

Regional labour market mobility by education and income

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This article provides a study of regional mobility performance with focus on changes in education and personal income in a sample of nine Norwegian labour market regions. The analysis shows that the level of education was significantly higher amongst the employed moving between regions compared to that of the non-mobile and the employed changing job within regions. The larger regions experienced a “brain-drain” through the migration process during the recession period in the beginning of the 1990s, whilst the smaller regions benefited from a “brain-gain” over the same period. During the upswing period in 1996-97, this situation was reversed. The locally 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 locally mobile employed. In-migrants to Oslo, Stavanger and Tromsø experienced higher income growth compared with out-migrants from these regions. In the other regions however, out-migrants showed higher income increases than their in-migrant counterparts.

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 article the ability to increase the input of, and the returns to human capital investments in different regions and sectors of the regional economy is analysed by using changes in average educational levels and changes in personal incomes among employed. 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.

The analysis of labour market mobility is here limited to a sample of nine Norwegian labour market regions. The regions are aggregated into three main categories representing different types of local labour markets within the nation according to size and structure of the regional economy. The regions are chosen to consist of the three main conurbation regions of the nation (Oslo/Akershus, Bergen and Trondheim), three main regional centres including higher educational facilities as well as research institutes (Stavanger, Kristiansand and Tromsø), and finally three regional centres in smaller regions (Ålesund, Kongsvinger and Mo i Rana). The basic hypothesis is that some similarities should exist in labour market performance be-

tween 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), Stambøl (2000)). 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 concise gross-flows in and out of different sectors and segments in the regional labour markets, i.e. a so-called “vacancy-account”. The analysis presented in this article represents, however, a sample of a more comprehensive investigation on local labour market performance (see e.g. Edvardsson et al. 2000, 2002, Persson ed. 2001, Stambøl 2001,2002).

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.

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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 et al.1996,1997,1999 and Stambøl 1998,1999,2000a,b). In this article the aim is, however, primarily to analyse the change of educational level and personal income among employed persons in regions and sectors connected to job-migrants, as well as investigating how these transitions operate within different and to a certain extent similar local labour markets. It was thus important to compare changes in labour market mobility among employed migrants and non-migrants, investigating the local labour market's inter- and intra-regional transitions. The necessary data for all employed persons 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 here defined as employed persons 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.

The status groups are defined as follows: *Employed persons* are individuals included in a set of different register-based labour market data sources. Besides there are also given definitions of unemployed persons, persons under education and other persons outside the labour force. For more details see e.g. Stambøl (2002). Problems of status occur, however, when employed persons are found in more than one of the registers defining these status groups. It is possible that one person may be included in several registers mentioned, e.g. partly employed, partly unemployed and partly under education in the same year. To solve this problem in the classification of employed persons

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.

Definitions of changes of sectors follow similar patterns as the definitions of migrants, where the Norwegian data shows the economic sector of each employed person in the first and second year of each period. A definition of other variables includes age, the level of education and annual personal income. Individuals of working age are defined as persons within the 16-64 year age group. This age group was chosen because the analysis is part 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. In this analysis 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 employed person is given a "score" for the educational level as follows:

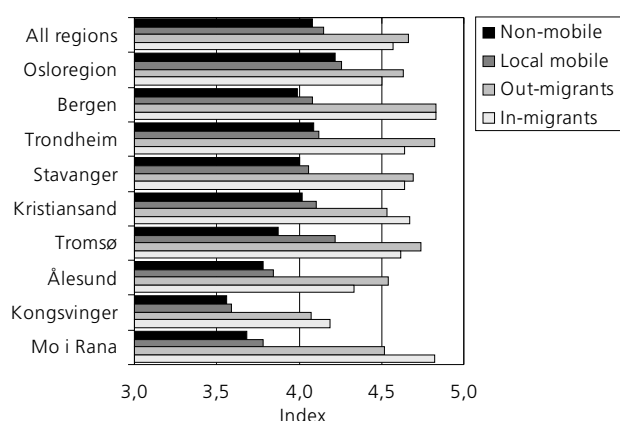
Compulsory education	= 2 points
Upper secondary school (second stage I)	= 3 points
Upper secondary school (second stage II)	= 4 points
Post secondary education (Higher education) (1-2 years)	= 5 points
Post secondary education (Higher education) (3-4 years)	= 6 points
Post secondary education (Higher 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 (NUS89). 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.

The concept of income is here defined by personal income, mainly covering the annual wages each person obtain by ordinary work.

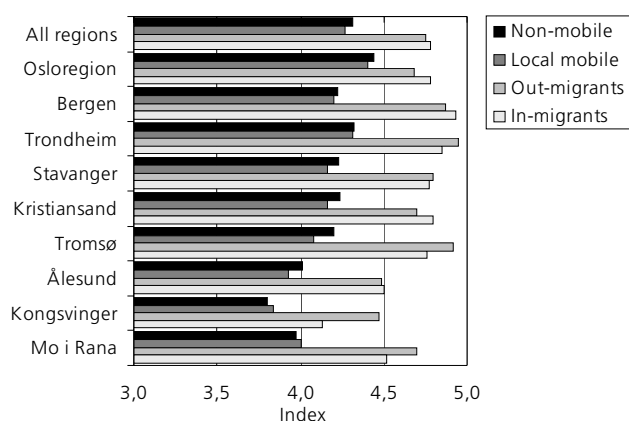
Finally labour market mobility is in this article defined as mobility among employed persons between and within twenty-one economic main sectors and one unspecified sector (see the sectors in tables below) and/or migration between regions.

Figure 1. Average educational level 1990-91 among employed 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region.
Index: Calculated classification of education



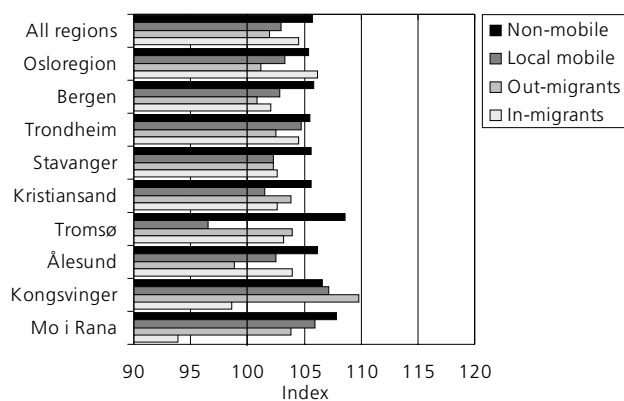
Source: Statistics Norway.

Figure 2. Average educational level 1996-97 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Index: Calculated classification of education



Source: Statistics Norway.

Figure 3. Average educational level 1996-97 in relation to average educational level 1990-91 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Index: Average educational level 1990-91=100



Source: Statistics Norway.

Empirical analyses of “qualitative” labour market mobility

The mobility of human capital

In e.g. Persson ed. (2001) and Stambøl et al. (1999, 2002) we have mainly analysed the quantitative aspects of the regional labour mobility measuring the gross and net streams of intra- and interregional mobility by number of persons. In this article we examine the “qualitative” impacts of labour mobility between and within regions and sectors. 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 returns to their human capital investments 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 the changes in personal income.

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 the concept of average education (for definition see the section above). As described in Stambøl (2002), it was a clear tendency to increase the educational level of the population in all regions during the 1990s, and especially then for the number of people with higher education. In this section we examine which groups contribute most to the rise of the educational level among employed in each region. In figure 1 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 non-migrants. 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 2 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 3, 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 has increased their educa-

tional 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, counterbalanced 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.

Moreover, the “brain-gain”, “brain-drain” approach also poses important questions in terms of regional competitiveness across the different sectors. What are the net effects of the “brain-gain” and “brain-drain” processes across the regions and sectors? The table 1 illustrates the interregional competitiveness of qualified persons between sectors in 1996-97.

As shown in table 1, pharmaceutical production, finance and energy experienced the highest “brain gain” through the migration processes, whilst the most pronounced “brain-drain” sectors through

Table 1. 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	Sta- vanger	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
All sectors	102	101	98	99	102	97	100	92	96	100

Source: Statistics Norway.

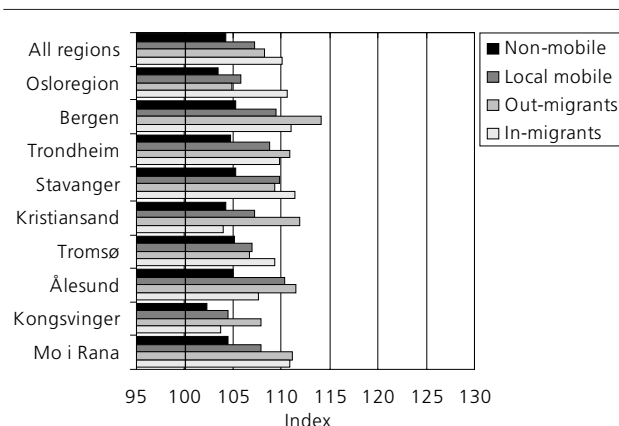
migration were machine and transport production, retail, hotel and restaurant, transport, the non-market services and somewhat more surprisingly information technology and post and telecommunication. At the regional level the most pronounced “brain-gain” effect from internal migration were to be found 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.

Income changes

In the same manner in which qualification streams were investigated in the previous section, this section illustrates the income changes in the different mobility groups and sectors. In figure 4 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 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 supports 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.

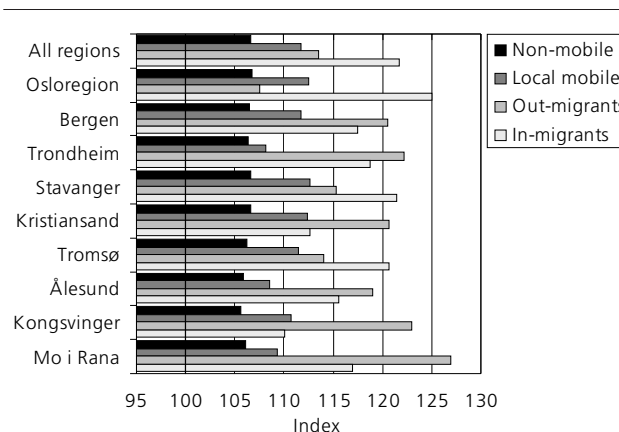
Figure 5 shows similar results from the economic upswinging period in 1996-97. The difference in income change between the groups was however now more consolidated, with lowest income change occurring amongst the non-mobile employed, and higher in-

Figure 4. 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



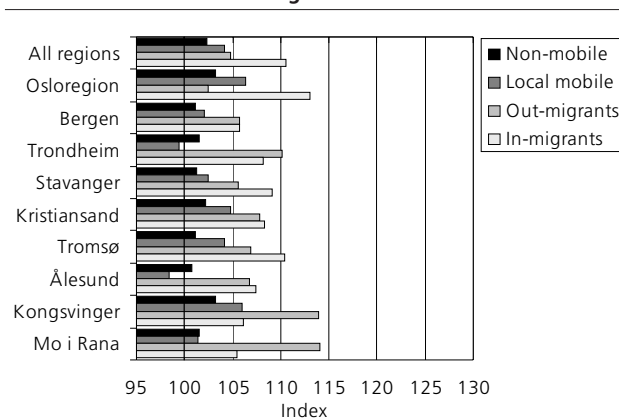
Source: Statistics Norway.

Figure 5. Income change 1996-1997 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Per cent. Index: Income level 1996=100



Source: Statistics Norway.

Figure 6. Income change 1996-97 in relation to income change 1990-91 among employed persons 16-64 years broken down by non-mobile, local mobile, in- and out-migrants. By region. Per cent. Index: Income change 1990-91=100



Source: Statistics Norway.

Table 2. 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	Sta- vanger	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
All sectors	116	97	97	105	93	106	97	90	92	100

Source: Statistics Norway.

come 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 significant 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 5).

In figure 6 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.

The level of income change is also an important target in the regional competitiveness calculations of different sectors. In table 2 the income change amongst the interregional cross sector mobile group is shown for regions and sectors in the 1996-97 period. In the table the average income change of out-migrants from each sector is set at 100, thus index entries above and below 100 illustrates that entries to these sectors show either higher or lower income rises when compared to their leaving counterparts.

Here 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 were 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 were 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. Concluding remarks

- 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.
- 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.
- 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.

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