledge of the net change, while the opposite is obviously not the case (Aaberge 1988). One basic aspect of this analysis is then to establish a regional labour market indicator illuminating the annual gross-flows between the statuses. Figure 2.1 illustrates how this regional labour market indicator is measured in a so-called "vacancy account". Concerning the "vacancy accounting", we deal with filled in vacancies in the regional labour markets, which means that the average stock of vacancies that were not filled in is not taken into consideration in this stage of the analysis.

**Figure 2.1. A "vacancy-account" for gross-stream analyses in regional labour markets**

<b>A. Entering stock:</b> The number of employed in sector <i>s</i> in region <i>r</i> in year <i>t</i> by age, gender and education	
<b>Employment leave:</b>	
- From job to another job in another sector	(1) Out-migrated from the region (geographical mobil)
- From job to unemployment	(2) Not migrated from the region (local mobil)
- From job to outside the labour force ( <i>Further education</i> )	
- ( <i>Retirement -Leaving working age</i> )	
- ( <i>Other insurance</i> )	
- ( <i>Emigration</i> )	
- ( <i>Dead</i> )	
= Total employment leave	
<b>Employment recruitment:</b>	
- To job from a job in another sector	(1) In-migrated to the region (geographical mobil)
- To job from unemployment	(2) Living in the region (local mobil)
- To job from education	
- To job from outside the labour force	
= Total employment recruitment (represents the filled in vacancies from year <i>t</i> to year <i>t+1</i> )	
<b>B. Outgoing stock:</b> The number of employed in sector <i>s</i> in region <i>r</i> in year <i>t+1</i> by age, gender and education	

**Some measures derived from the labour market mobility**

For illuminating the regional adaptability to structural change and for comparisons between regions the

recruitment (and leaving) processes in different regions are concentrated on a set of mobility measures, which are as follows:

*Vacancy filling rate:* The number of entries (gross recruitment in the local labour markets plus in-migration to jobs) per total exits from employment (employment exits in the local labour market plus out-migration from jobs).

#### **Local vacancy filling rate**

This rate is used as a measure of the local labour market self-sufficiency, and is measured as entries from local recruitment in relation to total entries in the local labour market.

#### **Cross sector exchange rate**

This measure illuminates the intensity of local labour market mobility within the local labour markets, and are expressed as follows: The number of employed in the local labour market changing sector from year  $t$  to year  $t + 1$  within the local labour market in relation to all employed in the local labour market in year  $t$ .

#### **Job export/import by labour migration. Net employment change by internal and international migration**

*Concerning internal migration:* In-migrants to job in the local labour market in year  $t + 1$  in relation to all employed in the local labour market in year  $t$ . Employed out-migrating from the local labour market from year  $t$  to year  $t + 1$  in relation to all employed in the local labour market in year  $t$ . *Concerning international migration:* Persons immigrating to a job in the local labour market in year  $t + 1$  in relation to all employed in the local labour market in year  $t$ : Employed emigrating from the local labour market from year  $t$  to year  $t + 1$  in relation to all employed in the local labour market in year  $t$ .

#### **Local labour market performance index**

The analysis finally includes a total local labour market performance index, which measures the relative performance in each region. The total performance index is composed of a set of different mobility rates derived from internal gross streams within the local labour markets. In the national context all local labour market mobility measures are compared with the national average measures correspondingly. More details are described in section 4.3 below, and in Edvardsson et. al. (2000), Persson et al. (2001) and Stambøl (2001).

### 3. Regional description and classification

This section includes a short description of the regions involved in the analyses featuring some aspects of the population, migration, educational level and labour market. As mentioned in the introduction, the investigation takes into consideration a sample of nine labour market regions, which are aggregated into three categories representing different local labour markets according to the size and structure of the regional economy. The three main categories of regions consist of the three main conurbation regions of the nation, the three main regional centres including higher educational facilities as well as research institutes, and three regional centres in smaller regions. These regional divisions correspond to a classification of economic regions used by Statistics Norway, except for the region of Oslo, which includes several local economic regions. (Altogether Norway is partitioned into 90 economic regions (see Hustoft A.G. et al. 1999)).

The three conurbation regions consist of the region of Oslo, the region of Bergen and the region of Trondheim. The region of Oslo in this context consists of the counties of Oslo and Akershus, which is further divided into 5 economic regions and 23 municipalities. The economic region of Bergen, which represents the main centre of western Norway, is further divided into 19 municipalities. The economic region of Trondheim, which is the centre of middle Norway, includes 9 municipalities altogether. In spite of their different population sizes and geographical location, these three conurbation regions should display some similarities in relation to educational facilities, the main functions of public services and administration, as well as in a diversified private sector.

The second main category of regions consists of the economic regions of Stavanger/Sandnes, Kristiansand and Tromsø. The Stavanger region in the south-western Norway, has for several years been the main base for the oil and natural gas operations in the North Sea. The region is further divided into 11 municipalities. The economic region of Kristiansand represents the main centre of southern Norway, and encompasses 4 municipalities. The economic region of

Tromsø is the main centre of northern Norway, and includes 5 municipalities. These three regions all have a central position at an intermediate level in the national context, as well as good educational facilities and rich history of manufacturing and good access to market and non-market services.

The third main category of regions includes major regional centres in some minor regions without well-developed higher education facilities. As a sample of regions for this analysis, the regions of Ålesund, Kongsvinger and Mo i Rana was chosen. The economic region of Ålesund is located in the coastal districts of the county of Møre og Romsdal in the northern part of western Norway, and encompasses 11 municipalities. The economic region of Kongsvinger, which is located in the interior of eastern Norway close to the Swedish border in the southern part of the county of Hedmark, includes altogether 6 municipalities. Finally the economic region of Mo i Rana is an interior manufacturing centre of the county of Nordland in the southern part of northern Norway, and encompasses 3 municipalities.

#### 3.1. Population and migration

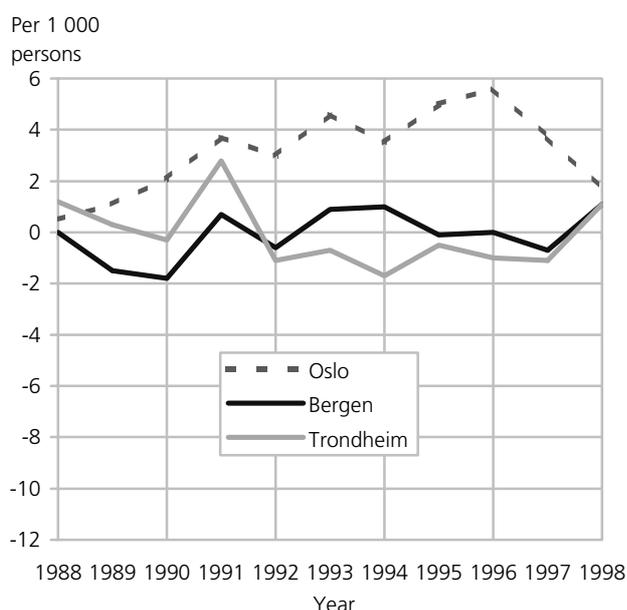
The regions represent almost a hierarchically division with regard to the population size, with some exceptions though (see table 3.1). The intermediate classified region of Stavanger has higher population figure compared with the conurbation region of Trondheim in the upper category of regions. This regional classification may, however, be justified because of relatively more central functions located in the Trondheim region, as well as due to the fact that the town of Trondheim is somewhat bigger than the town of Stavanger. The same relation is, however, apparent in the different size of population in the third category classified region of Ålesund compared with the second category region of Tromsø.

Most regions experienced population growth throughout the 1990s. The strongest increases in population were found in the medium-sized regions of Stavanger and Tromsø, showing almost 10 per cent rises in population during the period 1990-1997. In the

**Table 3.1. Population changes 1990 -1997 by age group and region. Per cent**

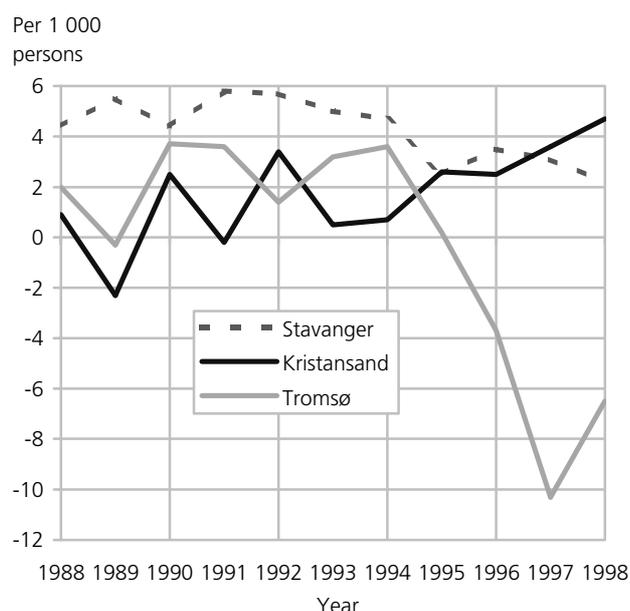
Region	Age group					Total change	Total pop 1997.
	0-15	16-24	25-64	65-74	75+		
Oslo-region	17.3	-13.8	12.6	-9.1	9.8	7.8	941 089
Bergen	8.2	-12.6	10.2	-8.2	14.9	5.2	340 111
Trondheim	10.0	-15.6	9.7	-7.4	16.0	4.9	196 048
Stavanger	12.4	-5.2	14.4	-10.1	23.6	9.8	210 357
Kristiansand	10.6	-10.0	10.5	-1.0	23.6	7.3	95 481
Tromsø	14.7	-18.8	16.3	-3.2	18.9	9.2	71 154
Ålesund	1.6	-9.3	6.4	-4.1	15.6	2.7	80 888
Kongsvinger	-1.7	-18.6	0.6	-11.4	13.5	-2.7	49 672
Mo i Rana	5.5	-19.8	5.3	-9.0	30.7	1.8	31 830
Norway	6.3	-13.4	8.7	-9.1	13.0	3.8	4 392 714

**Figure 3.1a. Net-migration 1988-1998. Conurbation regions. Per 1 000 persons (Internal migration)**

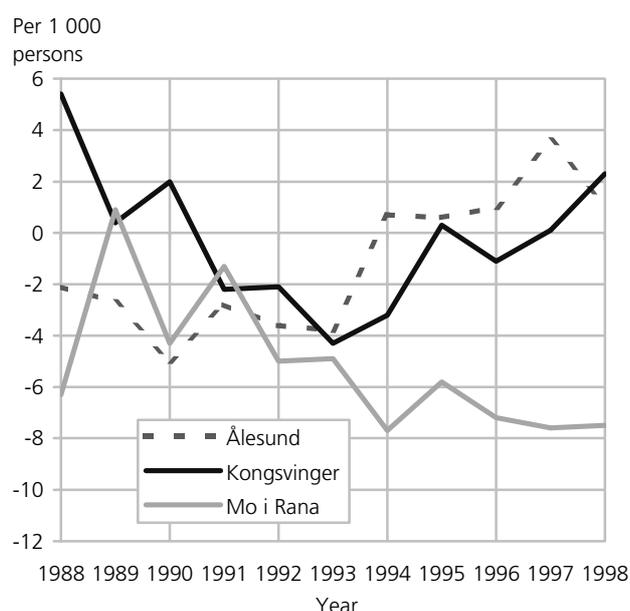


smaller regions of Ålesund and Mo i Rana the population growth almost stagnated, whilst the region of Kongsvinger showed a small decreases in the population during this period. Broken down by age groups there were some regional differences. The Oslo-region exhibited tremendous growth in the numbers of children, though all regions experienced a decrease in the number of persons within the 16-24 age cohort. This is however, a general observation across Norway, and is due to low fertility rates in the 1970s and the 1980s. Due to high net in-migration and high fertility, the Stavanger region was somewhat less affected by such decreases. The main group of persons in working age grew however, fast in the regions of Tromsø, Stavanger and Oslo, whilst the smaller region of Kongsvinger had almost no growth at all. A general fall in the numbers of young retired was most noticeable in the regions of Stavanger and Kongsvinger, whilst a tremendous growth in the number of old retired was most pronounced in the regions of Stavanger and Kristiansand and especially in the region of Mo i Rana.

**Figure 3.1.b. Net-migration 1988-1998. Main regional centres Per 1 000 persons (Internal migration)**



**Figure 3.1.c. Net-migration 1988-1998. Smaller regional centres Per 1 000 persons (Internal migration)**



An overview of the migration processes during the last ten years can be read from the figures 3.1a - 3.1c, showing the net migration to each region in the period 1988-1998 from internal migration in Norway. The regions of Oslo and Stavanger showed positive net in-migration across the period. The Oslo-region experienced very high net in-migration in the second half of the 1990s with a somewhat declining tendency towards the end of the period due to high prices and volume problems in the housing market. The region of Bergen displayed negative net migration trends at the end of the 1980s, followed by near balance in internal

migration during the 1990s, whilst the region of Trondheim mostly experienced negative net migration throughout the 1990s. The intermediate classified regions of Kristiansand and Tromsø mostly experienced positive net in-migration during the first half of the 1990s. In the second half of the 1990s the Kristiansand region increased its net in-migration, whilst the region of Tromsø experienced a dramatic rise in the net out-migration. The latter phenomenon was typical of all of northern Norway in this period, partly due to earlier delay of out-migration in the first half of the 1990s.

Among the smaller regions, Kongsvinger showed positive net in-migration both at the end of the 1980s, and the 1990s, whilst the Ålesund region turned from migration loss to positive net in-migration in the second half of the 1990s due to a general tightening in the labour market. The region of Mo i Rana mostly experienced net out-migration, which like in other regions of northern Norway, increased during the second half of the 1990s.

### 3.2. Educational capacity and the structure of education

It is now widely accepted that the educational level of the population in employment age is of vital importance to the relative performance of the regional labour market. Well-developed facilities for secondary and especially post-secondary education are seen as important criteria for localisation of many knowledge based branches of the economy. The ability to adapt new technology is of immense importance in a labour market, which must internalise continual changes of technology whilst continuing to increase relative regional competitiveness.

Figure 3.2 shows the percentage of the resident population 16-64 years with secondary and post secondary education in each region in 1990 and 1997. Persons with secondary education represented approximately half of the population in most regions both in the initial period of the 1990s as well as in 1997. All regions except for that of Oslo increased their percentage of population with secondary education between 1990 and 1997. The highest rise in secondary education appeared in the smaller regional centres of Ålesund, Kongsvinger and Mo i Rana, resulting in the highest share of population with secondary education in 1997. The region of Oslo experienced the lowest percentage of persons with secondary education in both periods. One important reason for this is to be found in the high percentage of people with higher education, representing almost one third of the population cohort of 16-64 years in 1997. As expected, all regions increased their percentage of the population with higher education from 1990 to 1997. Measured by percentage points, there seem to have been a close race between the regions in terms of increasing their level of higher educated inhabitants, although a somewhat

Figure 3.2. Population 16-64 years with secondary and higher education in 1990 and 1997. By region of residence. Per cent

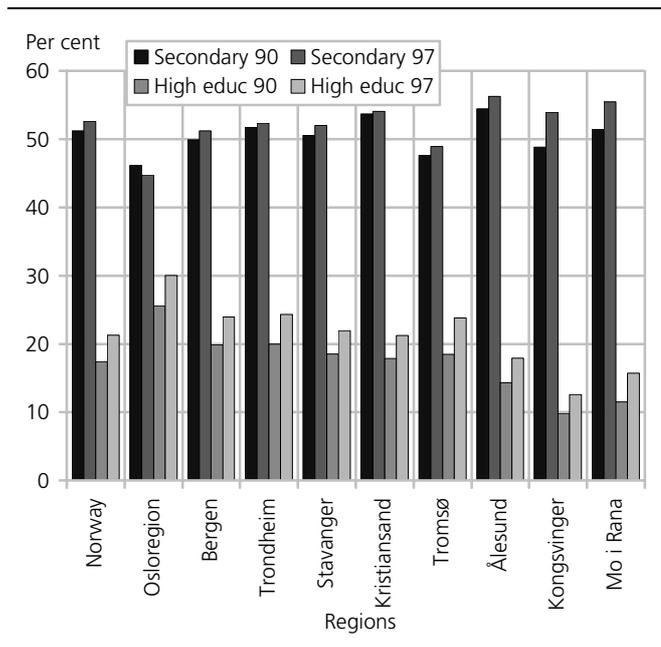
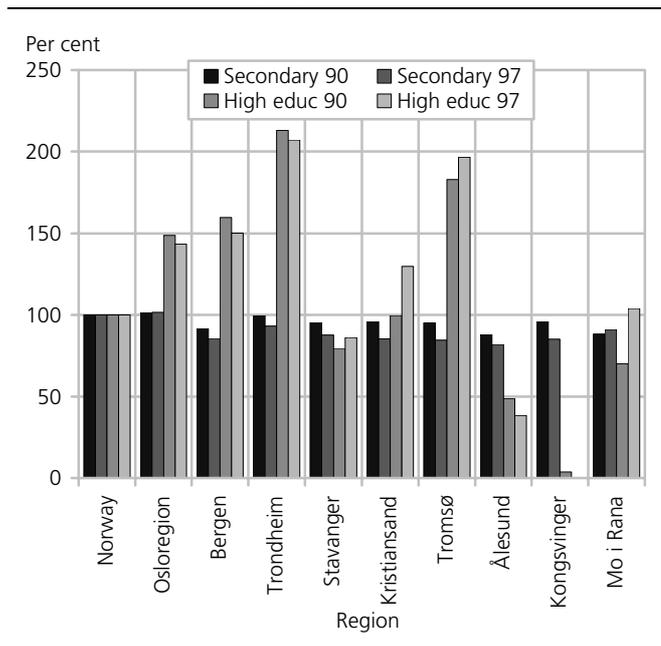


Figure 3.3. Rank of capacity in secondary and post-secondary education. By region. Index: Full capacity=100



higher rise in the university regions of Oslo, Bergen, Trondheim and especially Tromsø is to be noticed. Opposite to the situation among middle educated persons, the smaller regions of Ålesund, Kongsvinger and Mo i Rana showed the lowest rise of inhabitants with higher education in this period, maintaining their relative position on the bottom level of the scale relating to the share of population with higher education.

One way of indicating potential rises in educational levels across the regions, is to take into consideration

educational facilities. Regions with well-developed capacity of secondary schools as well as universities and high schools are expected to have advantages with respect to the share of population taking secondary and higher education. Figure 3.3 shows the capacity of places in the secondary school and in higher education. The rank of capacity is measured as all pupils and students in secondary school and in high schools and universities in the regions in relation to resident pupils and students in the regions. Full capacity is recognised by an index set at 100. For secondary schools, which are rather decentralised located in Norway, the rank of capacity is mostly close to 100. For higher education not surprisingly the rank of capacity is highest in the university regions of Oslo, Bergen, Trondheim and Tromsø. In the region of Trondheim, the number of students at university and high school is more than twice as high as that of the actual number of students residing in the region.

Another way of indicating potential increases in educational levels across the regions is then to take into consideration the number of persons under secondary and higher education. In figure 3.4, the resident population under secondary and higher education is measured in relation to the total population in the cohort 16-64 years in 1990 and 1997 respectively. In 1990 the highest share of population under secondary education was to be found in the smaller regions of Ålesund and Mo i Rana, whilst the lowest share was observed in the region of Oslo. Due to demographic reasons, the share of population under secondary education generally fell during the 1990s. This decrease was less noticeable in the regions of

Kristiansand and Stavanger, which showed the highest share of population under secondary education in 1997. It was a general rises in the share of population under higher education during the 1990s. The regions of Trondheim and Tromsø showed the highest share of students, but the increases of population under higher education was most noticeable in Tromsø. Whilst the national figures indicate higher share of population under secondary education than under higher education, the university regions of Oslo, Bergen, Trondheim and Tromsø all have relatively higher share of students in 1997. This confirms the hypothesis that well-developed capacity of higher education increases the rate of students among the settled population in a region. The relative low share of students in Oslo compared with the percentage of population with higher education (see figure 3.2), indicates, however, a clear positive net in-migration of persons with higher education.

### 3.3. Change of employment and the structure of production

There were remarkably small differences in total change of employment between most of the regions during the 1990s (see figure 3.5). The region of Kongsvinger was however an exception to this trend with a slight fall in employment between 1990 and 1997. All the other regions experienced a rise in total employment around or just above the national average. The highest growth in employment was to be found in the regions of Stavanger and Tromsø. Breaking down the total change by main sectors showed, however, some regional differences. The manufacturing sectors had a large increase in employment in the regions of

Figure 3.4. Population 16-64 years under secondary and higher education in 1990 and 1997. By region of residence. Percent

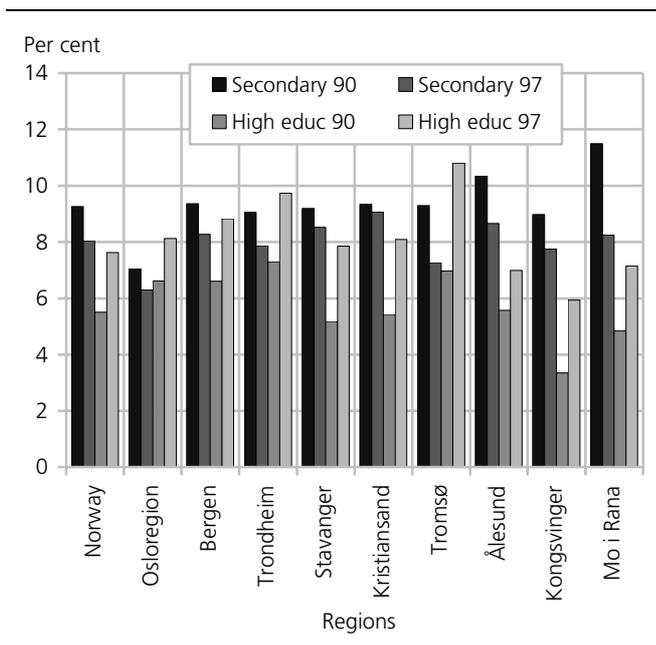
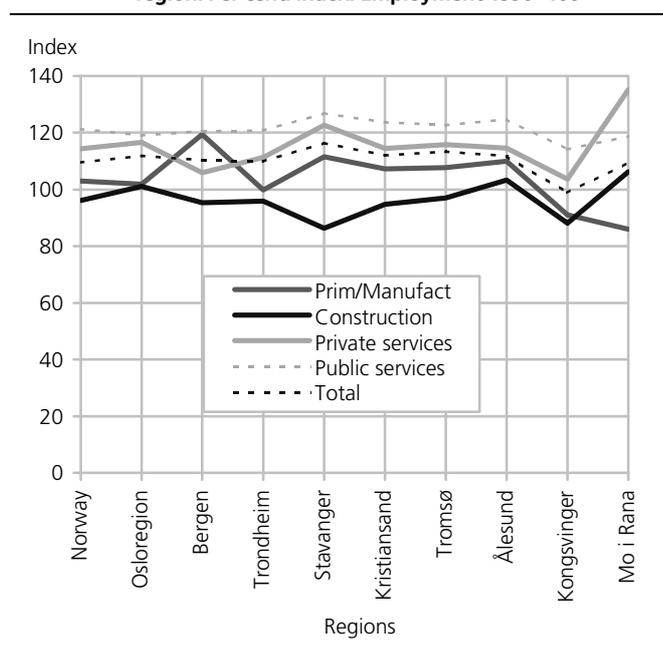


Figure 3.5. Change of employment 1990-1997 by main sector and region. Per cent. Index: Employment 1990=100



**Table 3.2. Structure of production in 1997 by sector and regions. Per cent employed by region of residence**

Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kristian- sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	3.3	4.1	4.3	5.5	3.3	7.6	8.4	8.7	7.5	6.5
2. Manuf. Raw material	0.8	1.2	1.1	1.3	4.3	0.1	0.9	1.7	8.2	2.3
3. Manuf. Labour int.	2.9	5.3	5.6	4.3	6.8	5.0	15.4	12.1	5.9	6.1
4. Machine/transport	1.2	3.8	1.5	5.5	3.7	0.8	6.0	2.2	0.9	3.3
5. Electro	1.2	1.6	1.1	1.0	0.3	0.1	0.8	1.2	0.4	1.1
6. Printing/publishing	3.0	1.6	1.2	1.6	1.2	1.0	0.9	1.4	1.5	1.6
7. Energy	1.2	4.4	2.0	9.0	2.1	1.3	1.5	1.3	2.3	2.5
8. Pharmaceutical prod.	0.4	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1
9. Construction	4.8	6.6	6.3	5.4	6.6	7.0	6.3	7.8	7.5	6.4
10. Retail	8.8	8.2	8.4	8.2	10.4	8.2	7.7	7.7	10.7	8.6
11. Hotel/restaurant	3.3	3.2	3.1	3.4	3.6	4.2	2.5	1.8	2.9	3.2
12. Wholesale	11.4	6.9	8.2	8.0	7.5	6.9	7.0	7.4	4.8	7.7
13. Transport	5.4	6.1	5.1	5.3	5.9	6.6	6.1	5.1	5.7	5.3
14. Post/telecom.	2.3	1.6	2.5	1.4	1.7	2.0	1.4	1.9	1.6	1.8
15. Finance	14.3	8.7	8.8	10.0	8.2	7.2	5.9	5.2	8.8	8.7
16. Inf. technology	2.0	0.8	1.0	0.9	0.6	0.6	0.4	0.5	0.6	0.9
17. Culture/sport	2.5	1.7	1.6	1.9	2.1	2.0	1.6	1.6	1.5	1.9
18. Basic education	4.9	6.2	7.2	6.1	7.7	6.1	6.3	6.1	7.7	6.3
19. High education/R&D	2.6	3.1	6.0	1.1	0.4	6.0	0.4	0.3	0.6	1.7
20. Health and Social	14.8	17.3	16.8	13.9	16.1	20.1	15.4	18.0	15.9	16.1
21. Public adm.	8.7	7.4	8.1	6.0	7.3	7.2	3.9	7.7	4.9	7.6
22. Unspecified	0.3	0.2	0.3	0.4	0.2	0.2	0.3	0.2	0.2	0.3
<b>All sectors</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Bergen and Stavanger, whilst the opposite was the case in the regions of Kongsvinger and Mo i Rana. After a depression in the economy during the first years of the 1990s, just some few regions succeeded to recover their 1990 level of employment in the construction sector seven years later. Both market and non-market services experienced a growth in employment far above the total national average. In most regions the public service sectors have been the main factor behind the employment growth from 1990 to 1997. The private service sectors showed, however, a remarkable rise in employment in the Stavanger- and Oslo-regions and not at least in the region of Mo i Rana.

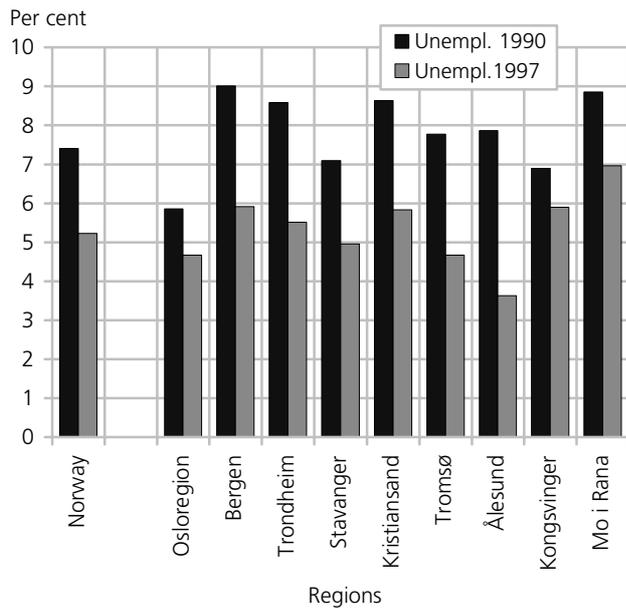
Table 3.2 shows the structure of production in each region in 1997 measured by employment. The structure definitely varies between the regions. Concerning the primary sectors and mining the most extensive employment is to be found in the region of Tromsø and the smaller regions of Ålesund, Kongsvinger and Mo i Rana. In manufacturing the region of Mo i Rana shows high shares of raw material based production, whilst the labour intensive production is remarkable important in the regions of Ålesund and Kongsvinger. The energy sector has an important position in the Stavanger- and Bergen-regions, mostly due to oil-based production, whilst printing and publishing shows its central location with highest share in the Oslo-region. The central location is also remarkable in service branches as wholesale, finance and information technology, whilst higher education/research and development is, as could be expected, most important in the university regions. Health and social services

represents the largest percentage of employment in all regions, with exceptional high figures for the region of Tromsø. In all other sectors the structure of production is more evenly distributed across the regions.

### 3.4. Unemployment and labour market participation

Unemployment figures and labour market participation rates give a good illustration of the regional labour market situation. In the 1990s it was observed great regional differences in unemployment. Figure 3.6 shows unemployed in per cent of the labour force in the age cohort 16-64 years in 1990 and 1997. It is important to remark the definition of unemployment, which in the analysis include all persons with at least one month of unemployment in each year. The figures thus become higher compared with the average number of unemployed during a year. In 1990 the Oslo region showed the lowest unemployment, especially due to relative low unemployment figures in the surrounding county of Akershus. Other central regions experienced as high unemployment as the smaller regions at the beginning of the 1990s. As could be expected unemployment fell from the recession period in 1990 up to the boom period of 1997. This was especially the case in the region of Ålesund, but also the central regions of Bergen and Trondheim and the intermediate classified regions experienced a strong fall. In 1997 the region of Ålesund showed the lowest unemployment figures, whilst Mo i Rana still had a considerable unemployment rate.

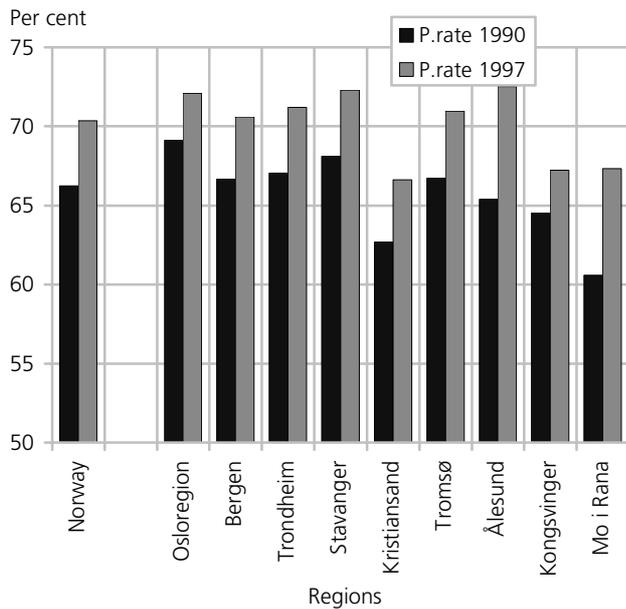
**Figure 3.6. Unemployed in 1990 and 1997 in per cent of the work force 16-64 years. By region<sup>1</sup>**



<sup>1</sup> Unemployment comprises all persons unemployed at least 1 month per year).

Figure 3.7 shows the labour market participation rate in 1990 and 1997 measured as employed in per cent of the population in the age group 16-64 years. It is important to remark that the employment figures are somewhat lower than in official statistics, due to the fact that all employed with at least 6 months of annual unemployment are defined as unemployed. At the beginning of the 1990s the labour market participation rate was highest in the Oslo-region and lowest in the region of Mo i Rana. The labour market participation rate was also remarkable low in the intermediate classified region of Kristiansand, which was due to especially low female labour market participation. It was a general increases in the labour market participation rate during the 1990s. Beside the regions of Oslo and Stavanger the region of Ålesund showed a remarkable high participation rate in 1997. Besides the smaller regions of Mo i Rana and Kongsvinger, the Kristiansand region still showed far below average participation rate.

**Figure 3.7. Employed in per cent of population 16-64 years in 1990 and 1997. By region<sup>1</sup>**



<sup>1</sup> Special definitions of employment.

## 4. Empirical analyses of labour market mobility

The performance of regional labour markets has been the main approach of this analysis. As mentioned in the introduction, the performance of regional labour markets is basically analysed in three settings. Firstly performance is investigated through the ability of the local labour market to adapt to and facilitate structural change in the local economy by use of some specified labour market mobility measures. Secondly the ability to increase the input of and the returns to human capital investments in different sectors of the regional economy is analysed by using changes in average educational levels, and changes in incomes. Finally we reflect on how the local labour markets perform through different activation rates to employment, both from gross streams within the local labour markets, and through job recruitment from net internal migration. The sections below give some illustrations to how these performances have been functioning in some Norwegian regions in the 1990s, exemplified by years of recession and economic upswing.

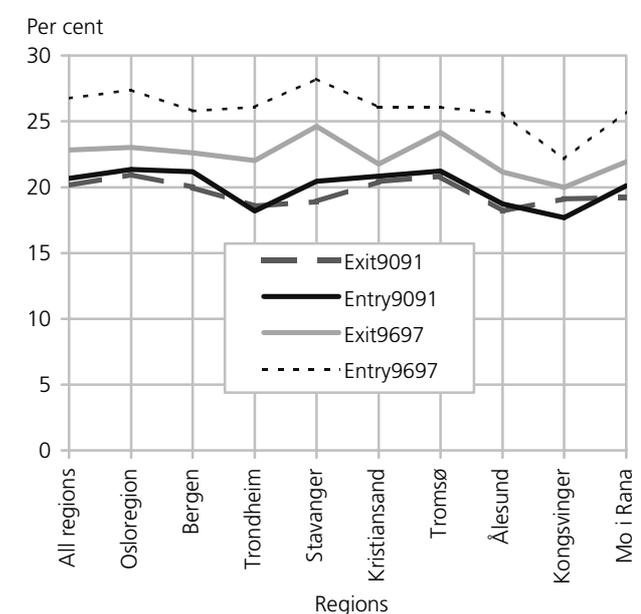
### 4.1 Adaptability to structural change

Increased labour mobility may be of importance for reaching the targets of the labour market policy, that is to say employing as large part of the work force as possible in ordinary employment. Furthermore high mobility is expected to satisfy employers' need to fill vacancies with suitable labour as quickly as possible in a flexible labour market undergoing continual structural change. On the other hand, regional policy clearly states the necessity that such processes must be governed in such a way as not to disturb the regional balances, and that the mainline in the settlement patterns remains unchanged. Hypotheses are raised with the expectation of increases in labour market mobility as economic recession recedes and we move to more affluent years with steady economic growth. In the sections below we illustrate some regional labour mobility analysed by a selection of chosen mobility concepts.

#### 4.1.1. Vacancy filling

As documented by earlier analyses, e.g. Stambøl et al. (1999), the necessary recruitment to jobs is to a certain extent a function of the leaving processes in the

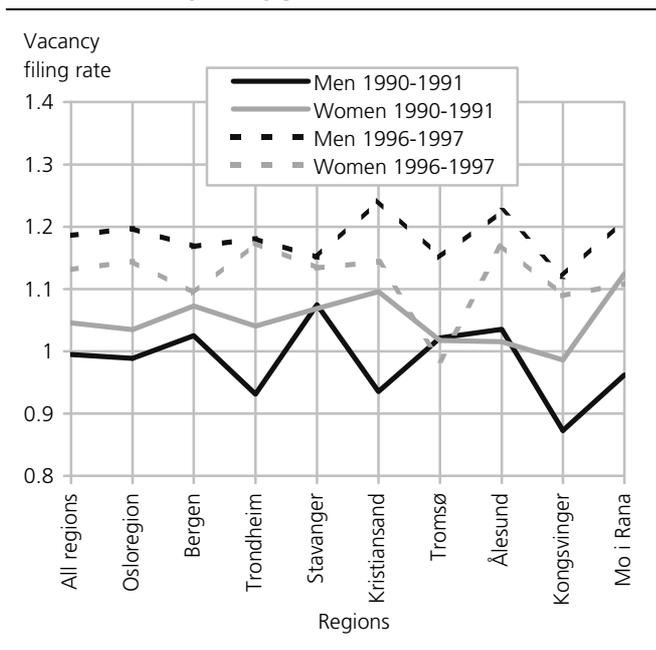
Figure 4.1a. Total exits and entries in per cent of stock of employed in 1990-1991 and 1996-1997. Employed persons 16-64 years. By regions



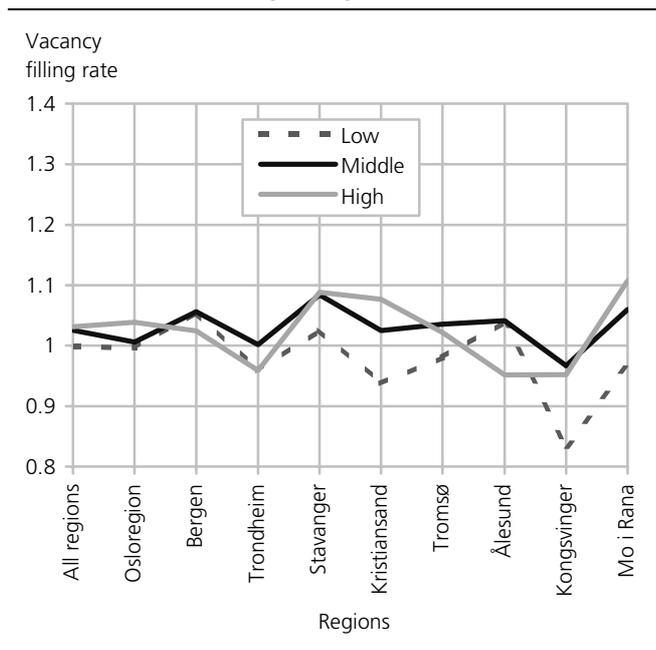
regional labour markets. The main part of the recruitment is thus a replacement of employed leaving a job mostly due to transitions to other jobs in the same local labour markets, but also because of out-migration from jobs. In addition the recruitment should fill in the vacancies emerging from employed changing their status in the labour market, e.g. to unemployment, further education, retirement or in another way leave the work force. As illustrated by the vacancy account in section 2, these replacement processes are corrected for annual growth or decline of employment in each local labour market.

In figure 4.1a total exits and entries in each of the regional labour markets are shown in per cent of total stock of employed the first year in each of the time periods 1990-91 (recession) and 1996-97 (economic upswing). The figures surely confirm the hypothesis expecting higher labour mobility in an economic upswing compared to that of a period of recession.

**Figure 4.1b. Vacancy filling rate 1990-1991 and 1996-1997. Persons 16-64 years. By gender**



**Figure 4.1c. Vacancy filling rate in the recession period 1990-1991. Persons 16-64 years. By education**

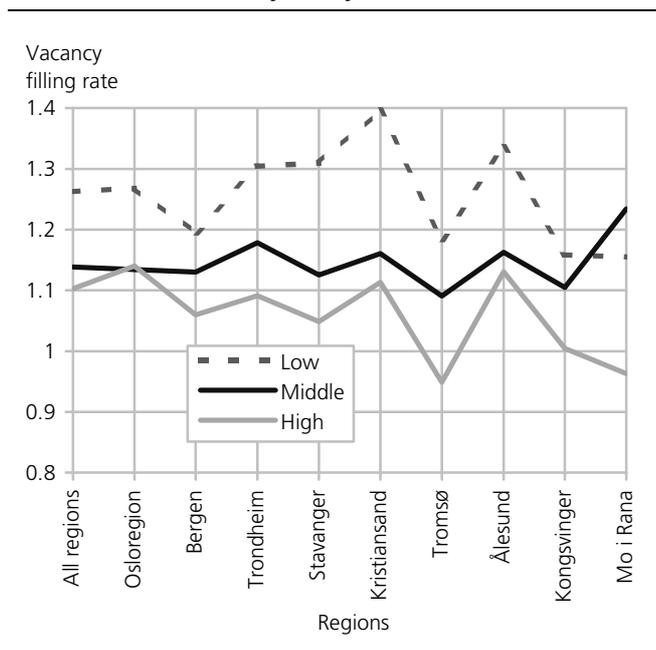


This is generally true both concerning total exits as well as total entries. In the period of recession the highest levels of labour mobility were observed in the Oslo region and in the northernmost region of Tromsø, both of which showed a slight increase in employment. In spite of showing the highest growth of employment in this period, the Stavanger region experienced below average labour mobility, mostly due to relative low exits from employment. In a recession period, which also affected the most central labour markets, the capital region of Oslo showed slightly higher exits from and entries to jobs than the regional average. The Kongsvinger region was most affected by the recession, showing far below average entries to jobs.

In the period of economic upswing the need for recruitment increased considerably across all regions. The highest percentage of entries was observed in the regions of Stavanger and Oslo, both showing above average exits from employment, which thus had to be more than replaced. Strongest net employment growth took, however, place in the regions of Ålesund, Oslo and Kristiansand. Due to higher exits from employment in the capital region, the need for new entries were somewhat higher compared with the two other regions. Like in the recession period, the region of Kongsvinger also experienced the lowest percentage of entries to jobs during the economic upswing. This was partly due to low exits from jobs, but also due to relative low employment growth.

In Figure 4.1b the total labour mobility is broken down by gender. The results are presented using vacancy filling rates measured by entries to jobs in relation to exits from jobs (see section 2). Figures above 1 reveal

**Figure 4.1d. Vacancy filling rate in the upswing period 1996-1997. Persons 16-64 years. By education**



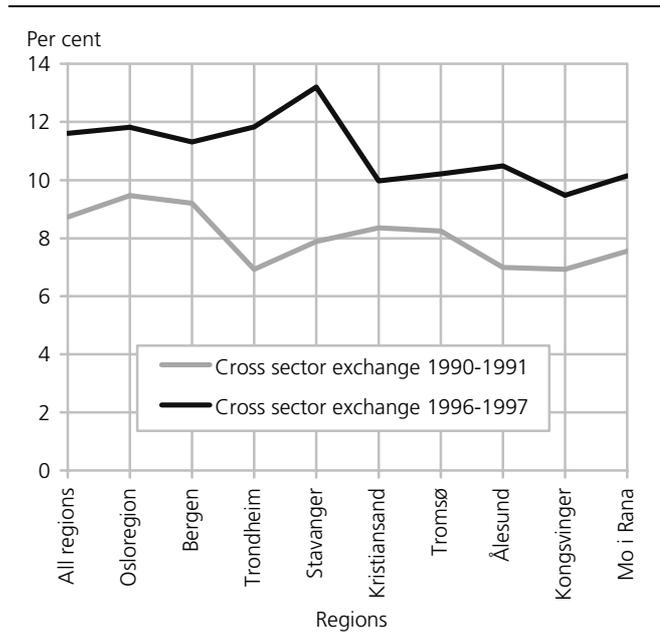
employment growth, whilst figures below 1 represent employment decline. Except for the regions of Stavanger, Tromsø and Ålesund the recessionary period mostly affected employed males, who therefore experienced a decrease in employment across most regions. In a majority of regions the economic upswing years of 1996-97 considerably favoured male employment, showing a significantly higher excess of entries to jobs compared to that of employed females. Especially in the region of Tromsø the excess of entries to jobs by employed males were dominating, whilst the region experienced a decline in the female employment.

In Figures 4.1c and 4.1d the total labour mobility is broken down by educational levels. The recession years in the beginning of the 1990s mostly affected the lower educated echelons of those in employment (Figure 4.1c). This was most dramatically in the region of Kristiansand and especially in the region of Kongsvinger, where the entries to jobs by low educated persons were about 17 per cent below the exits from jobs. The regions of Bergen and Ålesund differed, however, from the other regions with a labour market recession that mostly affected the higher educated employed. Correspondingly, the employment increase in the upswing period in economic activity in the second half of the 1990s, was strongest almost across the board for those in the lower education brackets, who thus enjoyed a much higher excess of entries to jobs compared with that of middle and higher educated persons (Figure 4.1d). The region of Mo i Rana was the only one deviating from this pattern, showing higher excess of entries to jobs among middle educated persons. One explanation of the well developing labour markets for lower educated persons was to be found in the fact that this group was generally most affected in the recession years earlier in the 1990s, re-entering the labour markets as employed in the second half of the 1990s. These results may as well reveal remarkably high labour market participation, forcing employers to search for potential employees from the most marginal sections of the work force. On the other hand, it is, however, important to notice the weak labour market performance of the higher educated in the northernmost regions of Tromsø and Mo i Rana during the economic upswing period. In both regions persons with higher education background showed an excess of exits from jobs, revealing a decline of employment for this group. The observed change in employment by education is partly explained by changes in the structure of production, which clearly varies across the regions.

#### 4.1.2. Cross sector exchange

As mentioned in the previous section, cross section exchange, or in other words local job-to-job mobility between sectors, is expected to take up a large part of the total labour mobility. As with 'total mobility', hypotheses are made in the expectation of an increase in cross section exchange when turning from periods of economic recession to periods of economic growth. In figure 4.2 we thus illustrate how the level of local cross sector exchange differed across the regions in the two investigation periods. As described in section 2 above, the local cross section exchange is measured by a rate, showing the number of employed changing sector in the local labour markets between the first and second year in each period in relation to the total stock of employed persons. Compared with total labour market mobility in the figure 4.1a above, local cross section exchanges comprise slightly fewer than half of the total mobility in and out of employment. Figure 4.2 shows a

Figure 4.2. Cross sector exchange in per cent of stock of employed in 1990-1991 and 1996-1997. Employed population 16-64 years. By region

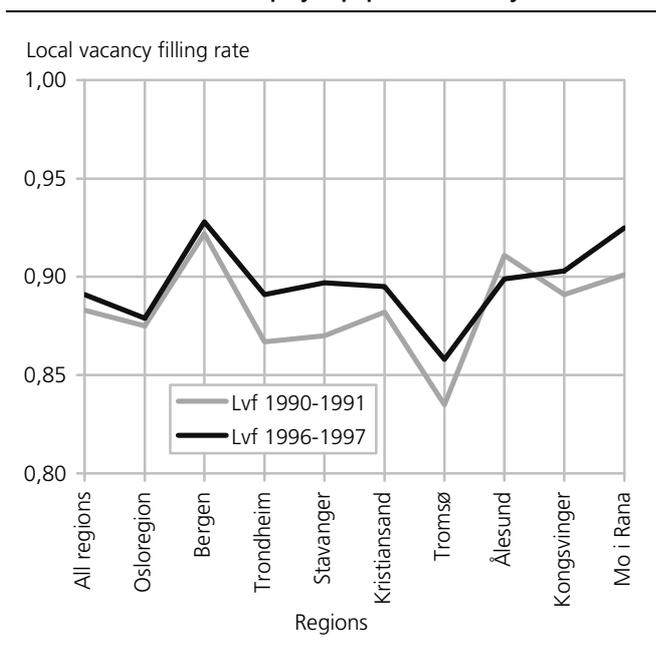


general increase in the local cross section exchange when turning from economic recession to periods with economic upswings. There were, however, some regional differences in the change of cross section mobility, showing relatively small variations between the time periods in the regions of Kristiansand and Tromsø, while the upswing period revealed a considerable higher cross sector exchange than in the recession period in Stavanger, Trondheim and Ålesund. The highest cross sector mobility during the recession period was found in the regions of Oslo and Bergen, while the economic upswing period showed highest local job-to-job mobility in Stavanger and the three large regions of Oslo, Bergen and Trondheim.

#### 4.1.3. Level of self-sufficiency in local labour markets

A well functioning regional labour market is in many ways dependent on a sufficient local supply of workers to fill in the continually emerging vacancies. On the other hand, a well functioning local labour market will be attractive for potential in-migrants as well as functioning as a buffer to potential out-migration. To examine this further, the level of self-sufficiency in the local labour markets are measured by a local vacancy filling rate, defined as the local recruitment to jobs in relation to the total recruitment to jobs in each region (see section 2). Figure 4.3 shows the level of self-sufficiency in the recession period 1990-91 as well as in the period of economic upswing in 1996-97 correspondingly. The general trend is a somewhat higher level of self-sufficiency in the boom period compared with the recession years at the beginning of the 1990s. Recent investigations, e.g. Stambøl et al.

**Figure 4.3. Local vacancy filling rate (Lvf) 1990-1991 and 1996-1997. Employed population 16-64 years.**



(1997, 1999), and in the sections below, reveal however that migrants display a very high rate of competitiveness in the labour markets. This effect is expected to be even stronger in a recession period, when the competition for jobs among suppliers is increasing. Although the geographical labour market mobility increases from a recession to a boom period, competition in the labour market itself is gradually shifting from the supply side to the demand side, raising the possibility and also the necessity that other parts of the workforce attain employment. The different level of self-sufficiency between the time periods appearing from figure 4.3 may reflect these differences in labour market behaviour, in particular favouring the relative position of migrants in periods of recession.

Not surprisingly, the regions normally showing the highest gross-migration figures also show the lowest level of self-sufficiency in the local labour markets. The regions of Oslo and Tromsø generally have high supply of in-migrants, which in competition with the local labour force results in high shares of in-migrants to jobs. On the other hand, the smaller regions of Ålesund, Kongsvinger and Mo i Rana, all showed rather high level of self-sufficiency in their local labour markets. Due to relatively low in-migration to jobs and above average out-migration from jobs, these regions are very dependent on their own labour force in filling in the emerging vacancies. Somewhat more surprisingly, the same tendency was to be found in the local labour market of Bergen, which basically was due to relatively low in-migration to jobs. The local labour market of Ålesund was the only one showing higher level of self-sufficiency in the recession period. The main reason is to be found in an increased tightness in

this local labour market in the second half of the 1990s, turning the net-migration to jobs from a clear deficit in the beginning of the decade, to a surplus of migrants to job in the upswing period.

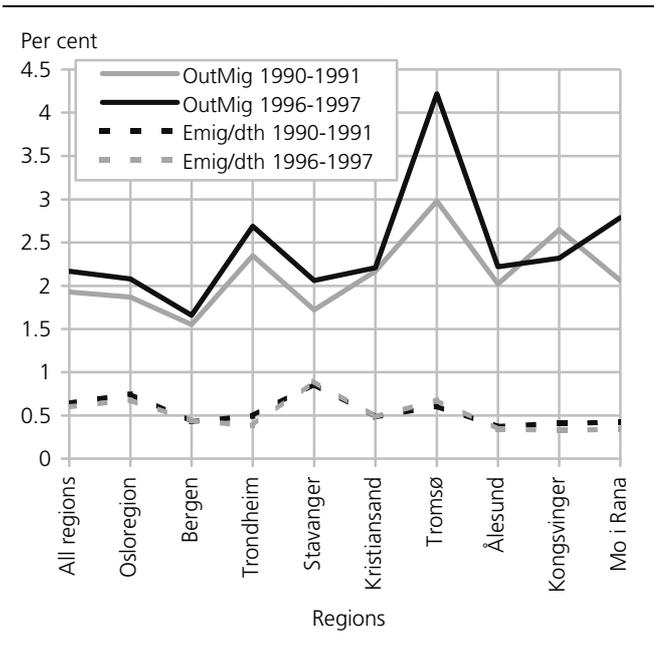
#### 4.1.4. Job exports and imports by labour migration

An indicator of regional competitiveness may be found in the gross streams in and out of the local labour markets due to geographical mobility. As mentioned in the section above, a well-developed and well-functioning regional labour market will attract in-migrants as well as reduce the tendency of out-migration. Investigations of labour mobility through both gross in- and out-migration are shown in the figures 4.4a and 4.4b. In addition to internal migration in Norway, the investigation includes labour mobility through immigration and emigration/death. In the age group 16-64 years the death figures will, however, be of marginal importance. All labour migrants are measured in per cent of the stock of employed the first year in each of the time periods.

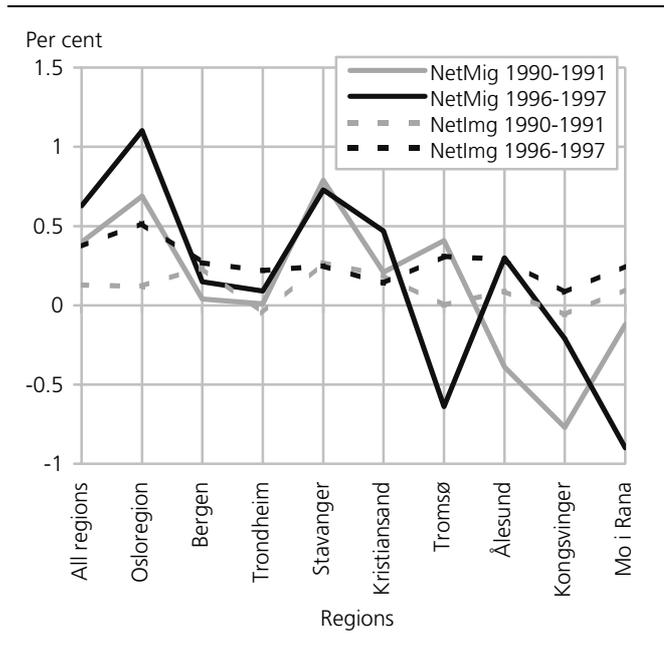
Figure 4.4a shows the level of exits from jobs through internal out-migration and emigration/death in times of recession and economic upswings. It was almost generally higher exits through out-migration during the upswing period, whilst there were small differences between the periods in the level of emigration/death. The reason for higher internal migration from jobs during boom periods is to be found in the tendency towards increased migration from recession to economic upswings. The region of Kongsvinger differed, however, from all other regions with higher out-migration from jobs during the recession period. The region of Tromsø showed the highest out-migration from jobs in both periods, and the transition from jobs through migration was especially dramatic during the economic upswing. Also the regions of Trondheim and Mo i Rana experienced high out-migration from jobs during this period. On the other hand, the region of Bergen had far below average out-migration from jobs in both periods. Concerning emigration from jobs Stavanger showed the highest figures both during recession and the upswing period.

Similar figures for internal in-migration and immigration to jobs are shown in figure 4.4b. Not surprisingly the Oslo-region did experience high in-migration to jobs. This was most noticeable during the economic upswing in the second half of the 1990s. Even higher figures were to be found in the region of Tromsø, revealing a generally high labour mobility through migration in this region. As like for out-migration from jobs the region of Bergen also showed the lowest in-migration to jobs, revealing a very low level of geographical mobility in the labour market in this region. Immigration to jobs was most comprehensive in the regions of Stavanger and Oslo and in the upswing period also in Tromsø.

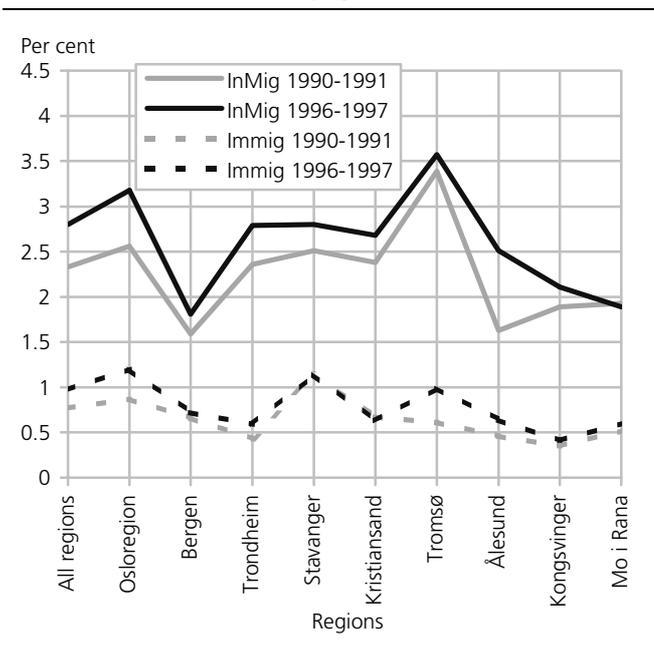
**Figure 4.4a. Gross out-migration and emigration/death 1990-1991 and 1996-1997. Employed population 16-64 years. In per cent of stock of employed**



**Figure 4.4c. Net internal migration and net immigration in 1990-1991 and 1996-1997. Employed population 16-64 years. In per cent of stock of employed**



**Figure 4.4b. Gross in-migration and immigration 1990-1991 and 1996-1997. Employed population 16-64 years. In per cent of stock of employed**



to make to the employment net change, showing an almost balanced net migration to jobs in both periods. Net immigration to jobs did, however, contribute somewhat to the employment growth during the economic upswing period. During recession the internal migration did contribute negatively to job growth in the smaller regions of Ålesund, Kongsvinger and Mo i Rana. In the two latter regions and in the regions of Tromsø this was also the situation during the 1996-97 period. The net immigration to jobs during the upswing period did, however, compensate somewhat for the net loss through internal migration.

In the figures 4.4d-f internal net-migration in each region is broken down by four different status groups. In the presentation the net migration between employment, those under education, unemployment and other status groups outside the work force is then described in sixteen different columns. Well-functioning regions are expected to have positive net migration to employment from all other status groups, positive net migration to education but negative net-migration to unemployment. Positive net-migration to other status groups outside the workforce may also have a positive interpretation, though if such migration relates to transitions from employment in other regions, there may be some negative aspects to such mobility.

The net result of all geographical labour mobility is to be found in figure 4.4c. The capital region of Oslo, and the region of Stavanger showed the highest net-migration to jobs both during recession and the boom period. In the Oslo region the net immigration to jobs did also contribute considerably to the employment increase during the economic upswing period. In the other central regions of Bergen and Trondheim the internal migration processes had a minor contribution

In the three most central regions (figure 4.4d) it is clear that different logics of labour migration were involved. The relatively high net migration to jobs in the Oslo region was mainly due to job-to-job migration in both periods. It was however partly explained also by a visible net-migration to jobs from education,

especially in the boom period. In relation to labour migration, the net effect of education-to-education migration was rather weak in the capital region. This is due to the fact that many students did not register their migration before the end of the studies, or were simply waiting until they change their status to employed. The regions of Bergen and Trondheim experienced clear negative job-to-job migration during the recession. During the boom period however Trondheim still exhibited a clear pattern of negative job-to-job migration, whilst Bergen showed a positive albeit minor, effect from job-to-job migration. The most comprehensive contribution to job recruitment through migration in these regions descended from education-to-job migration in both periods. On the other hand both regions showed clear negative effect of job-to-education migration, especially in the periods of economic upswing. It is, however, worth noticing that the Trondheim region showed substantially higher net effects of education-to-education migration compared with the other university regions.

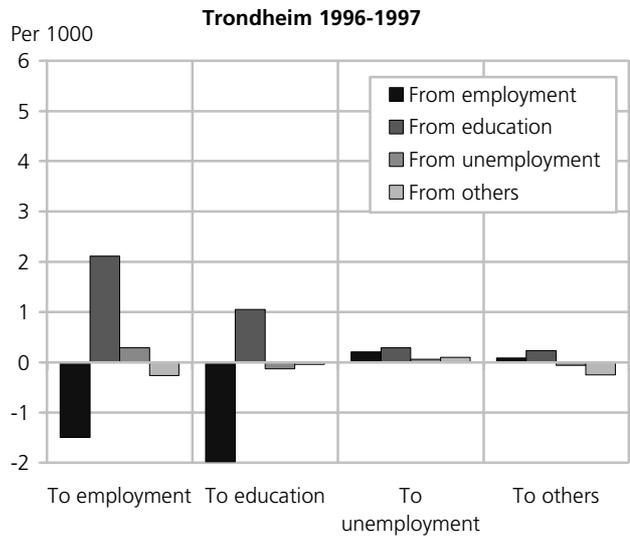
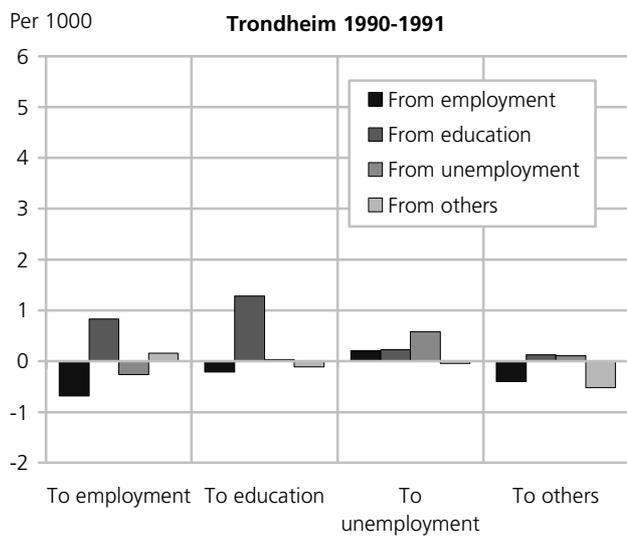
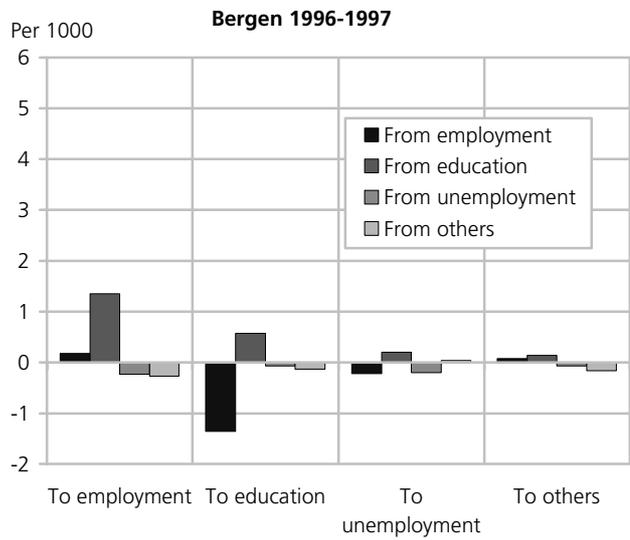
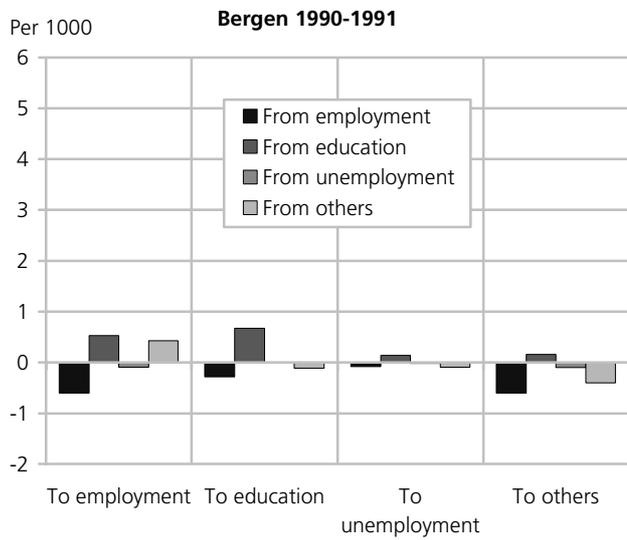
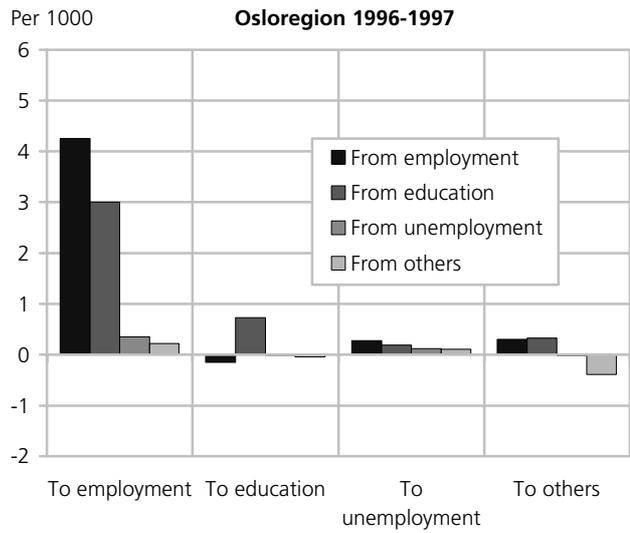
In the middle sized regional centres of Stavanger, Kristiansand and Tromsø (figure 4.4e) both similarities and differences emerged in terms of the migration patterns between the status groups. During the recession period at the beginning of the decade, positive job-to-job migration existed across all three regions. In the boom period this effect still remained in the two first regions, whilst the region of Tromsø experienced a strong negative effect of job-to-job migration, which then actually represented a clear majority of the total net loss through migration in this region. The net effect of education-to-job migration did contribute to job growth in all three regions, not surprisingly somewhat more during the boom period and somewhat more in Stavanger and Kristiansand compared with Tromsø. Somewhat surprisingly all regions experienced a visible net effect from migration to jobs among persons from outside the labour force during the recession period. This effect was, however, negative both in Stavanger and Tromsø during the boom period. On the other hand all regions had net loss through job-to-education migration. This effect was visible higher in the period of economic upswing, and somewhat more comprehensive in the region of Kristiansand. In this region the net loss of employed migrants who left the labour force contributed considerably to the net out-migration in the recession period. Finally both Stavanger and Tromsø experienced positive net effects of migration from persons who stayed outside the labour force in the recession period, while the region of Kristiansand attracted this group during the boom period.

In the smaller regional centres of Ålesund, Kongsvinger and Mo i Rana (figure 4.4f) a somewhat different structure was found to exist in terms of the

contribution to net out-migration during the recession period. In the region of Kongsvinger, negative job-to-job migration was clearly the main explanation for net migration losses. In the other regions it was job-to-job and job-to-education, as well as transition from job-to-outside the work force, that mostly contributed to negative net-migration. In the period of economic upswing, all three regions experienced negative effects from job-to-education migration, but also job-to-job migration contributed negatively to employment growth in Kongsvinger and especially in Mo i Rana. In this period Ålesund had positive effects from job-to-job, education-to-job and unemployment-to-job migration. Ålesund and especially Kongsvinger did also to a certain extent attract migrants from outside the labour force.

In this more detailed presentation of net migration we have only touched upon the net effect of migration to and from unemployment. These net effects were however, less visible compared with the net effects from transitions between several other status groups. One reason for this was that the number of unemployed was far below the number of persons either in education, or outside the workforce, and particularly when compared with the actual number of the employed. During the recession period, however, all regions except for Stavanger, exhibited a negative net effect from unemployment-to-job migration. This net loss was most pronounced in the region of Kongsvinger. During the economic upswing however, Oslo, Trondheim, Stavanger, Kristiansand and especially Ålesund experienced positive net effect of unemployment-to-job migration. Concerning the opposite transition of job-to-unemployment migration the regions of Oslo, Trondheim, Kristiansand and Kongsvinger experienced net in-migration of this group during the recession, thus contributing to increased unemployment in these regions. During the economic upswing the net effect of job-to-unemployment migration did contribute to increase the unemployment in Oslo, Trondheim, Stavanger, Kristiansand and Ålesund, but in all these regions except for Stavanger, this effect was weaker than the positive effect stemming from unemployment-to-job migration. Considering the net effect of migration among persons that stayed unemployed during both years in each of the investigation periods, all regions except for Bergen and Ålesund experienced net in-migration during the recession. During the period of economic upswing, the regions as Oslo, Kongsvinger and especially Mo i Rana showed visible accumulation of unemployment-to-unemployment migrants. These results are in accordance with earlier findings (see Stambøl et al.1999) that much of the positive effect of unemployment-to-job migration is often counterbalanced by job-to-unemployment and unemployment-to-unemployment migration.

**Figure 4.4d. Net migration by different status groups 1990-1991 (recession) and 1996-1997 (economic upswing) in the main cities of Norway. Per 1000 population 16-64 years**



**Figure 4.4e. Net migration by different status groups 1990-1991 (recession) and 1996-1997 (economic upswing) in intermediate regional centres in Norway. Per 1000 population 16-64 years**

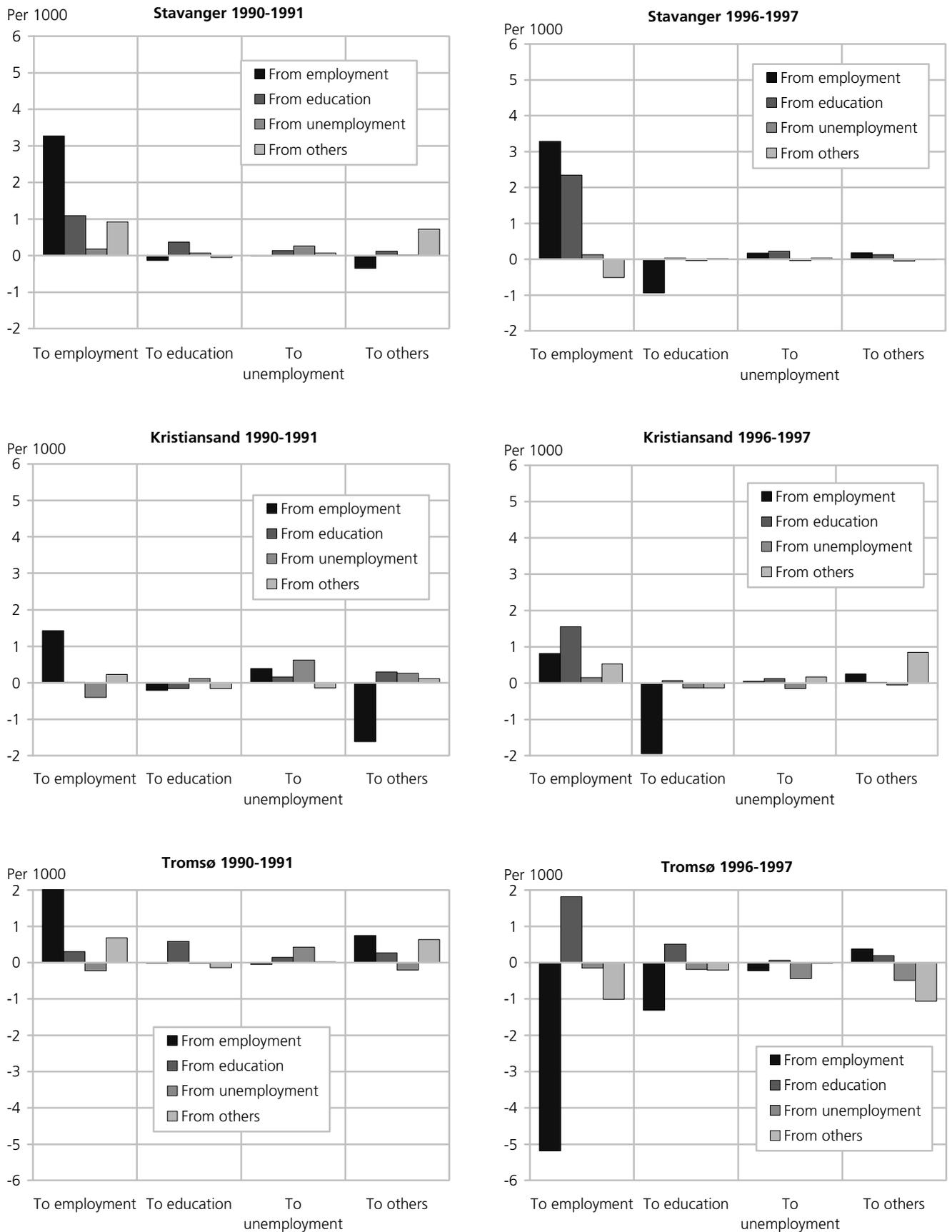
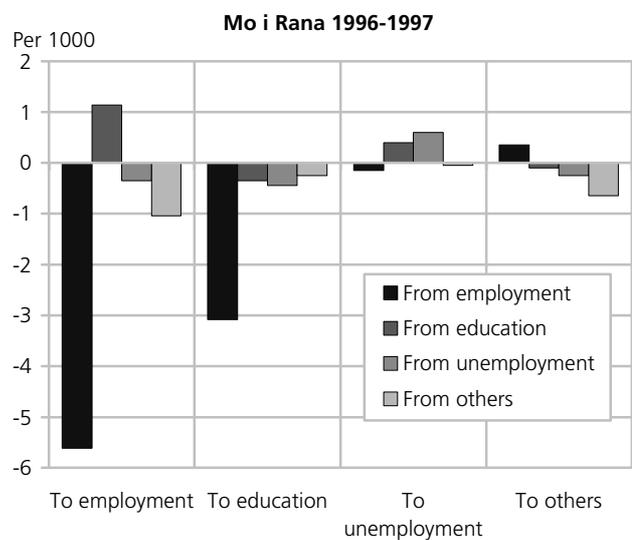
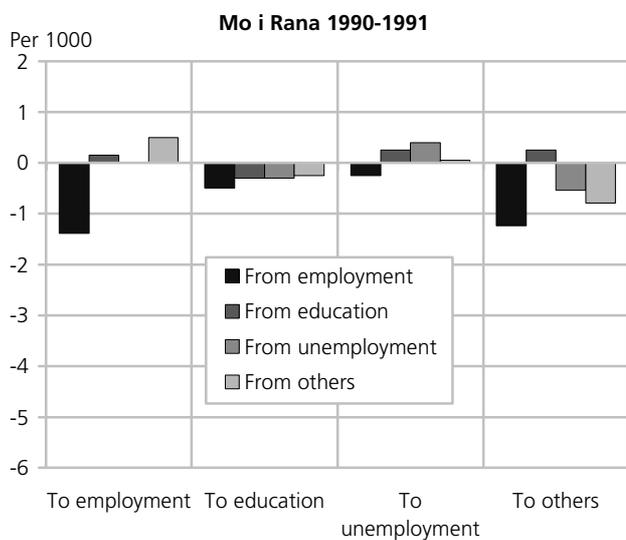
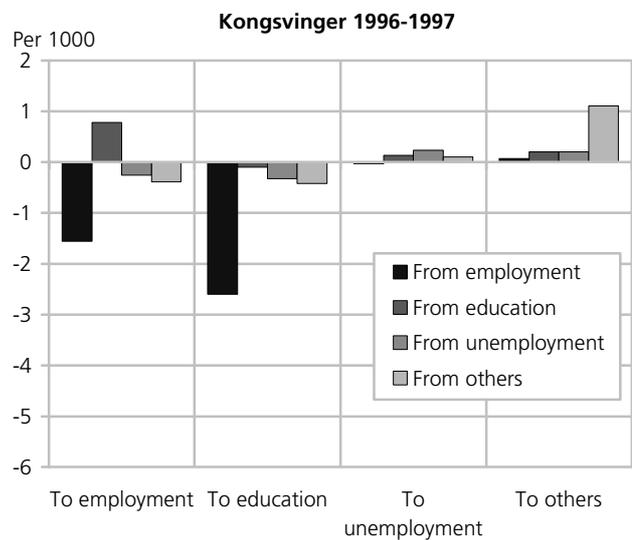
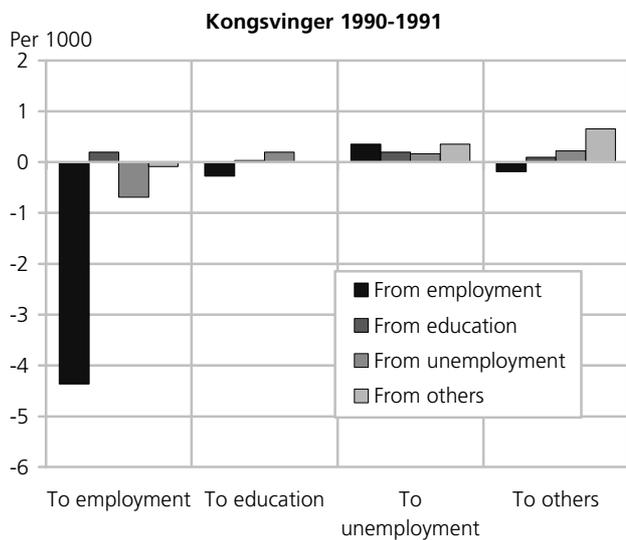
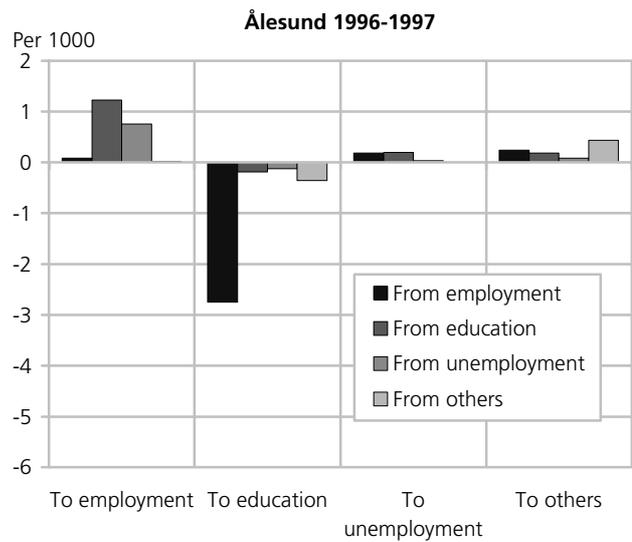
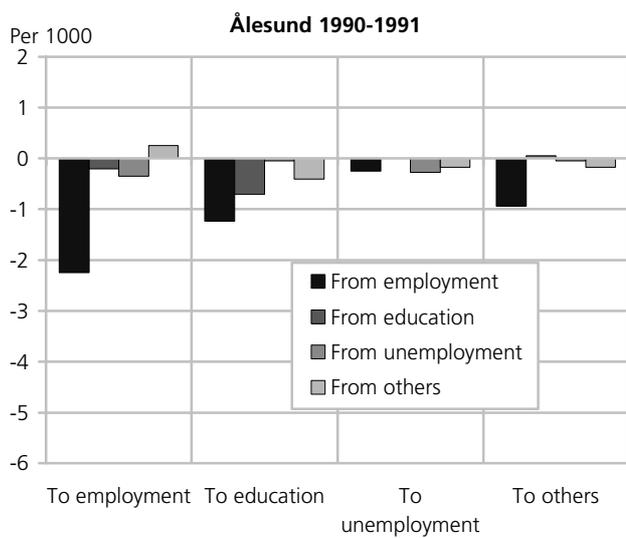


Figure 4.4f. Net migration by different status groups 1990-1991 (recession) and 1996-1997 (economic upswing) in smaller regional centres in Norway. Per 1000 population 16-64 years



## 4.2. Input and economic returns to human capital investment

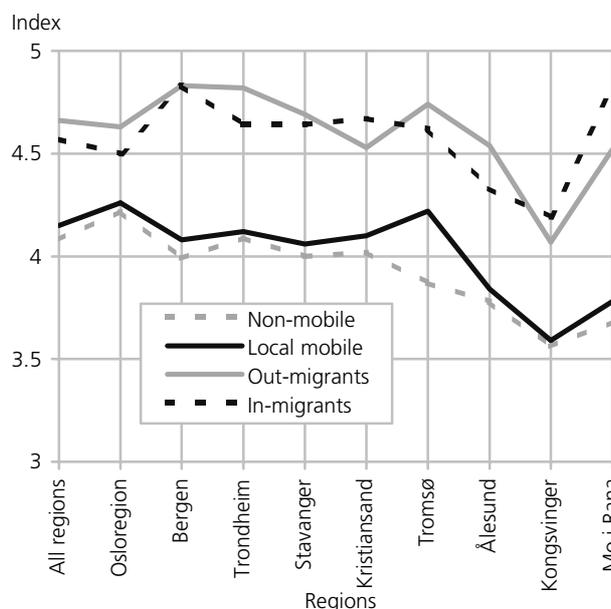
In section 4.1 above we have analysed the quantitative aspects of regional labour mobility measuring the gross and net streams of intra- and interregional mobility by the number of persons. In this section we examine the "qualitative" impacts of labour mobility between regions and sectors. As has already 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. 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 sectors that actually give the best return. This section is thus stressing two main aspects of these topics, first analysing the regional and sectional competitiveness for the most qualified labour, and second, analysing the return to human capital by help of changes in personal income.

### 4.2.1. Changes of educational level. "Brain-drain" or "brain-gain"?

For an examination of the two concepts "brain-drain" (a relative loss of qualified persons) and "brain-gain" (a relative gain of qualified persons), we have introduced a concept of average education (for definition see section 2 above). As described in section 3.2, 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. In this section we examine which status groups contribute most to the rise of the educational level among employed in each region. In Figure 4.5a the average educational level of employed migrants, local mobile employed and local non-mobile employed are shown during the recession years in the beginning of the 1990s. It was a clear tendency that the local mobile employed had a somewhat higher educational level compared to that of the local non-mobile employed. On the other hand employed in- and out-migrants showed a considerably higher educational level when compared with employed stayers. This indicates that the migration streams of employed persons include those of a high qualification level in addition to the actual numbers represented. This indicates that the regional competition for employed migrants becomes even more important. Analysing the "brain-gain", "brain-drain" through regional migration in this way, it is noteworthy that the Oslo region experienced such a "brain-drain" of employed persons in this period, showing higher educational level among employed out-migrants compared with employed in-migrants. As earlier described, the recession period hit the capital region and other central regions as much as other regions. This can also be seen from a "brain-drain" of employed migrants in regions as Trondheim,

Stavanger and Tromsø, while the region of Kristiansand and the smaller regions of Kongsvinger and Mo i Rana experienced a "brain-gain" of employed migrants in these years.

**Figure 4.5a. Average educational level 1990-1991 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Index: Calculated classification of education**



**Figure 4.5b. Average educational level 1996-1997 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Index: Calculated classification of education**

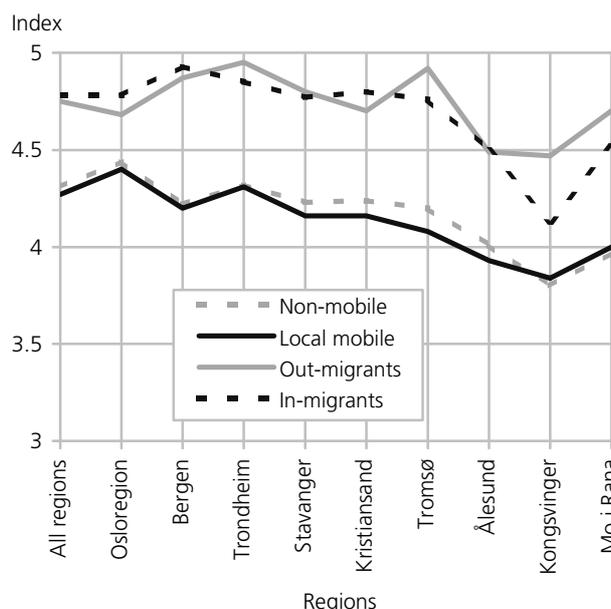
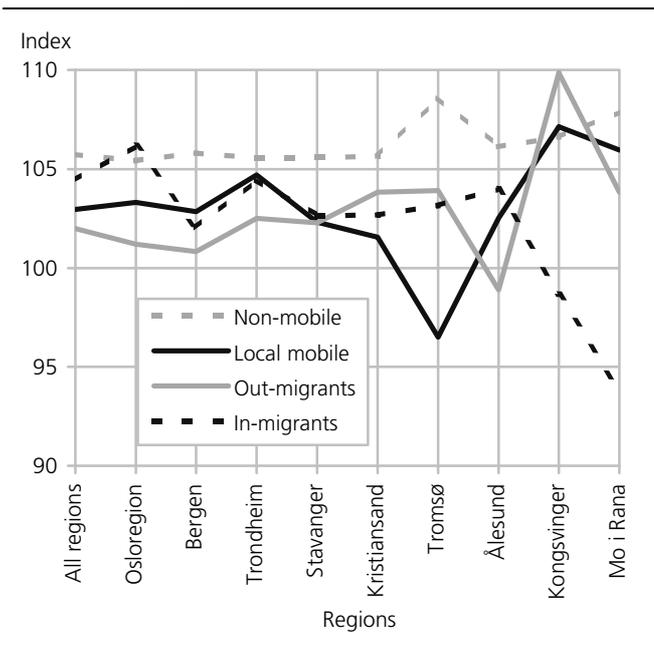


Figure 4.5b shows similar results from the period of economic upswing in the second half of the 1990s. Like in the recession period, the educational level of employed migrants was considerably higher than that in the category "other employed". The central regions of Oslo and Bergen in addition to the region of

Kristiansand all then showed a "brain-gain" through the migration process, whilst the regions of Tromsø, Kongsvinger and Mo i Rana experienced a "brain-drain" correspondingly. Considering the majority of employed persons who did not migrate, the educational level now seemed to have been somewhat higher among non-mobile compared with local mobile. This may be even better illustrated from figure 4.5c, which shows the average educational level among employed in the boom period 1996-97 in relation to the average educational level among employed in the recession period at the beginning of the 1990s. Looking at the average figures for all regions, actually all groups of employed increased their educational level between these periods. The figure indicates, however, that employed non-mobile have increased their educational level most during the 1990s. In-migrants to jobs also showed a significant rise in their educational level, whilst out-migrants from jobs showed the lowest improvement of their education. Considering the regional figures, the improvement of education of local non-mobile employed was generally high in all regions, but most remarkable in the northern regions of Tromsø and Mo i Rana. In Tromsø this was, however, counter-balanced by a decrease of the educational level among local mobile employed during the 1990s. The increased "brain-drain" through the migration processes in the smaller regions of Kongsvinger and Mo i Rana was recognised through a fall in the educational level of in-migrants to jobs during the 1990s, as well as through a considerable increase in the educational level of out-migrants from these regions.

**Figure 4.5.c. Average educational level 1996-1997 in relation to average educational level 1990-1991 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Index: Average educational level 1990-1991=100**



**Table 4.1. Average level of education among employed in 1996 by sector and region. Index: Average level of education for all employed in Norway =100**

SECTOR	Oslo/Akershus	Bergen	Trondheim	Stavanger	Kr. sand	Tromsø	Ålesund	Kongs-vinger	Mo i Rana	Norway
1. Primary/mining	101	93	91	87	94	78	86	85	80	88
2. Manuf. Raw material	109	88	90	85	90	82	83	81	87	91
3. Manuf. Labour int.	88	86	88	86	88	86	86	81	87	86
4. Machine/transport	96	95	95	98	100	90	92	87	96	94
5. Electro	110	103	105	99	100	91	92	82	95	102
6. Publishing/Printing	101	97	94	96	101	97	98	92	88	98
7. Energy	111	105	110	116	102	97	98	90	99	104
8. Pharmaceutical prod.	121	118	107	112	90	72	108	92	144	111
9. Construction	94	91	94	91	93	90	88	83	88	90
10. Retail	94	91	92	91	92	90	91	88	91	91
11. Hotel/restaurant	91	89	89	89	88	89	88	87	85	89
12. Wholesale	99	92	94	95	94	91	93	89	89	95
13. Transport	95	93	91	92	94	90	91	81	85	91
14. Post/telecom.	97	88	94	88	91	90	90	90	91	93
15. Finance	112	106	109	104	107	104	104	98	102	107
16. Inf. technology	120	120	124	115	116	119	114	102	124	118
17. Culture/sport	108	98	99	100	100	97	100	95	95	101
18. Basic education	129	126	125	128	127	127	126	122	123	126
19. High education/R&D	141	139	140	129	132	140	141	103	144	139
20. Health and social	110	106	108	107	109	108	103	96	100	105
21. Public adm.	118	109	114	114	114	110	108	105	107	111
22. Unspecified	108	106	104	102	103	100	98	90	95	100
<b>All sectors</b>	<b>106</b>	<b>101</b>	<b>104</b>	<b>101</b>	<b>101</b>	<b>101</b>	<b>96</b>	<b>92</b>	<b>94</b>	<b>100</b>

Moreover, the "brain-gain", "brain-drain" approach also poses important questions in terms of regional competitiveness across the different sectors. In table 4.1 the average educational level in different sectors and regions for 1996 is shown. Besides the non-market services of basic and higher education, research and development and public administration, the highest level of education was to be found in pharmaceutical production, finance and information technology. The lowest level of education was observed in the primary sectors of agriculture, forestry and fishing, mining, labour intensive manufacturing and in operations of hotels and restaurants. As the regional average of all sectors suggests, the highest educational level in most branches was to be found in the regions of Oslo and Trondheim, and vice-versa the lowest level in the smaller regions of Ålesund, Kongsvinger and Mo i Rana. Sectors such as primary/mining and manufacturing all showed significantly higher educational level in the capital regions than in other regions, mostly due to more administrative functions and localisation of head quarters. The higher educational level of the Oslo region was also pronounced in sectors such as finance, culture and sport and public administration. At the other end of the scale, the region of Kongsvinger exhibited lower educational level across all sectors than that of the national average. Most pronounced was the relatively low educational level in sectors such as manufacturing, transport, finance, information technology and particularly in higher education, research and development.

What then are the net effects of the "brain-gain" and "brain-drain" processes across the sectors? The tables

4.2a and 4.2b illustrate the intra- and interregional competitiveness of qualified persons between sectors in 1996-97. The first table shows the net effects of "brain-gain", "brain-drain" processes among cross sector mobile employed within the local labour markets, while the second table illustrates the net results of qualification from job migration between regions.

Within the local labour markets, the most pronounced "brain-gain" sectors were to be found among post and telecommunication, finance, culture and sport and basic education, whilst the sectors which predominantly experienced "de-qualification" through local cross sector mobility were publishing and printing, energy and public administration. Nevertheless it was plain to see there were different regional effects of these processes at work. The most pronounced "brain-gain" sector at the regional level was higher education, research and development in the region of Kongsvinger. This may however be seen in light of the relatively low educational levels achieved in 1996 (notice the section above). Other strong "brain-gain" sectors at the regional level were pharmaceutical production in Trondheim, energy in Trondheim and Kongsvinger, post and telecommunication in Trondheim, basic education in Stavanger and higher education, research and development in Stavanger and Mo i Rana. On the other hand the most typical "de-qualification" sectors from job-to-job mobility within these local labour markets were electro, energy and raw material manufacturing in Mo i Rana, publishing and printing in Bergen, and public administration in Trondheim, Stavanger and Tromsø.

**Table 4.2a. Differences in the average level of education among local cross sector mobile in 1996-1997. By sector and region. Index: Average level of education of leavers in each sector = 100**

Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kr.sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	98	97	96	100	95	99	99	99	98	99
2. Manuf. Raw material	98	96	100	102	98	97	110	99	88	98
3. Manuf. Labour int.	103	102	101	99	101	98	102	103	109	101
4. Machine/transport	96	101	100	100	99	106	100	102	94	98
5. Electro	98	96	109	94	92	102	107	96	80	100
6. Publishing/Printing	93	82	93	96	95	90	95	110	110	93
7. Energy	94	100	114	98	98	101	97	115	84	96
8. Pharmaceutical prod.	93	-	125	-	-	-	-	-	-	96
9. Construction	100	98	100	98	102	94	99	100	102	99
10. Retail	99	97	100	98	99	102	98	98	99	98
11. Hotel/restaurant	99	97	98	96	98	96	99	103	98	98
12. Wholesale	100	104	101	97	100	99	99	101	99	101
13. Transport	97	97	99	94	98	99	100	101	99	98
14. Post/telecom.	107	108	111	108	103	96	101	101	102	105
15. Finance	102	102	100	105	103	102	98	98	99	102
16. Inf. technology	99	103	101	102	99	106	104	108	97	100
17. Culture/sport	101	105	103	99	102	106	106	99	98	102
18. Basic education	99	102	100	112	101	99	99	95	100	102
19. High education/R&D	97	99	100	111	99	108	103	145	113	100
20. Health and social	99	98	101	98	101	98	99	99	98	99
21. Public adm.	97	100	90	78	103	88	100	99	105	96
22. Unspecified	101	95	97	94	93	93	100	94	107	98
<b>All sectors</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Table 4.2b. Differences in the average level of education among employed in- and out-migrants in 1996-1997. By sector and region.**  
**Index: Average level of education of out-migrants in each sector = 100**

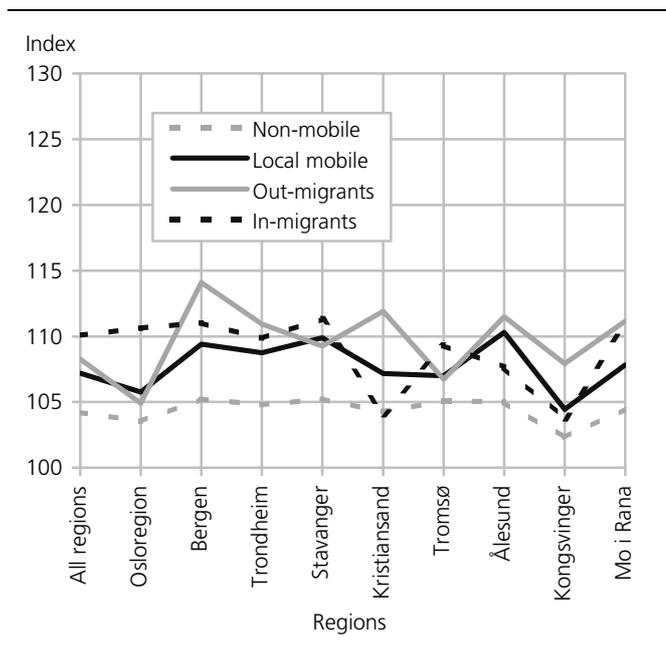
Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kr.sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	104	97	110	92	105	90	100	89	100	99
2. Manuf. Raw material	95	94	103	95	103	-	80	111	142	100
3. Manuf. Labour int.	108	100	103	93	105	94	102	87	90	100
4. Machine/transport	105	105	101	93	113	103	102	81	108	99
5. Electro	105	108	87	96	111	100	103	96	-	100
6. Publishing/Printing	101	88	92	113	107	98	105	106	83	100
7. Energy	111	95	103	100	103	77	95	86	106	101
8. Pharmaceutical prod.	97	-	163	-	125	-	-	-	-	102
9. Construction	103	99	100	101	102	96	102	94	94	100
10. Retail	102	101	100	95	97	100	102	96	106	99
11. Hotel/restaurant	102	101	97	96	100	108	96	98	79	99
12. Wholesale	103	93	94	100	97	98	104	92	101	100
13. Transport	105	100	99	96	102	96	105	93	91	99
14. Post/telecom.	103	112	90	94	91	95	82	113	100	99
15. Finance	102	103	97	99	106	100	103	83	102	101
16. Inf. technology	97	105	95	102	109	103	122	92	79	98
17. Culture/sport	97	91	89	99	108	99	103	126	79	100
18. Basic education	98	99	100	96	100	99	101	107	102	99
19. High education/R&D	101	104	91	101	116	93	113	71	91	100
20. Health and social	101	105	96	98	100	95	101	90	97	99
21. Public adm.	102	97	100	98	103	101	93	95	93	99
22. Unspecified	104	70	87	95	89	93	80	-	-	97
<b>All sectors</b>	<b>102</b>	<b>101</b>	<b>98</b>	<b>99</b>	<b>102</b>	<b>97</b>	<b>100</b>	<b>92</b>	<b>96</b>	<b>100</b>

As shown in table 4.2b, pharmaceutical production, finance and energy experienced the highest "brain gain" through the migration processes, whilst the most pronounced "brain-drain" sectors through migration were machine and transport production, retail, hotel and restaurant, transport, the non-market services and somewhat more surprisingly information technology and post and telecommunication. At the regional level the most pronounced "brain-gain" effect from internal migration were to be found in the raw material manufacturing in Mo i Rana. The number of migrants behind this changes were, however, not so very high. Other strong "brain-gain" sectors from migration at the regional level were raw material manufacturing in Kongsvinger, machine and transport production in Kristiansand, energy in Oslo, post and telecommunication in Bergen and Kongsvinger, information technology in Ålesund and culture and sport in Kongsvinger. The "brain-gain" effect of migration in pharmaceutical production was even higher in Trondheim and Kristiansand, but there were very few migrants behind these figures. The most typical "de-qualification" branches from migration were energy in Tromsø, hotel and restaurant, information technology and culture and sport in Mo i Rana, and particularly higher education, research and development in Kongsvinger.

#### 4.2.2. Economic returns

In the same manner in which qualification streams were investigated in the previous section, this section illustrates the course of economic returns in the different mobility groups and sectors. In figure 4.6a the income change among employed migrants, the local mobile employed and the local non-mobile employed is shown during the recession years at the beginning of

**Figure 4.6.a. Income change 1990-1991 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Per cent. Index: Income level 1990=100**



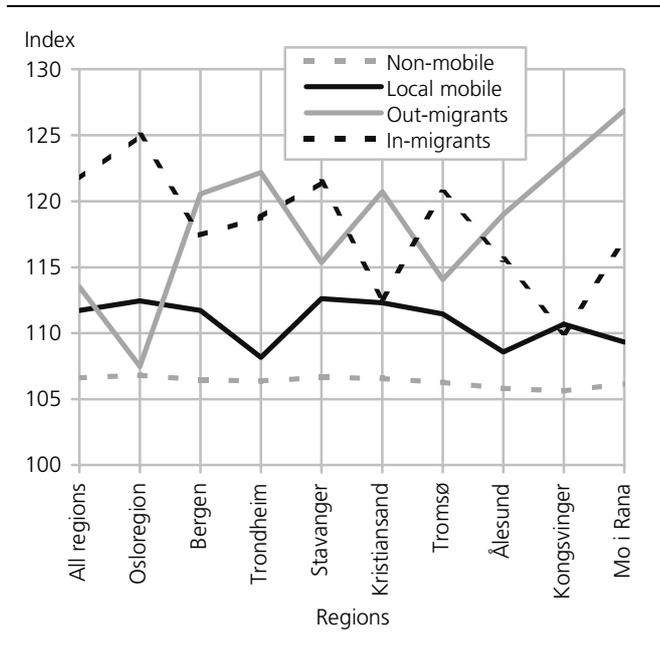
the 1990s. It was a clear tendency that non-mobile employed had a weaker income growth compared with employed persons that were mobile within or between the regional labour markets. This reveals the expectation that when employed persons choose to change their jobs, they mostly do this when achieving a higher income. Another important factor is the educational level. As shown in the section above, the mobile employed almost generally have higher educational level than non-mobile employed. In this context we

thus expect that migrants do achieve a higher income growth compared with other employed. In addition to different income levels within the local labour markets, income changes through regional migration also reflect the differences in income across regions. This is illustrated by the differences in income change between in- and out-migrants in the capital region of Oslo, showing much higher income growth amongst in-migrants compared to that of out-migrants. The opposite phenomenon was observed in many of the other regions, showing higher income growth among out-migrants compared to that of in-migrants.

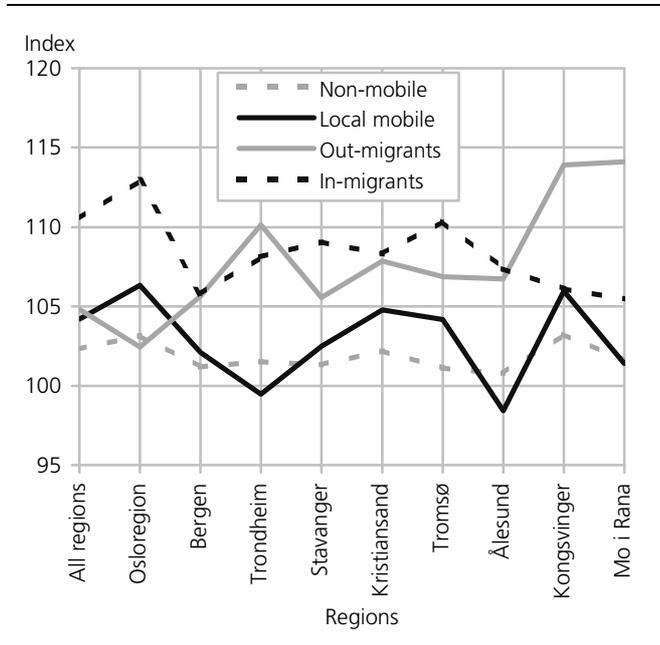
Figure 4.6b shows similar results from the economic upswing period in 1996-97. The difference in income change between the groups was however now more consolidated, with lowest income change occurring amongst the non-mobile employed, and higher income growth generally taking place amongst migrants as opposed to those classed as local mobile employed. Strong income growth was particularly prevalent amongst in-migrants to the region of Oslo. As described in the section above, the "brain-gain" of the migration processes was significantly in the capital region in these years, adding to the regional differences in income level, which may reflect the relative lower income growth of out-migrants from Oslo. The regions of Stavanger and Tromsø also showed higher income growth among in-migrants compared to that of out-migrants. This was somewhat surprising in the region of Tromsø, experiencing a clear "brain-drain" through the migration processes in this period. It may, however, be important to take into consideration a hypothesis, whether employed migrating to Tromsø from other parts of Northern Norway increased their income more than higher educated employed migrating from Tromsø to other parts of the country. It is in this context also important to note that there was a very sharp rise in income amongst out-migrants from the smaller regions of Kongsvinger and Mo i Rana, reflecting very high economic returns through moving to other regions (see figure 4.6b).

In figure 4.6c the income change during the economic upswing in 1996-97 is compared with the income change in the recession period in the beginning of the 1990s. As expected, the increase of income follows the economic cycles with higher income rise during the upswing period. Also in this context, the income winners in the regional labour markets were those who chose to move to Oslo, Stavanger and Tromsø or out-migrated from the smaller regions of Kongsvinger and Mo i Rana. On the other hand it may be noticed that the income losers have been the local mobile employed in the regional labour markets of Trondheim and Ålesund, showing lower income increase during the economic upswing period than in the recession period. It has to be noticed, however, that these groups actually had a relatively high income growth during the recession period in the beginning of the 1990s.

**Figure 4.6.b. Income change 1996-1997 in relation to income change 1990-1991 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Per cent. Index: Income level 1990=100**



**Figure 4.6.c. Income change 1996-1997 in relation to income change 1990-1991 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Per cent. Index: Income level 1990=100**



An indication of differences in regional incomes is shown in table 4.3, indicating the levels of income across different sectors and regions in 1996. It is, however, important to notice that the table is based on average annual income of all employed persons, and is thus not corrected for man-hour worked. All results are, however, measured by an index in relation to the

national average income for all employed set at 100. The expected differences in man-hour worked, reveal the relatively high income levels in the manufacturing sectors, basically due to a domination of employed (mostly male) working full time. On the other hand the relative low income levels in many service sectors reflects the relatively high participation of employed (mostly female) working part time. The man-hour differences is, however, a phenomenon more operating across sectors than within sectors, thus making it possible to indicate regional differences in income level within each of the sectors.

The dominating position of the Oslo region with regard to income levels was visible in all sectors, showing higher average income in each of the sectors in the capital region than the national average correspondingly. The figures also revealed a relatively high income level in the region of Stavanger, whilst the smaller regions of Kongsvinger and Mo i Rana showed lower income levels in most of the sectors compared with that of national average figures. These differences do, to a certain extent therefore, reflect differences in educational level between the capital region of Oslo and the smaller regions of Kongsvinger and Mo i Rana (see table 4.1). The income levels in the Oslo region and Stavanger reveal, however, a higher level than the average educational level suggested. On the other hand, the levels of income seemed to have been somewhat lower in the regions of Trondheim, Kristiansand and Tromsø than the average educational level suggested (see table 4.1).

The level of income change is also therefore an important target in the regional competitiveness

calculations of different sectors. In table 4.4a the income change amongst the local cross sector mobile group is shown for regions and sectors in the 1996-97 period. In the table the average income change of leavers in each sector is set at 100, thus index entries above and below 100 illustrates that local entries to these sectors show either higher or lower income rises when compared to their leaving counterparts.

For Norway as a whole, the manufacturing sectors showed a relatively strong income rise for employed entering these branches in relation to employed leaving. The reason for this was however not to be found in change of educational level, as the "brain-drain" effect was predominant amongst the local cross sector mobile in these sectors at the national level (see table 4.2a). One reason was that these sectors showed good economic development in this period. Another factor may also be due to the change in man-hour worked amongst those entering and those leaving these sectors. As mentioned above, manufacturing sectors usually have higher annual man-hour levels per employed in relation to many other branches of the economy. At the regional level however, some manufacturing sectors showed higher income growth among the leavers. This was most noticeable in the machine and transport sector in Oslo, and in the energy sector in Stavanger and Kristiansand. Highest relative income increases amongst those who entered the manufacturing sectors was to be found in the electro sector in Oslo and Tromsø. In the service sectors, the highest relative income growth of entering local cross sector mobile were to be found in retail in Trondheim, in post and telecommunication in Kristiansand and Tromsø and in information technology in Kongsvinger.

**Table 4.3. Differences in the average level of income among employed in 1996 by sector and region. Index: Average level of income for all employed in Norway = 100**

Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kr.sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	106	93	68	69	83	81	94	74	74	77
2. Manuf. Raw material	157	113	115	117	119	123	112	111	124	124
3. Manuf. Labour int.	112	99	97	101	101	93	93	95	101	97
4. Machine/transport	132	133	109	136	139	105	117	97	105	121
5. Electro	146	128	136	139	105	125	106	99	105	130
6. Publishing/Printing	139	125	109	124	118	124	114	99	85	124
7. Energy	159	175	147	198	158	122	136	112	136	158
8. Pharmaceutical prod.	157	141	131	136	101	88	106	112	134	138
9. Construction	111	106	103	111	105	102	103	98	101	104
10. Retail	81	76	85	71	68	76	68	64	77	73
11. Hotel/restaurant	71	69	64	66	61	68	60	54	64	64
12. Wholesale	137	116	114	126	107	107	111	95	97	117
13. Transport	127	120	108	125	111	110	116	108	106	116
14. Post/telecom.	105	83	100	84	89	91	83	94	84	93
15. Finance	139	121	119	123	116	116	111	95	99	122
16. Inf. technology	167	159	153	156	138	133	138	114	119	158
17. Culture/sport	102	73	76	78	74	86	71	67	78	82
18. Basic education	99	95	93	100	96	98	98	98	98	98
19. High education/R&D	127	125	130	125	128	122	118	92	112	124
20. Health and social	91	80	84	82	80	87	81	74	80	82
21. Public adm.	111	100	102	108	108	105	97	99	95	103
22. Unspecified	118	102	95	119	85	86	93	73	90	96
<b>All sectors</b>	<b>114</b>	<b>103</b>	<b>100</b>	<b>110</b>	<b>98</b>	<b>96</b>	<b>96</b>	<b>88</b>	<b>93</b>	<b>100</b>

**Table 4.4a. Differences in income change among local cross sector mobile in 1996-1997. By sector and region. Index: Average income change of leavers in each sector = 100**

Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kr.sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	89	95	95	91	87	96	103	95	96	94
2. Manuf. Raw material	102	105	98	106	105	103	99	101	104	103
3. Manuf. Labour int.	103	99	106	104	106	110	103	110	105	103
4. Machine/transport	83	104	112	107	100	100	103	103	104	102
5. Electro	132	107	102	104	90	131	101	104	101	113
6. Publishing/Printing	103	112	111	108	108	92	104	108	104	104
7. Energy	111	106	102	93	97	105	99	99	103	102
8. Pharmaceutical prod.	94	94	69	-	-	-	-	-	-	98
9. Construction	100	100	99	103	106	97	100	98	96	101
10. Retail	97	98	125	95	96	95	98	93	104	99
11. Hotel/restaurant	97	96	98	94	88	95	97	98	96	96
12. Wholesale	103	101	100	99	102	103	101	99	97	102
13. Transport	101	102	103	101	101	106	100	95	104	101
14. Post/telecom.	104	97	111	104	110	111	95	103	93	102
15. Finance	98	98	85	102	102	101	90	103	99	98
16. Inf. technology	103	103	103	104	102	104	96	116	99	101
17. Culture/sport	101	100	101	97	96	98	91	101	100	100
18. Basic education	102	100	98	103	103	107	101	102	103	102
19. High education/R&D	101	100	97	90	96	92	102	93	99	97
20. Health and social	99	99	101	100	99	99	99	100	98	100
21. Public adm.	100	101	100	106	100	105	106	110	101	102
22. Unspecified	94	106	99	121	98	107	90	107	103	99
<b>All sectors</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Table 4.4b. Differences in income change among in- and out-migrants in 1996-1997. By sector and region. Index: Average income change of out-migrants in each sector = 100**

Sector	Oslo/ Akershus	Bergen	Trond- heim	Stavanger	Kr.sand	Tromsø	Ålesund	Kongs- vinger	Mo i Rana	Norway
1. Primary/mining	96	98	75	101	85	105	98	99	77	90
2. Manuf. Raw material	107	83	91	107	110	-	99	85	107	99
3. Manuf. Labour int.	115	94	100	109	121	102	115	83	92	102
4. Machine/transport	112	92	83	115	104	102	101	86	100	101
5. Electro	130	84	108	108	86	342	96	96	-	108
6. Publishing/Printing	121	90	106	76	81	85	143	74	125	102
7. Energy	99	104	94	106	98	107	87	108	98	101
8. Pharmaceutical prod.	110	-	113	-	106	-	-	-	-	97
9. Construction	113	95	95	96	100	101	110	95	114	100
10. Retail	110	97	107	97	85	106	95	82	85	95
11. Hotel/restaurant	117	96	87	98	105	114	78	68	86	94
12. Wholesale	129	101	99	110	98	104	90	94	105	103
13. Transport	117	105	100	95	80	107	97	91	94	101
14. Post/telecom.	126	88	93	89	73	96	70	94	67	100
15. Finance	123	106	98	107	97	104	83	86	75	101
16. Inf. technology	128	77	96	111	61	79	101	57	101	103
17. Culture/sport	114	101	108	83	89	98	149	89	90	101
18. Basic education	116	93	107	118	97	109	99	82	85	102
19. High education/R&D	105	93	102	95	79	102	67	89	69	95
20. Health and social	112	90	99	110	90	112	94	89	104	100
21. Public adm.	110	99	90	105	97	102	87	106	92	101
22. Unspecified	92	162	97	87	60	121	64	-	-	95
<b>All sectors</b>	<b>116</b>	<b>97</b>	<b>97</b>	<b>105</b>	<b>93</b>	<b>106</b>	<b>97</b>	<b>90</b>	<b>92</b>	<b>100</b>

In table 4.4b similar results are shown for in- and out-migrants between regions and sectors. Here too the manufacturing sectors showed higher income growth amongst those who in-migrated to jobs in relation to those who out-migrated from jobs. The sectors that recruited "cheaper" labour than they exported were to be found in the primary sectors in addition to the service sectors of retail and hotel and restaurant and somewhat more surprisingly in higher education,

research and development. At the regional level, the electro sector, wholesale, post and telecommunication and information technology were the sectors that predominantly contributed to the very high income increase amongst in-migrants to Oslo. Actually all sectors in the capital region, except for the primary sectors and energy, contributed to higher income growth for in-migrants when compared to their out-migrant counterparts.

The relatively high income growth for in-migrants compared with out-migrants in Tromsø was observed in most of the sectors, but it was noteworthy to recognise that in growing sectors such as publishing and printing, telecommunication and information technology, the income increases was relatively higher amongst out-migrants. The very strong income increase of out-migrants compared to that of in-migrants in Kongsvinger and Mo i Rana, was mostly due to out-migration from sectors such as retail, hotel and restaurant, finance and basic education. In addition the relative income rises was remarkable among out-migrants from publishing and printing and information technology in Kongsvinger and post and telecommunication and higher education, research and development in Mo i Rana.

### 4.3 Explaining local labour market performance

In this final section with analyses, we do reflect how local labour markets perform through different activation to employment. The analysis includes a total local labour market performance rate, which measures the relative performance within each region. The total performance rate is composed of a set of different mobility rates derived from internal gross streams within the local labour markets. All local labour market mobility measures are compared to that of the national average measures correspondingly.

#### Local labour market performance index

Each individual in the local labour force (16 – 64 years) is classified according to their highest level of formal education: Primary, secondary and post secondary. Each individual in the local labour market is further classified in terms of careers to employment status year t + 1 from either of the following status year t: Employed, unemployed, under education and others outside the work force. As such, the local labour market performance index (LLMPI) is a description of the rate of activation of twelve pools of the workforce within the local labour market in comparison with the corresponding activation rate in the country as a whole (figure 4.7). As the figure shows, the activation rates are thus measured for four main groups (A-D) broken down by three educational levels. The activation rate of each group is measured separately, but the rate of each element may be interdependent. In a well-functioning and strong growing regional labour market there may be room for a high score in most of the separate indexes. In reality the situation may be different, where several of the included activation rates may be in competition with each other. In many regions high net in-migration to jobs may function as an obstacle to high transition from local unemployment to job or from local education to job, whilst in other regions the situation may be opposite. In the end of this section we thus include an analysis comparing the local activation to jobs in the local labour markets with activation through net in-migration to jobs.

**Figure 4.7. Local labour market performance index (LLMPI). Rate of local activation of twelve pools of labour force in the local labour markets (LLM)**

Status year t	Status year t+1: Employed		
	Education: Primary	Secondary	Post secondary
A. Employed in the same LLM	A1. Job to job (primary)	A2. Job to job (secondary)	A3. Job to job (Post secondary)
B. Unemployed in the same LLM	B1. Unemployed to job (primary)	B2. Unemployed to job (secondary)	B3. Unemployed to job (post secondary)
C. Under education in the same LLM	C1. From education to job (primary)	C2. From education to job (secondary)	C3. From education to job (post secondary)
D. Others in the same LLM	D1. Others to job (primary)	D2. Others to job (secondary)	D3. Others to job (post secondary)

Each of the elements in the total local performance index is calculated as follows:

A1-A3. Job to job: Persons still employed at the same LLM year t + 1 / All employed at the same LLM year t - (the same relation for the nation as a whole)

B1-B3 Unemployed to job = Became employed at the same LLM year t + 1 / All unemployed at the same LLM year t - (the same relation for the nation as a whole)

C1-C3 Education to job = Became employed at the same LLM year t + 1 / All persons under education in the same LLM year t - (the same relation for the nation as a whole)

D1-D3 Others to job = Became employed at the same LLM year t + 1 / Persons outside the labour force in the same LLM year t - (the same relation for the nation as a whole)

The total local labour market performance index (LLMPI) appears as the average of all twelve elements.

The total performance index gives an illustration how each local labour market performs in the national context. The decomposition of the total indexes should however help to indicate which political areas may, or may not be successful in terms of performance. The total indexes illuminate how the local regional labour market functions as a whole, whilst each element gives a measure of which transitions contribute to bettering the total local performance, and vice-versa. The job-to-job elements and not least, the unemployment-to-job elements, represent important areas for both national and regional labour market policies. Similarly, those moving from education to job, reflect the success of educational policy, in that they measure the extent to which local labour markets are able to absorb the newly educated. All of these elements are, however, important for the regional policies as a whole.

In table 4.5 the total local performance index of each region is shown for the period of recession at the beginning of the decade, and for the economic

**Table 4.5. Total local labour market performance index in 1990-1991 (recession) and in 1996-1997 (economic upswing)**

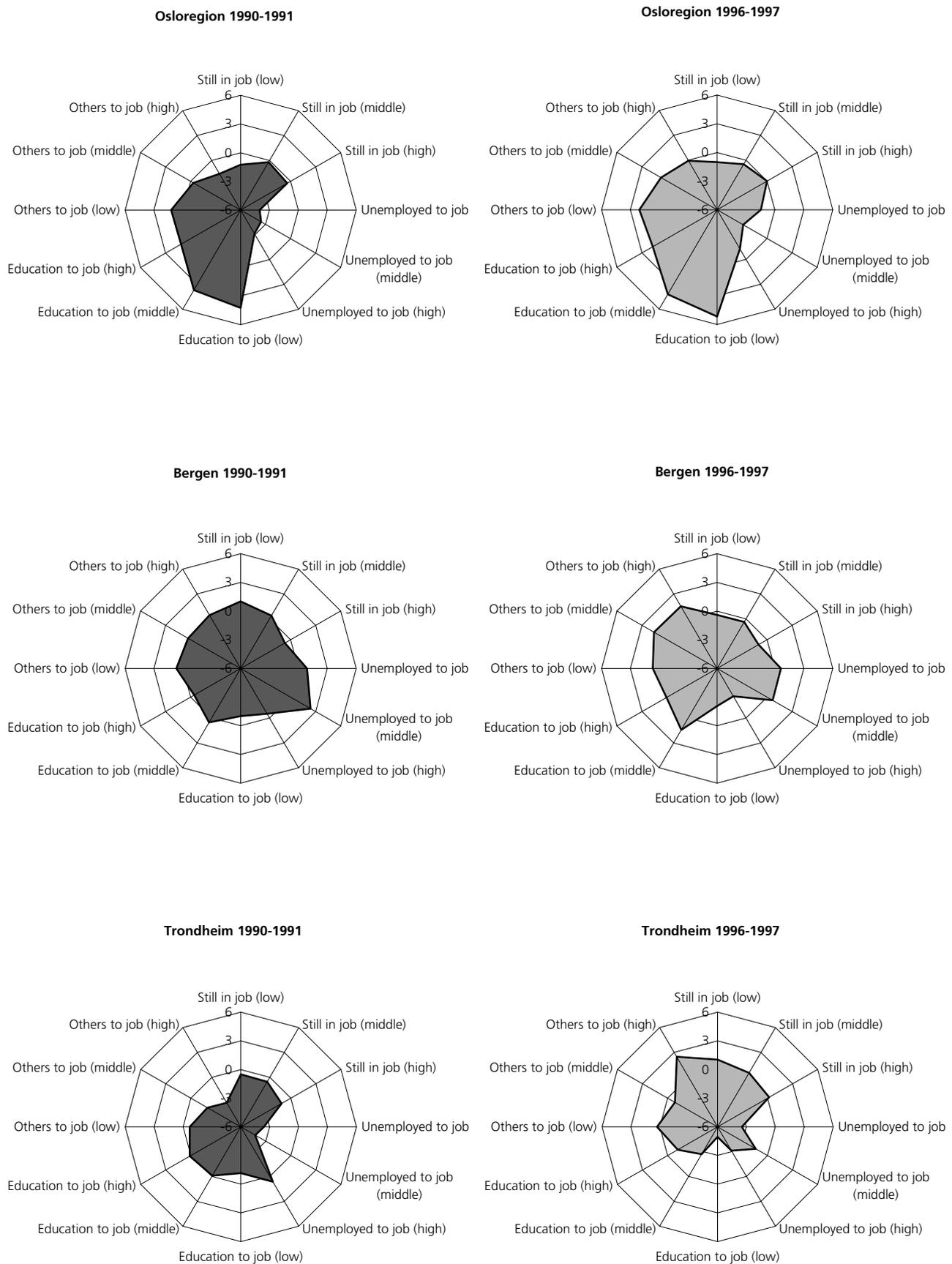
Total local index of performance in 1990-1991		Total local index of performance in 1996-1997	
1. Stavanger	0.79	1. Ålesund	1.58
2. Bergen	0.33	2. Stavanger	0.93
3. Mo i Rana	-0.34	3. Osloregion	0.56
4. Osloregion	-0.36	4. Bergen	-0.01
5. Tromsø	-0.71	5. Tromsø	-0.32
6. Ålesund	-0.73	6. Mo i Rana	-0.62
7. Kongsvinger	-1.32	7. Trondheim	-1.11
8. Trondheim	-1.36	8. Kristiansand	-1.59
9. Kristiansand	-2.74	9. Kongsvinger	-2.65

upswing period in the second half of the 1990s. During the recession period, only two of the nine regions performed better than the national average. Best local performance was to be found in the region of Stavanger, whilst the local labour market of Bergen also had slightly higher figures than the national average. On the other hand, the regions of Kongsvinger and Kristiansand showed local performances both below the other regions and compared to that of the national average. It is however worth noting the negative local performances in central regions such as Oslo and particularly Trondheim during this period. In the period of economic upswing, the number of regions with a level of local performances above that of the national average increased slightly to three out of nine. The region of Ålesund now showed the best level of local performances, whilst Stavanger, and the capital region of Oslo also experienced a level of local performance better than that of the national average. The region of Kongsvinger however showed an even weaker level of performance during the upswing period than that exhibited during the recessionary period. The central region of Trondheim on the other hand, hardly improve upon its relative performance between the periods.

In the three figures 4.8a - 4.8c the total local performance rates in each region are broken down by status and education (see each element shown in figure 4.7). The contribution from each element did vary considerably both between periods, between regions and within regions. The relatively good local performances in Stavanger during the recession period was mainly due to relative better access to the local labour market by persons with lower and middle levels of education from the element education to work. The transition rates from unemployment to job was also higher than in most other regions, and particularly then for unemployed with middle education. The better than average level of local performance during the econo-

mic upswing, mostly revealed the high transitions from education to job among low and middle educated, and high transition from unemployment to job among persons with higher education. The very low figures for local performances in the region of Kongsvinger can mostly be explained by the low transition rates from unemployment to work, and from education to work both during the periods of recession and economic upswing. The tendency to leave local employment was far less noticeable, particularly during the economic upswing. The negative local performance in the capital region during the recession period was, however, not evenly distributed amongst the transition elements. The negative figures were partly due to higher than average levels of deactivation from jobs in the local labour market, but were perhaps mostly due to very low transition levels from unemployment to work in all educational groups. The transition rates from education to job were, however, positive during this period. This transition pattern was also clearly present during the economic upswing period, when the positive total local labour market performance in the capital region revealed far higher transition levels from education to job than the national average. The very high local performance rate in the region of Ålesund during the upswing period was due to high transition levels to job from unemployment and from education to job amongst persons with lower education. The increased tightness in the local labour market did also strongly activate others outside the work force. The rather negative score in total local performance in the region of Trondheim during the recession was mostly due to low transition rates from unemployment to job amongst lower and middle educated unemployed. During the economic upswing period, lower than average transition rates from unemployment to job and from education to job contributed considerably to the far lower than average total performance. In the regions of northern Norway, there was in Tromsø higher than average deactivation rates from jobs and in Mo i Rana far lower than average transition rates from education to job that contributed mostly to the negative total performances during the recession period. In the period of economic upswing, there were in both regions higher than average deactivation rates from job and lower than average transition rates from education to job that contributed mostly to negative total performance indexes. This was most visible for persons with higher education. On the other hand, it was in both regions during the boom period a clear tendency of higher than average transition rates from unemployment to job, and particularly then for unemployed with lower and middle education.

Figure 4.8a. Local index of performance 1990-1991 (recession) and 1996-1997 (economic upswing) in the main cities of Norway



**Figure 4.8b. Local index of performance 1990-1991 (recession) and 1996-1997 (economic upswing) in intermediate regional centres of Norway**

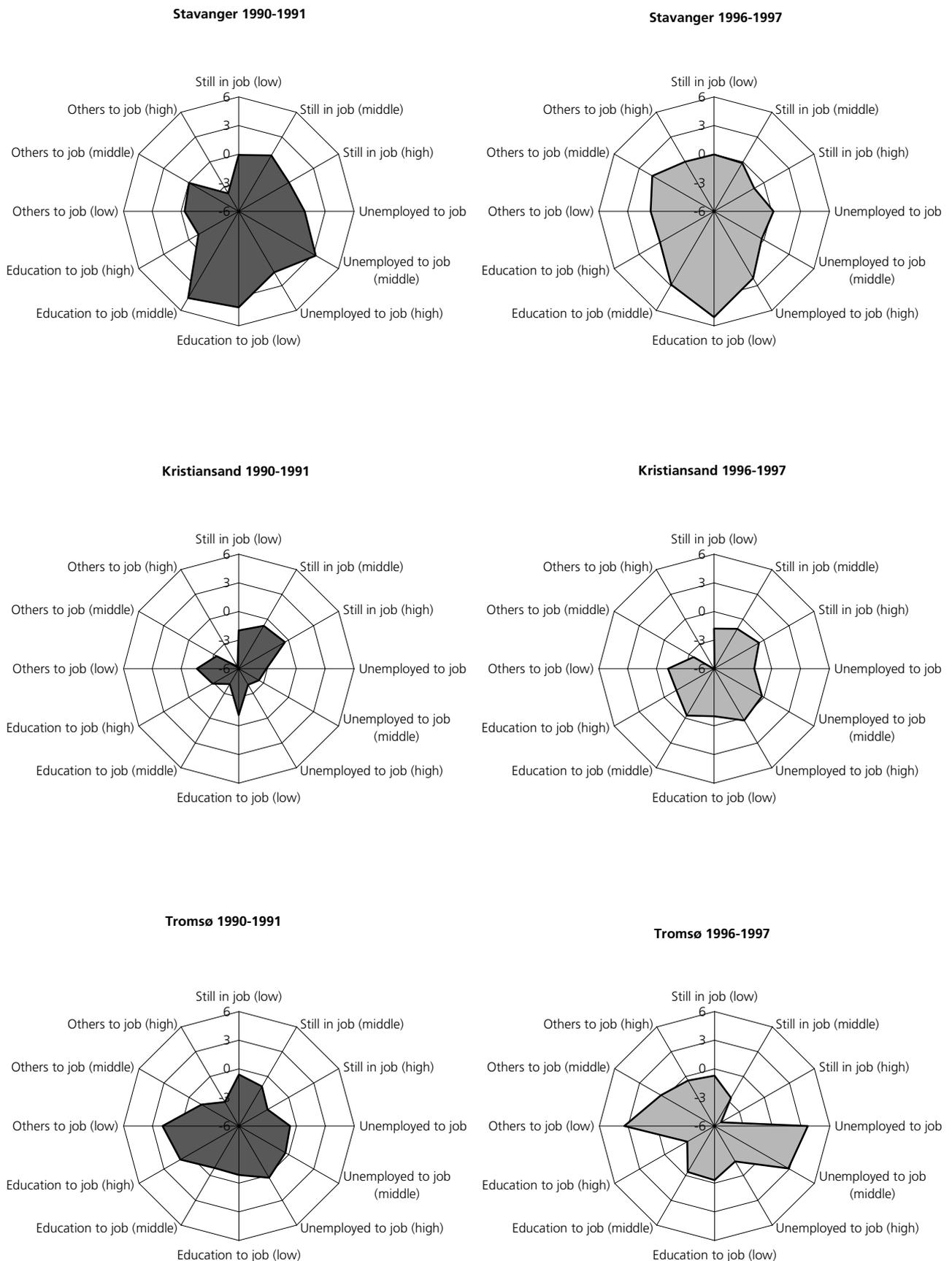
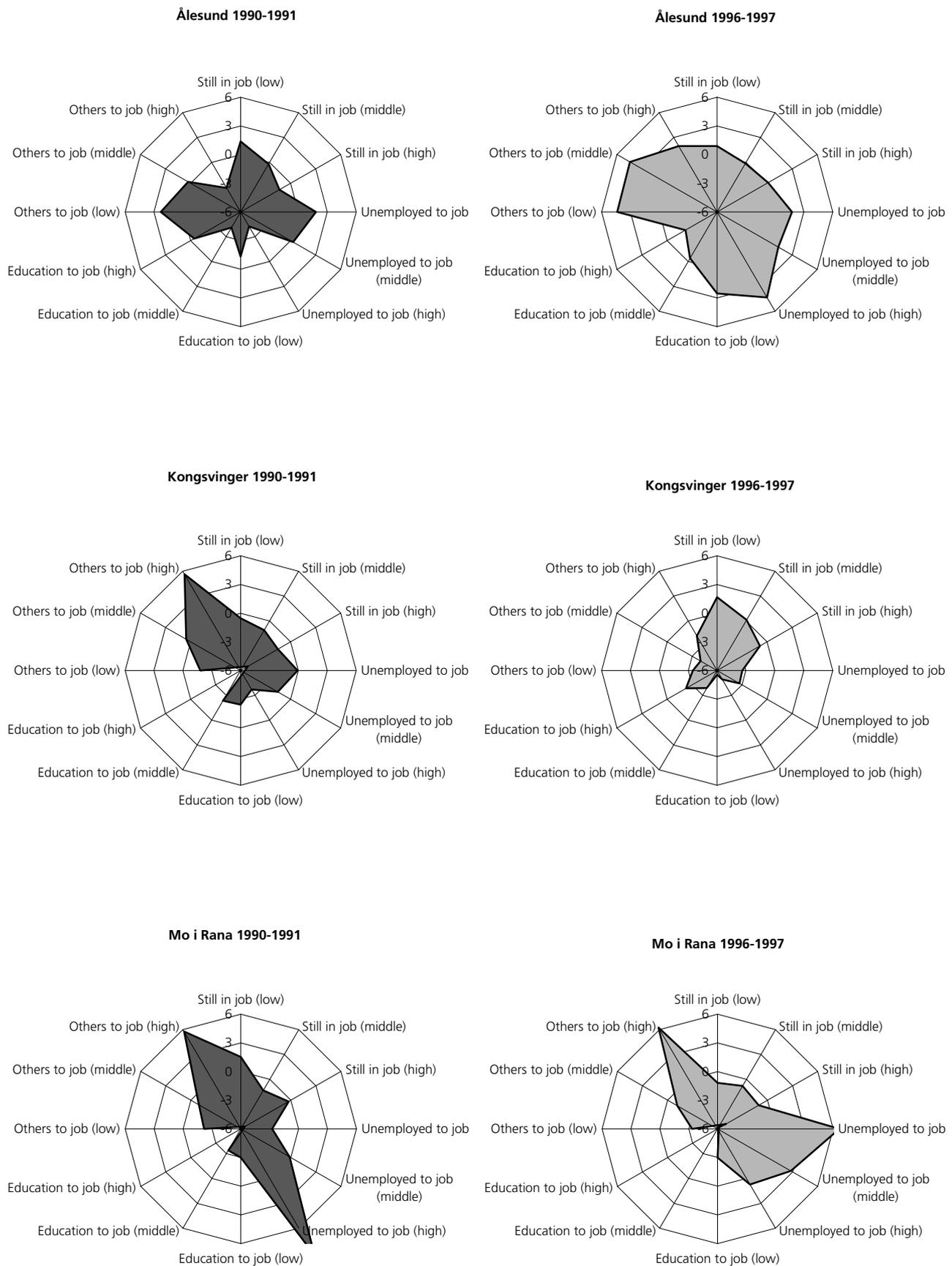


Figure 4.8c. Local index of performance 1990-1991 (recession) and 1996-1997 (economic upswing) in smaller regional centres of Norway



As mentioned above, the local performances within each region must be seen in light of the recruitment to jobs derived from the migration processes. In a well-functioning region with a growing labour market there should be room for and necessity of both high local recruitment to jobs as well as positive net in-migration to jobs. On the other hand, there may appear times when these groups are in competition with each other applying to fill in the same vacancies in the regional labour markets. As shown in several sections above, migrants represents a highly competitive group in the regional labour markets, which through their level of qualification makes them even more important than their actual number of persons should suggest. In the four figures 4.9a - 4.9d we have thus compared the local recruitment to jobs measured by the local performance indexes and the recruitment to jobs derived from the migration processes, here measured by the net migration to jobs in each region. The figure 4.9a shows the relationship between the total local labour market performance indexes and the total net in-migration to jobs, whilst in the three last figures all measures are broken down by educational level.

Figure 4.9a shows that it was a certain correlation between the local performances and net in-migration to jobs during the recession period. Some regions deviated, however, from this pattern with much higher net in-migration to jobs than the local recruitment suggested. With weak levels of local performances in most of the regions in this period, a relatively high net in-migration to jobs in the region of Oslo, and also in the regions of Tromsø and Kristiansand, may have contributed to an even weaker local performance in these regions. When turning to the economic upswing period in the second half of the 1990s, the positive development in the regions of Oslo, Stavanger and Ålesund gave room for both good local performances as well as positive net in-migration to jobs. Weak local performances in the regions of Tromsø, Mo i Rana and Kongsvinger was followed by net out-migration from jobs, whilst weaker than average local performances in the regions of Trondheim, and particularly Kristiansand, were counterbalanced by employment growth through the migration processes.

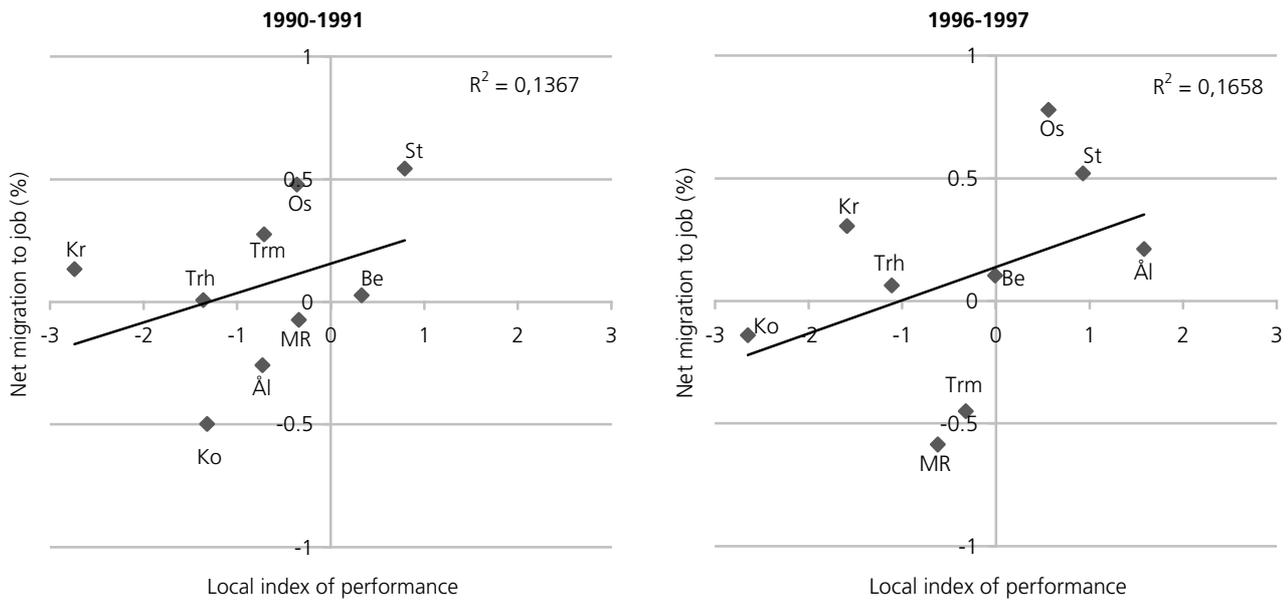
When breaking down all the results by educational level, figure 4.9b shows that the regions of Stavanger, Bergen and Oslo, all had better local performances of employed with lower education during the recession period than the national average. All these regions experienced also a positive net in-migration to jobs for this educational group. The relative good local performances of lower educated employed in the region of Ålesund was partly due to net out-migration from jobs, establishing vacancies in the local labour market. In all other regions, a weaker than average local performances for labour with lower education was followed by net out-migration from jobs during the recession period. In the economic up-

swing period, there were weaker correlation between local performances and net in-migration to jobs for lower educated labour. A well local performance for this group in the regions of Oslo and Stavanger was followed by a positive net in-migration to jobs. An even better local performance for this group in the regions of Ålesund and Tromsø was, however, counterbalanced by net out-migration from jobs. In a period with increasing employment, net out-migration from jobs increases both the prospects for and the necessity of good local recruitment. On the other hand, the very weak local performance of lower educated labour in a region such as Kongsvinger, increased the necessity of positive net in-migration to this category of jobs during the economic upswing period.

In figure 4.9c similar results are shown for middle educated labour. During the recession period the good local performance for this group in Stavanger was followed by a high net in-migration to jobs, whilst the negative local performance in the regions of Mo i Rana, Kongsvinger and Ålesund was followed by net out-migration from jobs correspondingly. The weaker local performance for middle educated labour in Oslo, Tromsø, Trondheim and Kristiansand was, however, counterbalanced by a clear net in-migration to jobs. In the economic upswing period the correlation between local performance and net in-migration of middle educated labour was somewhat better, although regions such as Kristiansand and Trondheim still showed considerably net in-migration to jobs in spite of not too well local performances.

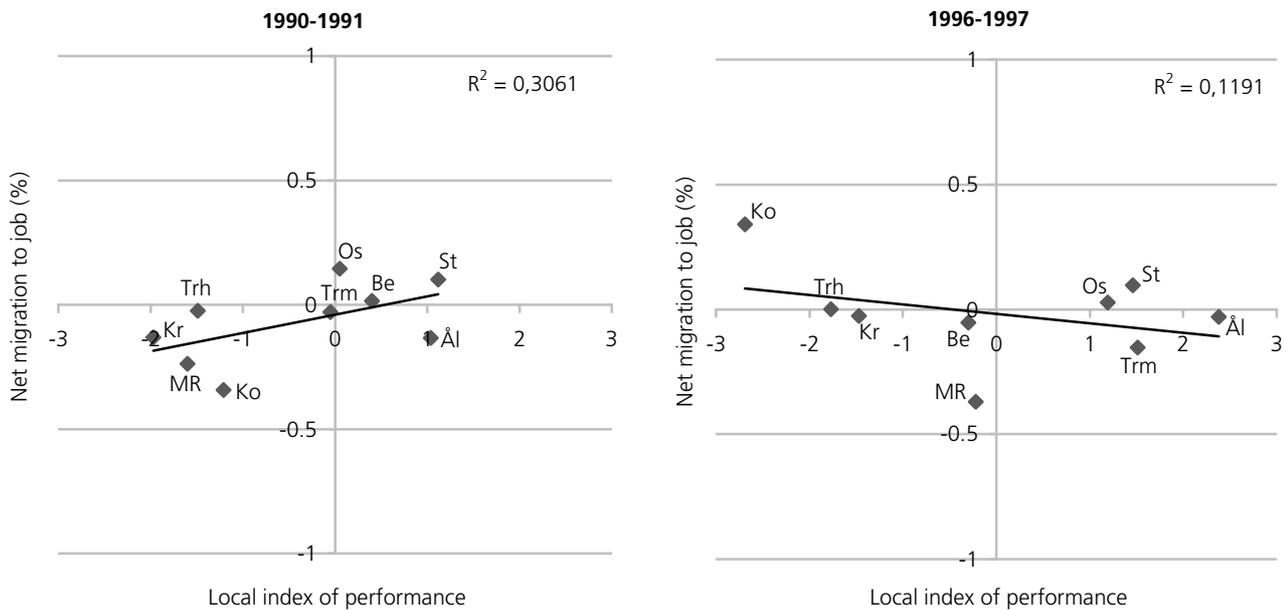
Finally figure 4.9d shows the correlation between local labour performance and net migration for higher educated labour. The figure reveals the very weak local labour market position for this group in the central regions during the recession period. Among the nine regions, only Mo i Rana experienced a local performance for higher educated labour above the level of the national average in this period. Most regions showed, however, negative correlation between local performance and geographical net mobility for this group. Central regions in southern Norway, such as Stavanger, Oslo and Kristiansand, showed all a considerably net in-migration to well qualified jobs in spite of rather weak performances for this group within these local labour markets. These figures reveal the fact that in-migrants were the winners in these regions, and rather strengthened the decrease of local performance in a period with very weak development in the employment. Figure 4.9d shows, however, better correlation between local performances and geographical net mobility of higher qualified labour during the economic upswing period. All regions, except for Kristiansand and Bergen, showed positive correlation between local recruitment and net in-migration to jobs in this period. As shown in many of the results above, the region of Kristiansand showed a clear positive net in-migration to jobs in spite of rather weak local performance.

Figure 4.9a. The relationship between net migration to job and total local index of performance in 1990-1991 (recession) and 1996-1997 (economic upswing)



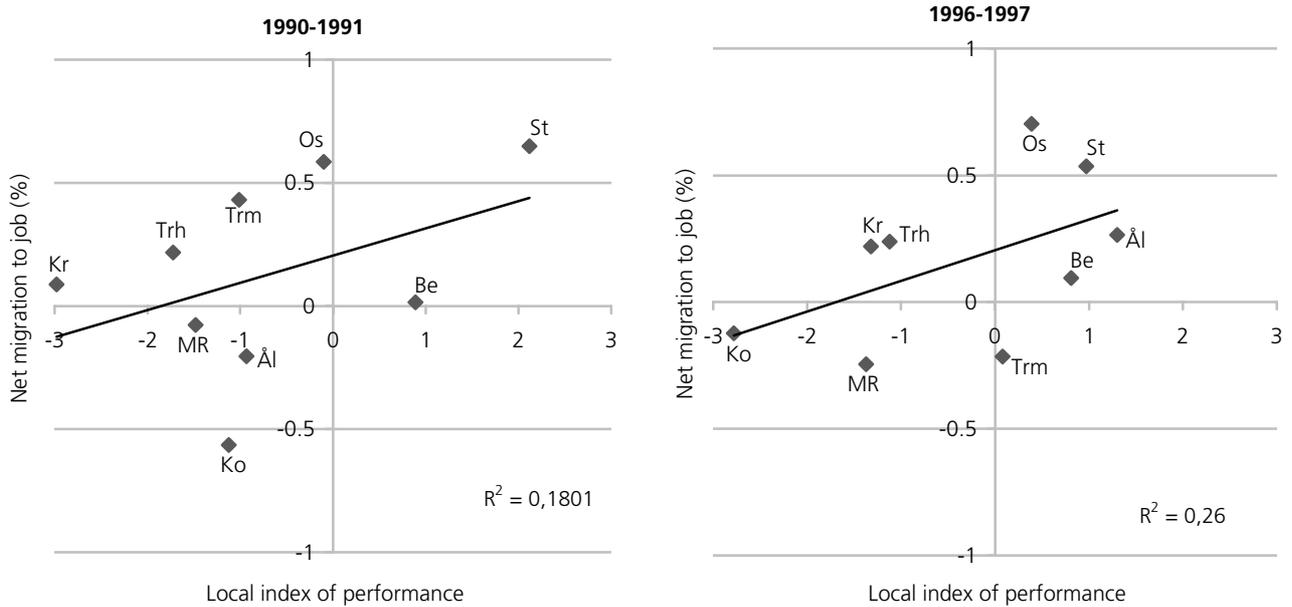
Os = Osloregion, Be = Bergen, Trh = Trondheim, St = Stavanger, Kr = Kristiansand, Trm = Tromsø, Ål = Ålesund, Ko = Kongsvinger and MR = Mo i Rana.

Figure 4.9b. The relationship between net migration to job among lower educated persons and local index of performance of lower educated in 1990-1991 (recession) and 1996-1997 (economic upswing)



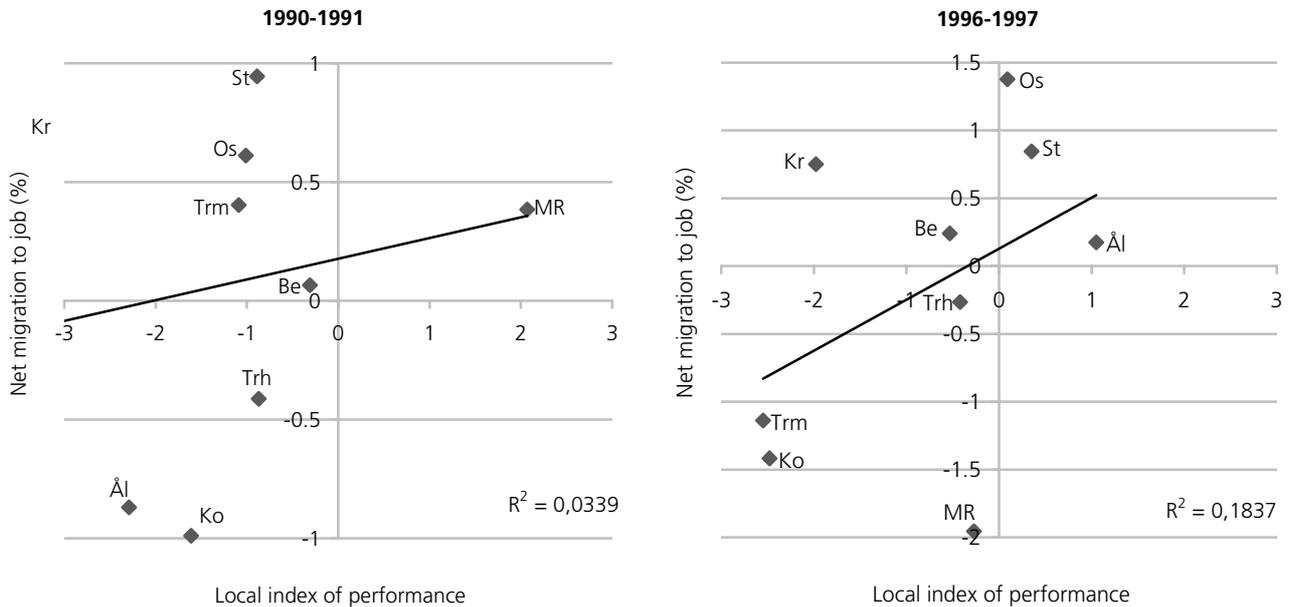
Os = Osloregion, Be = Bergen, Trh = Trondheim, St = Stavanger, Kr = Kristiansand, Trm = Tromsø, Ål = Ålesund, Ko = Kongsvinger and MR = Mo i Rana.

Figure 4.9c. The relationship between net migration to job among middle educated persons and local index of performance of middle educated in 1990-1991 (recession) and 1996-1997 (economic upswing)



Os = Osloregion, Be = Bergen, Trh = Trondheim, St = Stavanger, Kr = Kristiansand, Trm = Tromsø, Ål = Ålesund, Ko = Kongsvinger and MR = Mo i Rana.

Figure 4.9d. The relationship between net migration to job among higher educated persons and local index of performance of higher educated in 1990-1991 (recession) and 1996-1997 (economic upswing)



Os = Osloregion, Be = Bergen, Trh = Trondheim, St = Stavanger, Kr = Kristiansand, Trm = Tromsø, Ål = Ålesund, Ko = Kongsvinger and MR = Mo i Rana.

## 5. Concluding remarks

- A pattern of balanced regional migration at the beginning of the 1990s was replaced by a strong centralisation in migration processes in the second half of the 1990s. This was partly due to somewhat higher economic growth in the central regions (particularly in the regions of Oslo and Stavanger). Stronger centralisation also revealed the delay in the migration registration of a growing number of students in the end of the 1980s and the first half of the 1990s. A further reason was also to be found in the diminution of the regional labour mobility in wake of the generally weak economic development experienced by most regions at the beginning of the 1990s.
- The percentage of population with higher education generally grew during the 1990s. The general pattern of a higher percentage of the population with higher education experience in the most central regions, and lowest in the smaller regions was however maintained throughout the 1990s. There was however, a move towards convergence in this area, albeit of a limited nature.
- Most of the regions experienced levels of employment growth close to, or slightly above, the national average during the 1990s. The region of Kongsvinger represented an exception to this trend, exhibiting instead a slight fall in employment over this period. Throughout the period, market and non-market services generally showed stronger employment growth than other sectors.
- Gross labour market mobility generally grew from the trough of recession years at the beginning of the 1990s up to a peak during the economic upswing period of 1996-97. Whilst the female vacancy filling rate was higher than the corresponding male rate during the recession period, the situation was reversed during the economic upswing. This was somewhat surprising in light of the strong growth in the service sectors.
- The local cross-sector exchange did increase considerably from 1990-91 up to the 1996-97 period.
- Measured by education, the vacancy filling of middle and higher educated persons was higher than for those at the lower end of the educational scale during the recession, whilst the vacancy filling rate for the lower educated was dominant during the upswing period. This result may reveal a remarkable high level of labour market participation, forcing employers to search for employees from more marginal sections of the work force during upswing periods. Another explanation is to be found in the return to work among those low educated employed that lost their jobs during the recession period.
- The smaller regions showed a local vacancy filling rate above the average level in both investigation periods. This revealed a higher dependency on "own" work force due to less recruitment through in-migration and higher than average out-migration from jobs. The net immigration did, however, compensate somewhat for the net loss through internal migration.
- The self-sufficiency of local vacancy filling tends to increase in upswing periods and decrease in recession periods. This is due to the highly competitiveness of migrants that expects to have stronger effect during recessions when the competition at the labour market mainly is to be found at the supply side.
- The level of education was significantly higher amongst the employed moving between regions compared to that of the non-mobile and the local mobile employed. This difference was, however, slightly reduced during the 1990s, due to the relatively sharper rise in educational levels amongst the non-mobile employed.
- Besides the non-market services, the highest level of education was to be found in pharmaceutical production, finance and information technology.
- The central regions experienced a "brain-drain" through the migration process during the recession period, whilst the smaller regions benefited from a commensurate "brain-gain" over the same period. During the upswing period in 1996-97, this situation was clearly reversed. Pharmaceutical production, finance and energy experienced the highest "brain-gain" through migration, whilst the most pronounced "brain-drain" through migration occurred in sectors such as machine and transport

production, retail, hotel and restaurant, transport, the non-market services and, perhaps a little more surprisingly, in information technology and post and telecommunication.

- Those employed in the Oslo region and in Stavanger showed higher income levels in most sectors than the national average, whilst the situation was reversed in the smaller regions of Kongsvinger and Mo i Rana. The level of income seems to have been somewhat higher in the Oslo region and Stavanger than the average level of education would have itself suggested, whilst the situation was reversed in the regions of Trondheim, Kristiansand and Tromsø.
- The local mobile employed exhibit a significantly higher income growth when compared with the non-mobile employed, and employed migrants showed an even higher increase in income than that of the local mobile employed. In-migrants to Oslo, Stavanger and Tromsø experienced higher income growth compared with out-migrants from these regions. In all other regions however, out-migrants showed higher income increases than their in-migrant counterparts. Higher income rises amongst in-migrants compared with their out-migrant counterparts were most pronounced in the labour intensive manufacturing sectors, electro production, in printing and publishing and in service sectors like wholesale, information technology and basic education.
- The special measure analysing general local performance within local labour markets, revealed that the best local adjustments were to be found in the regions of Stavanger and Bergen during the recession period, and in the regions of Ålesund, Stavanger and Oslo during the economic upswing period. Regions such as Kongsvinger, Kristiansand and Trondheim generally exhibited weaker local performance in the labour market than that of the national average. Thus it was no clear tendency of better general local performances within larger regional labour markets compared to that of medium sized and smaller regional centres.
- Strong local recruitment directly from the educational system can however be seen in the capital region of Oslo, and in the region of Stavanger, whilst many other regions recruited locally from the ranks of the unemployed to the extent that was far above the national average. The increased tightness exhibited by many of the local labour markets during the economic upswing period reveals a clear tendency towards local recruitment from those currently outside the workforce.
- The migration process contributed significantly to total regional labour market performance, particularly so in regions such as Oslo, Stavanger and Kristiansand, and during the upswing period also in Ålesund. On the whole, migration processes

in the regional labour markets appeared to function better in the economic upswing period during the second half of the 1990s than in the recession period at the beginning of the decade, particularly for those with middle and higher levels of education. The highly competitive job-migrants did actually strengthen the weak performances within some local labour markets during the recession period, particularly in regions such as Oslo, Kristiansand and Tromsø. On the other hand the economic upswing period gave room for both local recruitment and in-migration to jobs in the best performing local labour markets, whilst the migration processes themselves contributed negatively to job growth in the less well performing local labour markets.

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