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**Research Report**

## Economic Growth, Regional Disparities and Employment in the EU-27

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Forschungsberichte

# wiiw Research Reports | 333

*Michael Landesmann and Roman Römisch*

## **Economic Growth, Regional Disparities and Employment in the EU-27**

December 2006

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*Michael Landesmann and  
Roman Römisch*

**Economic Growth,  
Regional Disparities  
and Employment  
in the EU-27**

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## **Executive summary**

### *Income growth and disparities*

- *Despite the acceleration of the economic convergence process over the past six years, the gap between the EU's New Member States (NMS) and Old Member States (OMS) is still sizeable.*
- *At the NUTS-2 regional level, the differences in economic growth and income levels between regions within and across countries are much more pronounced than country-level comparisons would reveal.*
- *The spatial distribution of income per capita shows a distinct core-periphery pattern, not only for the EU-27 (i.e., the EU-25 including the new accession countries Bulgaria and Romania) as a whole but also within many of the individual member states. High-income regions agglomerate in the centre of the EU-27 and incomes per capita are lower the more peripheral the EU-27 regions are.*
- *Within individual countries a strong core-periphery pattern features in Spain and Italy, and with some limitation also in Germany and the UK. The most pronounced core-periphery patterns are found within the NMS, because of the large size of the gap in income per capita between the capital cities and virtually all other regions.*
- *As regards the trends in regional disparities, inequalities across the regions of all NMS increased significantly from 1995 to 2002 and much more strongly than in most of the OMS. In the latter group four countries even show a decline in regional disparities, amongst them the two cohesion countries Greece and Spain, as well as Italy and Austria.*

### *Employment*

- *Compared to incomes per capita, employment rates are much less heterogeneous across the EU-27 countries. Low employment rates are found particularly in Italy, Greece and Spain in the OMS, and in Poland, Bulgaria and Hungary in the NMS.*
- *There is a clear distinction between the OMS and the NMS as concerns employment developments from 1998 to 2003. Without exception, employment rates in the OMS rose over that period, while in the NMS experiences were mixed. In Bulgaria, Hungary, Latvia and Lithuania the employment rates increased, while in the other six employment rates decreased. Thus high income growth rates observed for the NMS only seldom translate into an improvement in the employment situation (phenomenon of 'jobless growth'), in contrast to the OMS, where despite low average income growth employment rates were still growing.*
- *At the NUTS-2 regional level, the spatial distribution of employment rates in the OMS regions has in many instances a strong correlation with the spatial distribution of incomes per capita. In the NMS regions, the distribution of income does not necessarily correlate with the spatial distribution of employment rates, because in the peripheral, low-income regions in the Eastern parts of Poland and Romania the agricultural sector acts as a 'sponge' absorbing those people in employment who are unable to find a job in non-agricultural activities. If we calculate regional employment rates to include only non-agricultural employment, a core-periphery pattern of (non-agricultural) employment emerges in the NMS regions which is similar to the core-periphery pattern of incomes per capita.*



### *Regional types*

- *Grouping the EU-27 NUTS-2 regions into eight clusters according to the relative importance of broad sectors of activities reveals marked differences across the type of regions:*
- *In the capital city regions in the EU-27, GDP per capita is significantly higher than in other regions; this is most pronounced in the NMS. Agricultural regions have generally the lowest income levels. In basic industry regions (labour-intensive and heavy industry regions), incomes are low when compared to the national average and to the forward-looking industries regions (with a strong representation of engineering industries). As for the basic services regions and the mining regions, these show close to national average income levels in the NMS and partly in the Northern OMS. In the Southern OMS they represent problem regions with low income levels. In business services regions, which are usually economic core regions, income levels are higher than average and close to those of the capital cities. Tourism regions show a high income level only in the Southern OMS; in the NMS and the Northern OMS they are below average.*
- *Although the NMS outflanked the OMS in terms of income per capita growth rates over the more recent period, growth was unevenly distributed across the NMS regions quite in contrast to the OMS regions. Thus, in the NMS, the capital city regions grew ahead of all other regions, yet also forward-looking industries regions experienced higher income growth than other NMS region types.*

### *Regional employment by types of regions*

- *Employment rates for the population aged 25 to 64 are highest in the capital cities, the forward-looking industries regions as well as in the business services regions. Basic industry regions also show relatively high employment rates, though in the NMS and the Northern OMS they are below average, while in the Southern OMS they are above average. Low employment rates are found particularly in the mining and the basic services regions.*
- *In the NMS the agricultural regions feature rather high employment rates due to the 'sponge' effect of the agricultural sector, while in the Northern EU-15 they show close to the average national employment rates. Only in the Southern OMS they are lower. Concerning the tourism regions, employment rates are relatively low in the NMS and the Northern EU-15 regions, while the Southern EU-15 employment rates even surpass those of the capital cities.*

### *Employment by educational attainment levels*

- *In the EU-27 countries there is a close relation between educational level and the probability of being employed. Employment rates for the low-educated are without exception much lower than those for the medium-educated, which in turn are lower than those for the highly educated.*
- *At the regional level relatively high employment rates for the low-educated are found in the forward-looking industries and the business services regions across all country groups.*
- *High employment rates for the low-educated are also found in the agricultural regions in the NMS and the tourism regions in the Southern EU-15, though in the NMS this represents mostly hidden unemployment.*
- *Particularly low employment rates for the low-educated are found in the mining and basic services regions across all three groups of countries.*
- *In the NMS the development of employment rates of the low-educated was worst in the capital cities, largely because of a mismatch in the demand and supply of skills. By contrast,*

employment prospects were better within the NMS tourism and forward-looking industries regions. As concerns the OMS, major downward shifts in the low-educated employment rates were observed in the Northern EU-15 capital cities, as well as in the Southern EU-15 mining and basic services regions.

#### *Employment gains/losses by sectors*

- *In most NMS regions the agricultural sector was the main 'contributor' to total job losses. Thus in the agricultural, tourism and forward-looking industries regions the agricultural sector accounted for about 60% to 75% of all losses, while in the other regions its share was lower but, except for the mining regions, still ranged between about 30% and 47%.*
- *Manufacturing accounted for 20% to 30% of the job losses in many NMS regions. Notable exceptions to this are the tourism regions and the industrial regions. In the tourism regions manufacturing employment even increased, while in both the basic industry and the forward-looking industries regions employment losses in the manufacturing sector were considerably lower than elsewhere.*
- *In the NMS mining and basic industry regions, the shake-out of labour was still high in the mining sector, which accounted for about 12% to 20% of all employment losses in those regions.*
- *In the Northern EU-15 countries it was mainly the manufacturing sector where jobs were lost. With the exception of the tourism regions, the manufacturing sector accounted for 65% to above 80% of total losses, followed by the agricultural sector with a share of about 10% to 20% for most regions.*
- *In the Southern EU-15 countries it was mainly the agricultural sector that caused the highest number of job losses. The contribution of manufacturing to the employment decline in the Southern EU-15 was weaker than in the Northern EU-15 and limited to only part of the regions, in particular the tourism and basic industry regions.*
- *Increases in the number of jobs are with minor exceptions found exclusively in the services sectors, in both the NMS and OMS regions.*
- *In the NMS regions increases in the number of jobs occurred predominantly in the advanced services sectors and in public services, while in the OMS the increase of jobs was much more evenly distributed across all services sectors.*
- *With no exception the Northern EU-15 countries lose employment predominantly in the less skill- and technology-intensive basic industries. In the case of the forward-looking industries the decrease of employment is relatively strong in the capital-city, basic and business services regions, but much weaker in the regions specialized in forward-looking industries as well as in the mining regions. In the tourism and basic industries regions, the forward-looking industries sector contributed to the increase of jobs.*
- *In the Southern EU-15 regions a relatively strong labour shake-out of basic industries is observed in the tourism, basic industries and forward-looking industries regions. In contrast to the NMS, the forward-looking industries sector contributes positively to the number of jobs in most of the Southern EU-15 regions, except for the tourism and business services regions.*

#### *Employment by age cohorts*

- *Looking at the contribution of individual age cohorts to the employment losses and gains, we find a significant difference between the NMS and the Northern and Southern EU-15 regions.*

- *In the Northern EU-15 a decline of employment is almost exclusively found, across all regions, for those aged 25 to 29 and 30 to 34. In the Southern EU-15 employment declined in even younger age cohorts (15-19 and 20 to 24), which may reflect an extension of education within the Southern EU-15 regions. In the NMS the distribution of employment losses across age cohorts can in many instances be explained by the ongoing transformation process and accompanying structural changes.*
- *In the NMS employment gains concentrated on the young to middle age cohorts (25 to 29 and 30 to 34) and on the old age cohorts (above 50). In the former case these were the age groups that could already adapt to the new skill and job requirements caused by the pervasive structural changes in the NMS regions. By contrast, the increase in old age employment in the NMS regions is usually related to changes in the retirement regulations, in particular with respect to the retirement age.*
- *In the analysis of the regional employment situation for the young (aged 25-29) and older (aged 50-54) population, we find that in the agricultural regions in the NMS and the Southern EU-15 the employment rates for the young are at a lower level than those for the older age group. This is related to the high employment share of the agricultural sector, providing employment to those unable to find a job elsewhere (presumably mostly the older age group), while the underdevelopment of other sectors, in particular the services sector, leads to a lack of alternative employment opportunities for those entering the labour market.*
- *In the NMS and Southern EU-15 tourism regions, the situation is the opposite. Here the high or growing share of the tourism sector and of services in general are particularly favourable to the young age cohort and less so for the old age cohort.*
- *In the NMS regions the distribution of employment differs across age cohorts in the mining and the basic industry regions. Both types of regions, formerly centres of heavy industry and mining, were struck hard by the decline of these industries during the transition phase. That decline affected mostly the older age cohorts.*
- *In the problem regions in the Southern EU-15, i.e. the mining and the basic services regions, employment rates for the young-aged population are not only significantly below those of the older aged cohorts, but also amongst the lowest in all the Southern EU-15 regions.*
- *Young-age employment as well as the young-age population grew above average in the capital city regions, while both old-age employment and old-age population declined. Similar tendencies are found for the business services regions (with the exception of the Southern EU-15 business services regions), which indicates that large urban agglomerations offer a more favourable environment for the more mobile younger age cohorts, both in terms of employment opportunities as well as in living conditions, than for older age cohorts.*

**Keywords:** regional economic development, regional growth and employment, European Union, Central and East European countries

**JEL classification:** O18, R11

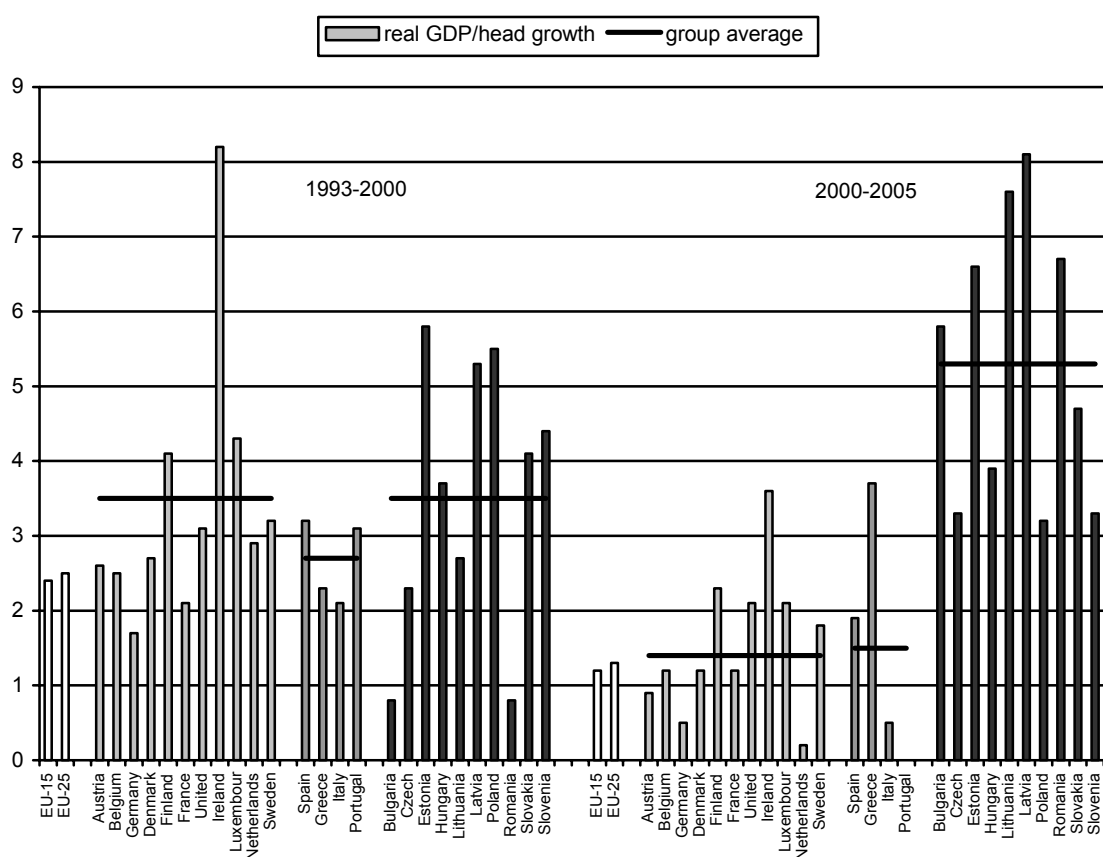
## Economic growth, regional disparities and employment in the EU-27

### 1 Income growth and disparities

Over the past decade and a half, economic developments in the EU-27<sup>1</sup> showed considerable disparities. For the EU's New Member States (NMS) the period immediately following the start of transition (1989/90) was marked by a sharp recession due to the systemic change and its consequences. In the subsequent period (up until approximately 2000) NMS economic development accelerated, but growth continued to be interrupted by various economic crises, such as banking and restructuring crises (viz. Hungary in the mid-1990s, the Czech Republic and Slovakia at the end of the 1990s), thus the catching-up process towards the EU's Old Member States (OMS) was rather slow. Taking the period 1993 to 2000, average real GDP per capita grew at approximately the same rate in the NMS and OMS (see Figure 1).

Figure 1

Real GDP per capita growth, annual averages: 1993-2000 and 2000-2005, in per cent

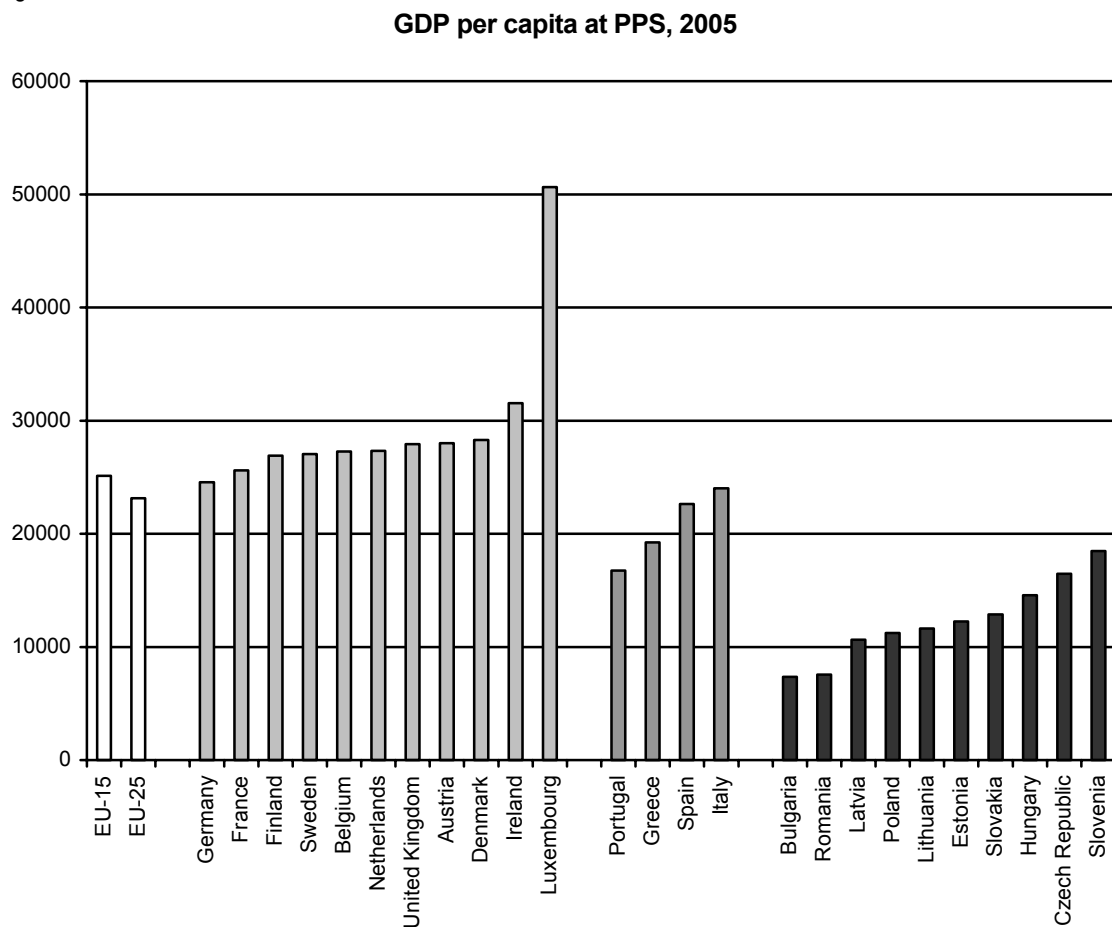


Source: AMECO Database, DG ECFIN.

<sup>1</sup> EU-25 including the accession countries Bulgaria and Romania.

From 2000 onwards, the economic catching-up process of the NMS gained momentum as growth slowed down significantly in almost all OMS, while the NMS economies became more stable and their growth rates outstripped those of the OMS: From 2000 to 2005, the (unweighted) average annual growth in GDP per capita in the NMS was nearly four percentage points higher than the average growth in the OMS. The three Baltic states as well as Bulgaria and Romania registered particularly high growth rates (annual averages of 5.5% and more); in the other NMS growth was somewhat lower (about 3-5% on average) but nonetheless significantly higher than in most of the OMS. Despite the acceleration of the convergence process over the past six years, the income gap between the NMS and the OMS has remains sizeable (see Figure 2) and the closure of this gap will take another few decades – even for the most advanced NMS.

Figure 2

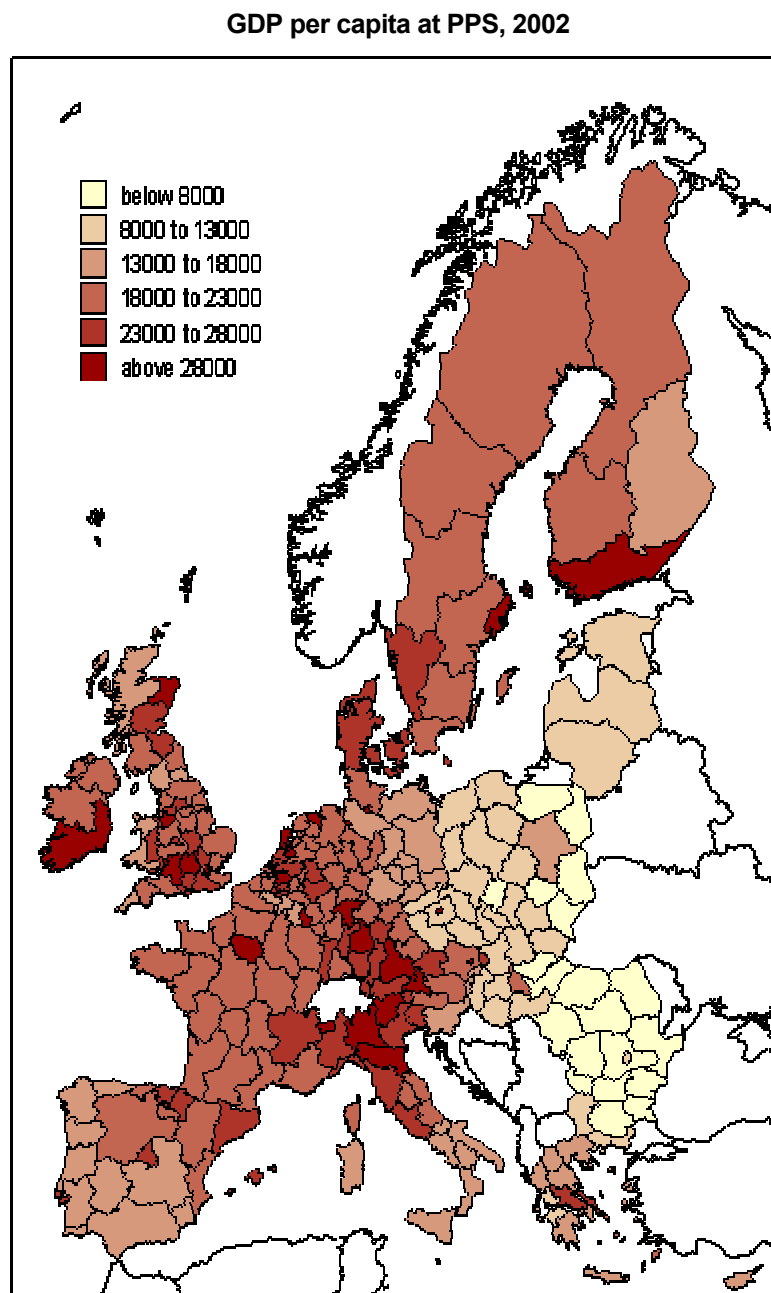


Source: AMECO Database, DG ECFIN.

At the NUTS-2 regional level, the differences in economic growth and income among regions within and across countries are much more pronounced than at the national level. While the development of an individual region is certainly correlated with the development of the respective country, the diversity of the regions with respect to their factor endowments, geographic location, sectoral structure and other aspects causes

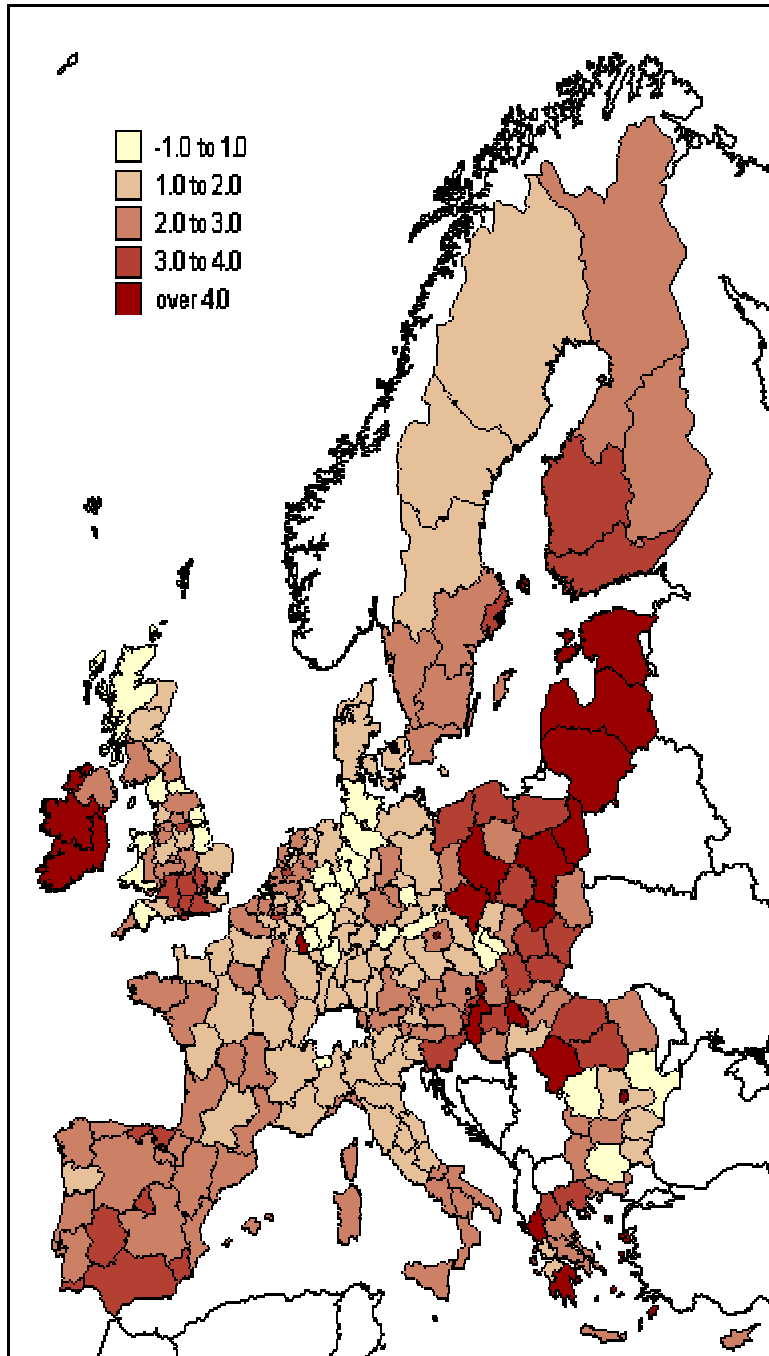
considerable heterogeneity in economic growth and income across regions (see Maps 1 and 2). The spatial distribution of income per capita shows a quite distinct core-periphery pattern not only for the EU-27 as a whole but also within many of the individual member states. A striking feature of the entire EU-27 is an agglomeration of high-income regions in the centre of the EU-27, comprising regions of Southern Germany, Austria, Northern Italy, the Southeast of France and some Benelux regions. By contrast, incomes per capita are lower the more peripheral the EU-27 regions are, such as the regions in the West of Spain and Portugal, Southern Italy and Greece, to some extent also the Northern regions of the Scandinavian countries, and particularly the Eastern regions of the NMS.

Map 1



Map 2

GDP per capita growth, real, annual average 1998-2002, in per cent



Within the individual countries such a core-periphery pattern features for instance in Spain and Italy, where the regions closer to the EU-27 core exhibit higher incomes per capita than the peripheral regions in the West and South of the countries. To some extent such patterns are also found in Germany and the UK, although in the latter the existence of major high-income agglomerations in the centre and the North of the country prevents major regional income disparities as found elsewhere. The most distinct core-periphery

patterns though are found within the NMS. The striking feature within the NMS regions are the gaps in income per capita between the capital cities and virtually all other regions. Although such differences between the capital cities and other regions are also observed in the OMS, they are much more pronounced in the NMS. The NMS capital cities, due to their market potential, factor endowments (skilled population, infrastructure) and sectoral structure, had much less difficulties in overcoming the negative effects of the systemic change (also fuelled by a concentration in the inflows of foreign direct investment) and developed much faster than the other NMS regions.<sup>2</sup>

Another interesting aspect as regards the regional distribution of incomes per capita is the existence of a West-East pattern prevailing in many NMS. In the Czech Republic, Hungary, Poland, Slovakia and, to some extent, Romania the regions that are located closer to Western borders show higher incomes per capita than the Eastern regions. In part this is explained by the proximity of the Western NMS regions to potential markets in the OMS that made them a favourable location for (manufacturing) FDI. These inflows of foreign investment supported economic restructuring in those regions and partly resulted in the emergence of new, technologically advanced, sectors, which in turn had positive effects on income and employment. By contrast, the Eastern NMS regions suffered much more from their adverse geographic location and sectoral structure. On the one hand, the downturn of heavy industries reduced incomes and employment significantly in particular in the Eastern regions of the Czech Republic, Hungary and Slovakia, which under the socialist regime had been specialized in these types of industry. On the other hand, the specialization in (often small-scale) agriculture in combination with a generally low market potential and insufficient endowment with relevant production factors (e.g. skilled population, infrastructure) in many of the Eastern regions of Poland and Romania are major obstacles to economic development in those regions. In consequence, not only are income levels in those regions lower as compared to other regions, but also the prospects for future growth are bleaker.

Information on the extent of regional disparities in income per capita is presented in Table 1. Here the coefficients of variation are calculated across the NUTS-2 and NUTS-3 regions for each of the EU-27 countries. Comparing first the 2002 levels of the coefficients of variation, the income disparities in the NMS both at the NUTS-2 and NUTS-3 regional levels are generally at the higher end of the EU-27. According to the figures, regional

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<sup>2</sup> The statistically observed disparities in income levels between the NMS capital cities and the other regions are not without two major caveats: First, data on differences in regional income do not adjust for differences in the price levels of the regions. Hence, assuming that the price levels in the capital cities are usually higher than in other regions, the income per head in the capital cities is likely to be overestimated, as the same price deflator is used throughout the regions within one country. Second, it may well be that enterprises record their corporate income in the headquarter location and not necessarily where this income is generated originally. Since many of the headquarters are located in the capital cities, this creates another upward bias in the income of the capital cities. Still, at present there is no way to circumvent these problems as no other income data are officially published (by the EU authorities).



Table 1

### Coefficient of Variation, GDP per capita at PPS, NUTS2 and NUTS3 regions

	including capital city regions			excluding capital city regions		
	1995	2002	2002-1995	1995	2002	2002-1995
	NUTS2 regions					
CZ	0.32	0.47	<b>0.15</b>	0.07	0.05	<b>-0.02</b>
HU	0.25	0.37	<b>0.12</b>	0.13	0.19	<b>0.06</b>
PL	0.16	0.21	<b>0.05</b>	0.14	0.14	<b>0.00</b>
SK	0.48	0.54	<b>0.06</b>	0.10	0.07	<b>-0.03</b>
BG	0.19	0.24	<b>0.05</b>	0.03	0.03	<b>0.00</b>
RO	0.25	0.42	<b>0.17</b>	0.11	0.15	<b>0.04</b>
<b>NMS</b>	<b>0.43</b>	<b>0.50</b>	<b>0.07</b>	<b>0.31</b>	<b>0.30</b>	<b>-0.01</b>
<b>OMS</b>	<b>0.29</b>	<b>0.29</b>	<b>0.00</b>	<b>0.25</b>	<b>0.24</b>	<b>-0.01</b>
AT	0.23	0.21	<b>-0.02</b>	0.16	0.15	<b>-0.01</b>
BE	0.37	0.37	<b>0.00</b>	0.16	0.18	<b>0.02</b>
DE	0.25	0.26	<b>0.01</b>	0.25	0.26	<b>0.01</b>
ES	0.20	0.19	<b>-0.01</b>	0.20	0.18	<b>-0.02</b>
FI	0.18	0.24	<b>0.06</b>	0.20	0.26	<b>0.06</b>
FR	0.17	0.17	<b>0.00</b>	0.08	0.07	<b>-0.01</b>
GR	0.19	0.18	<b>-0.01</b>	0.20	0.18	<b>-0.02</b>
IE	0.18	0.19	<b>0.01</b>	.	.	.
IT	0.27	0.25	<b>-0.02</b>	0.27	0.25	<b>-0.02</b>
NL	0.15	0.17	<b>0.02</b>	0.14	0.17	<b>0.03</b>
PT	0.22	0.23	<b>0.01</b>	0.10	0.15	<b>0.05</b>
SE	0.13	0.17	<b>0.04</b>	0.04	0.04	<b>0.00</b>
UK	0.30	0.36	<b>0.06</b>	0.16	0.19	<b>0.03</b>
	NUTS3 regions					
	<b>1995</b>	<b>2002</b>		<b>1995</b>	<b>2002</b>	
CZ	0.26	0.40	<b>0.14</b>	0.07	0.06	<b>-0.01</b>
EE	0.31	0.41	<b>0.10</b>	0.04	0.08	<b>0.04</b>
HU	0.28	0.39	<b>0.11</b>	0.16	0.20	<b>0.04</b>
LT	0.14	0.26	<b>0.12</b>	0.14	0.26	<b>0.12</b>
LV	0.32	0.56	<b>0.24</b>	0.22	0.19	<b>-0.03</b>
PL	0.28	0.43	<b>0.15</b>	0.28	0.32	<b>0.04</b>
SI	0.18	0.20	<b>0.02</b>	0.10	0.11	<b>0.01</b>
SK	0.42	0.49	<b>0.07</b>	0.15	0.13	<b>-0.02</b>
BG	0.24	0.29	<b>0.05</b>	0.16	0.16	<b>0.00</b>
RO	0.24	0.34	<b>0.10</b>	0.21	0.28	<b>0.07</b>
<b>NMS</b>	<b>0.43</b>	<b>0.52</b>	<b>0.09</b>	<b>0.36</b>	<b>0.40</b>	<b>0.04</b>
<b>OMS</b>	<b>0.37</b>	<b>0.38</b>	<b>0.01</b>	<b>0.34</b>	<b>0.35</b>	<b>0.01</b>
AT	0.27	0.25	<b>-0.02</b>	0.25	0.24	<b>-0.01</b>
BE	0.32	0.33	<b>0.01</b>	0.23	0.25	<b>0.02</b>
DE	0.41	0.43	<b>0.02</b>	0.41	0.43	<b>0.02</b>
DK	0.25	0.25	<b>0.00</b>	0.25	0.25	<b>0.00</b>
ES	0.21	0.21	<b>0.00</b>	0.21	0.20	<b>-0.01</b>
FI	0.17	0.22	<b>0.05</b>	0.15	0.18	<b>0.03</b>
FR	0.30	0.34	<b>0.04</b>	0.21	0.27	<b>0.06</b>
GR	0.33	0.31	<b>-0.02</b>	0.33	0.31	<b>-0.02</b>
IE	0.19	0.22	<b>0.03</b>	0.12	0.16	<b>0.04</b>
IT	0.26	0.24	<b>-0.02</b>	0.26	0.24	<b>-0.02</b>
NL	0.20	0.21	<b>0.01</b>	0.18	0.19	<b>0.01</b>
PT	.	0.28	.	0.12	0.21	<b>0.09</b>
SE	0.10	0.13	<b>0.03</b>	0.05	0.05	<b>0.00</b>
UK	0.38	0.46	<b>0.08</b>	0.20	0.27	<b>0.07</b>

Source: New Cronos Database, own calculations.

disparities are most pronounced in Slovakia, the Czech Republic, Romania and Hungary (as well as in Estonia and Latvia at the NUTS-3 regional level), followed by Belgium and the UK in the OMS, while disparities in Poland, Bulgaria, Slovenia and Lithuania are only slightly above or even in line with those found in the bulk of the OMS. Given the huge differences in income per capita between the capital cities and most other regions, the measure for regional disparities is also given excluding the capital cities. As a result, the situation changes markedly: the majority of NMS (both at the NUTS-2 and NUTS-3 levels) are at the lower end of the spectrum of the total EU-27. Thus – disregarding the capital cities – across all EU-27 countries regional incomes per capita are most equally distributed in the Czech Republic, Slovakia and Bulgaria in the NMS, and in Sweden and France in the OMS, while the disparities in the other NMS are at a comparable level to the remaining OMS.

As regards the trends in regional disparities, Table 1 shows clear evidence that from 1995 to 2002 inequalities across the regions (including the capital cities) of all NMS increased significantly and much more strongly than in most of the OMS. In the latter group, four countries even show a decline in regional disparities: the two cohesion countries Greece and Spain as well as Italy and Austria. Excluding the capital cities from the sample greatly reduces the growth of regional disparities within most NMS and OMS. In two NMS, the Czech Republic and Slovakia, we even find evidence for convergence of non-capital city regions, while in three other NMS (Hungary, Romania and Lithuania at the NUTS-3 level) a significant increase in disparities still continues, comparable to those observed in Portugal and the UK among the OMS. These trends in regional disparities are summary indicators of differences in real growth of regional income per capita (Map 2). Thus in the NMS it was particularly the capital cities that grew much more strongly than most of the other regions (except for the Western regions in Hungary and Romania), while in the four OMS where convergence was found the peripheral regions grew ahead of most of the other regions.

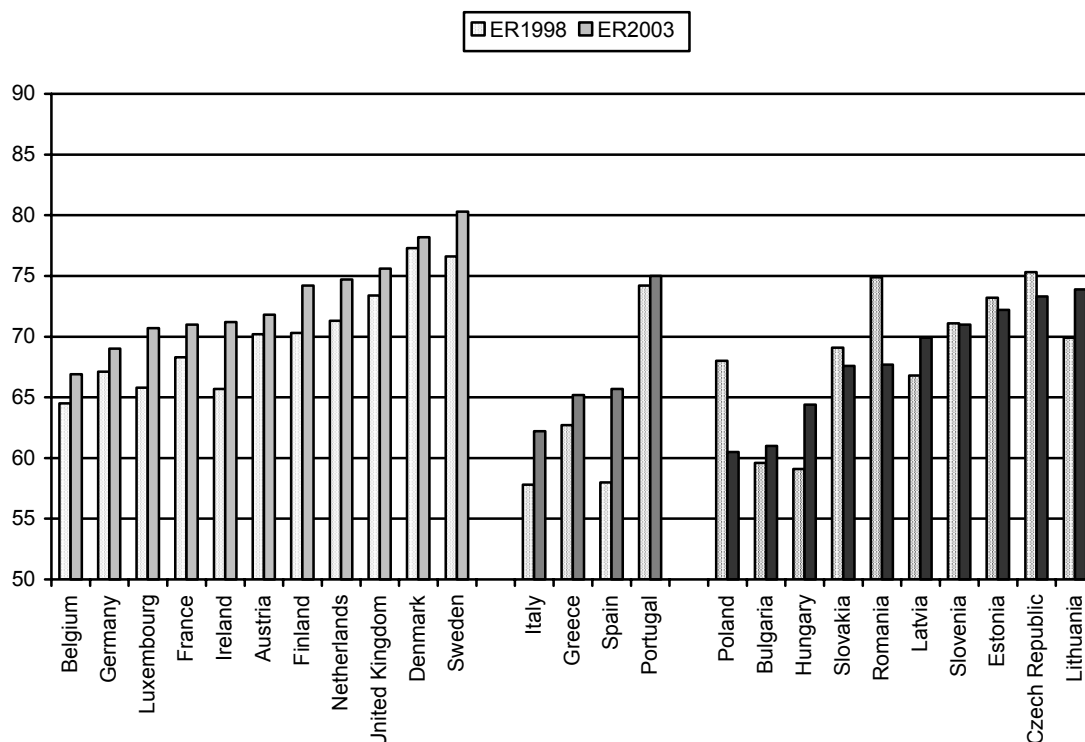
## **Employment**

Compared to incomes per capita, where we found a clear differentiation between the OMS and the NMS, employment rates are much less heterogeneous across the EU-27 countries. Thus in 2003, employment rates (i.e. the number of employed divided by the total population aged 25-64) vary not so much between country groups rather than across countries independently of whether they belong to the OMS or NMS. Figure 3 shows that in both groups there are a number of countries with rather high employment rates, while simultaneously there are also a number of countries with low employment rates, such as Italy, Greece and Spain in the OMS, and Poland, Bulgaria and Hungary in the NMS. By contrast, looking at the overall employment developments from 1998 to 2003, there is a clearer distinction between the OMS and the NMS. Without exception employment rates in the OMS rose over that period, with particularly high increases registered in Spain, Italy,

Ireland and Luxembourg, where employment rates grew by four percentage points or more over the five-year period. In the NMS experiences were mixed; out of the ten countries, four (Bulgaria, Hungary, Latvia and Lithuania) experienced an increase in employment rates, while in the other six employment rates decreased. In two of the six countries, Poland and Romania, the employment situation worsened quite dramatically, with employment rates dropping by more than seven percentage points in both countries.

Figure 3

**Employment rates, 1998 and 2003, population aged 25-64**

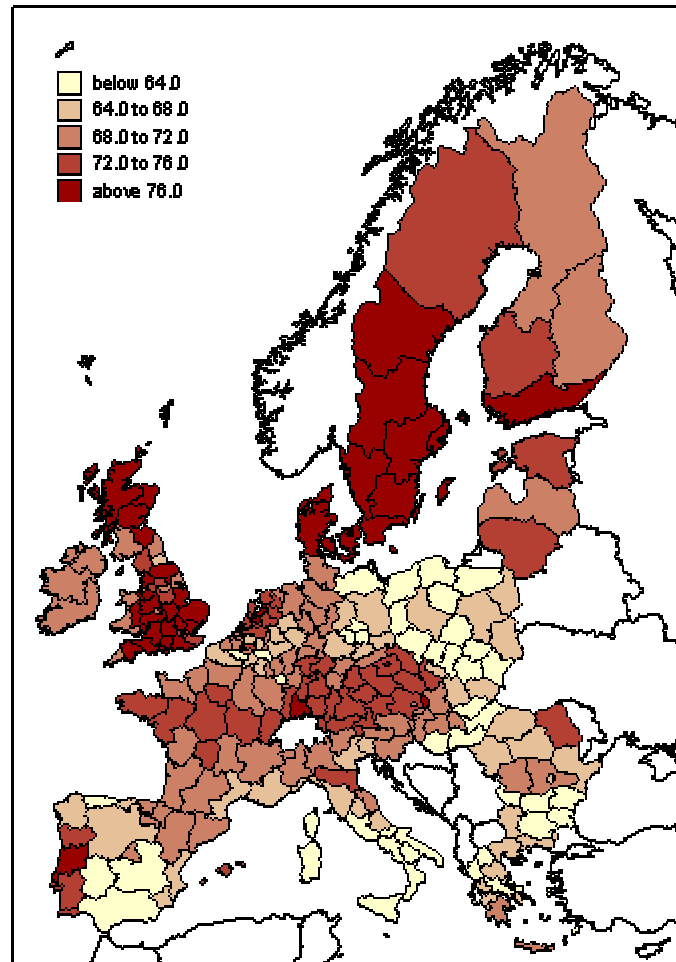


Thus, high income growth rates in the NMS only rarely translated into an improvement in the employment situation, as opposed to the OMS where, despite low average income growth, employment rates were still growing. To a large extent this phenomenon of 'jobless growth' in the NMS reflects, on the one hand, the sizeable gap in average (labour) productivity between the NMS and the OMS and, on the other (as we will show in the subsequent analysis), an underdevelopment of the services sector, which is the main employment generator in the OMS. Hence periods of strong catching-up in productivity in the NMS, which induce labour saving, are hardly compensated by growth of employment opportunities in the services sector.

The spatial distribution of employment across the NUTS-2 regions, shown in Map 3, shows in many instances a strong correlation with the spatial distribution of incomes per capita.

Map 3

Employment rate, 2003, population aged 25-64



Thus, as far as the OMS are concerned, a core-periphery pattern of employment similar to that of income per capita exists, as the regions in the core of the EU-27 exhibit higher employment rates than the peripheral regions in Spain, Italy and Greece. Yet, with respect to the NMS, such a pattern does not emerge: in contrast to the regional distribution of income, the peripheral, low-income regions, in particular in the Eastern parts of Poland and Romania, show higher employment rates than the higher-income regions in the Western parts. The explanation for this atypical situation is that these peripheral low income–high employment regions are heavily specialized in agriculture, with the agricultural sector acting as a kind of ‘sponge’ absorbing those people in employment that are unable to find a job in non-agricultural activities. If, however, we calculate regional employment rates to include only non-agricultural employment, this results in the emergence of a core-periphery pattern of (non-agricultural) employment in the NMS regions which is similar to the core-periphery pattern of incomes per capita.

This similarity of the core-periphery patterns of regional income per capita and of non-agricultural employment rates in both the NMS and OMS is the expression of a general correlation between income and employment across the EU-27 regions. In order to show that this correlation holds across the EU-27 countries despite their different income and employment levels, we calculate for each region its income per capita and (non-agricultural) employment rate relative to the respective country average. Plotting these relative income levels against the relative employment rates (see Figures 4a-4d), we find a strong correlation for the regions of the four Southern countries of the OMS and for the regions of the NMS, independently of whether capital cities are included or excluded in the latter group. For the regions of the Northern countries of the OMS, the correlation is also significant, but it is weaker than for the other two groups of countries.

The stronger link between income levels and employment rates in the less advanced regions and countries is probably mostly due to the link between services sector development (and hence the generation of employment opportunities in that sector) and income or general economic development. A basic rationale for this link is, e.g., provided by the base-multiplier theory in regional economics (for an outline see Fujita, Krugman and Venables, 1999). According to this theory a rise in regional income increases the share of income that is spent locally and as a consequence increases the local market and, in turn, employment. Thus, it becomes profitable to produce a wider range of goods and services because the growing market facilitates the exploitation of economies of scale and scope across a wider range of economic sectors. This expansion of activities generates new income and employment that increase the local market, and hence generates a cumulative process of regional economic development. In theory the limits to that process are given by a region's export base (i.e. the goods and non-factor services it produces for, as well as the factor services it offers to, external markets) and the amount of regional endowments required by the export base.

For the EU-25 regions, Figure 5 suggests a non-linear relation between the services share in total employment and the regional GDP per capita.

Given the non-linearity found in Figure 5, this might explain the weaker correlation of relative income and relative employment levels in the regions of the Northern EU-15 than in the regions of the Southern EU-15 and the NMS. Figure 5 shows that incomes in the Northern EU-15 regions are relatively high and more equally distributed combined with a high and similar employment share of the services sector, whereas incomes in the regions of the Southern EU-15 and the NMS are lower and more dispersed, with the consequence that also the services sector (and its ability to generate jobs) is at different levels of development across the regions.

Figure 4a

**Correlation between relative employment rates (without agriculture)  
and relative GDP per capita, EU-South\***

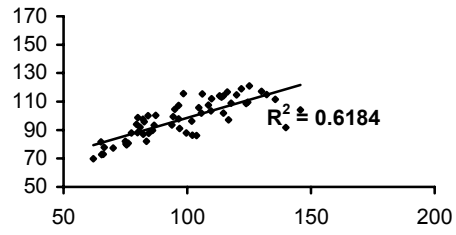


Figure 4b

**EU-North**

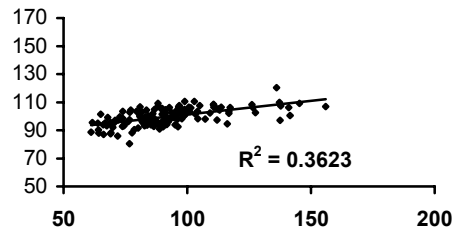


Figure 4c

**NMS with capital cities**

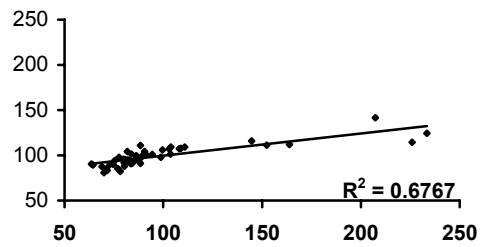
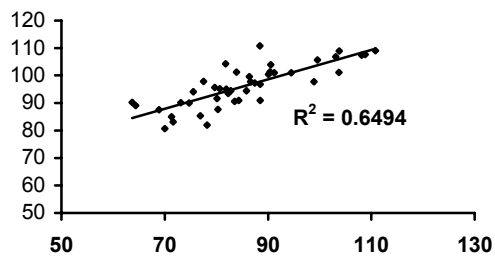


Figure 4d

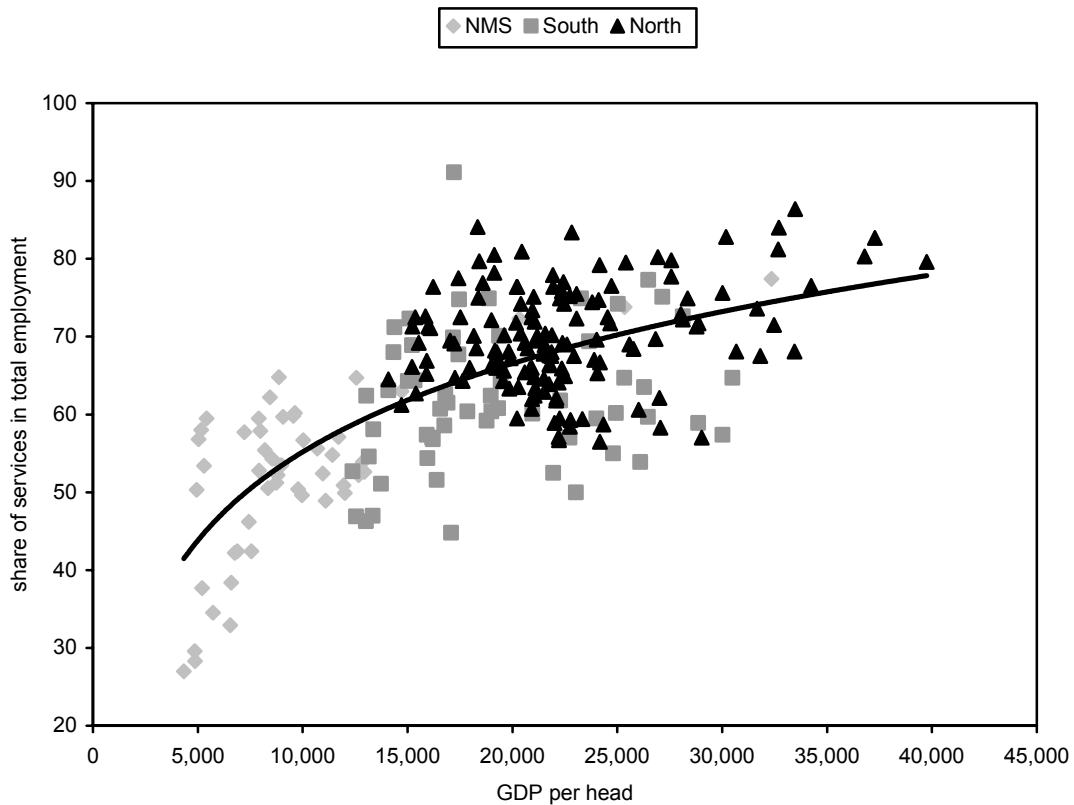
**NMS without capital cities**



Note: The 'relative' refers to variables always expressed relative to the country average.

Figure 5

### Correlation between absolute GDP per capita and the share of services in total employment



## 2 Regional clusters

In the following we investigate more closely how the economic structure of the EU-27 regions is correlated with their economic performance. We use information on the regions' sectoral structures – more precisely, on the regions' pattern of sectoral specialization – and relate this to their development in income and employment.

Given the limitations of regional data availability with respect to output or value added statistics by sectors, the regional pattern of specialization is derived using labour force survey employment data, which are available at the NUTS-2 regional level and at a NACE 2-digit sectoral breakdown. We define a region to be specialized in a particular sector according to which sectoral employment shares differ most strongly from the national (average) employment structure.

We define eight clusters of groups of regions, each with a particular specialization pattern. The more than 250 individual EU-27 NUTS-2 regions are assigned to these clusters, such that the correspondence of the specialization pattern of the respective region and the

respective cluster is as high as possible, and as different as possible from that of all other types of clusters (for details on the grouping of regions see Box 1).

In detail this means that each cluster contains a set of regions which are all specialized in the same economic sector; with regard to the definition of these clusters we rely on the definition derived in a similar analysis performed earlier for the NMS regions only (Landesmann and Römisch, 2005).

The eight clusters are defined as:<sup>3</sup>

- **agricultural regions:** are those regions in which the agricultural sector is more prominently represented (relative to the national average) in the employment structure than any other sector.
- **mining industry regions:** In these regions the employment share of the mining industry distinguishes the region most from the employment structure in the country as a whole.
- **basic industry regions:** these regions show a particularly strong presence of two types of industries: heavy industries such as metallurgy, but also labour-intensive industries such as textiles and clothing. The interest in these types of regions arises from the hypothesis that a strong presence of these industries reveals a legacy of the past when highly capital-intensive industries were supported by communist industrial (and regional) policy and – in the course of the transition process – these have become problem regions; on the other hand, the strong presence of labour-intensive branches indicates a potential competitive threat (in particular in the more advanced NMS) from countries with even lower wage rates.
- **forward-looking industries regions:** In this cluster regions specialized in the various engineering industries (mechanical, electrical and instrument engineering) are included: earlier, more detailed analysis (see e.g. Landesmann, 2000 and 2003) has shown that these industries experienced in the more advanced NMS the fastest productivity developments, the highest FDI inflows and also the strongest growth in exports to EU markets. A strong presence of such industries in a region thus reveals a comparative advantage in a part of the industrial sector which underwent quite successful modernization.
- **basic services regions:** These regions show a strong presence of those types of services (wholesale and retail trade, transport, postal services, etc.) that are evidence of some urbanization, but may also reflect a relative lack of any other type of employment opportunities.
- **tourism regions:** It turns out that some regions which have a high share of agriculture and of services in general are also important tourist destinations and hence show some

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<sup>3</sup> See also Landesmann and Römisch (2005).



distinct features compared to basic services or agricultural regions; they are therefore identified separately.

- **business services regions:** Certain regions, in particular those with large agglomerations, are (besides the capital cities) economic core regions. As such they exhibit a markedly higher share of financial and business services than most other regions. This cluster has been added to the types of regions defined in Landesmann and Römisch (2005), as the previous analysis was on the NMS regions only, where no business services regions were identified.
- **capital city regions:** Capital cities have a very special position in most of the NMS and OMS in terms of their economic structure, given the high share of employees in services in general and business services in particular, as well as in income and growth terms (see the earlier discussion).

Box 1

### Grouping of regions

The grouping of the more than 250 NUTS-2 regions of the OMS and NMS into our pre-defined clusters involved two steps.

Step 1 consisted in calculating for each region the ratio of the regional employment share of each sector ( $E_{r,s}$ ) in total regional employment ( $E_r$ ) to the country share of that particular sector ( $E_s$ ) in total country employment ( $E$ ). This was done using detailed NACE 2-digit regional employment data, which were aggregated into seven main sectors. Those sectors ( $s$ ) were agriculture, mining, basic industries, forward-looking industries, basic services, tourism and business services. We aggregated the NACE 2-digit sectors A, B to agriculture; the sectors CA, CB, E to mining; the sectors DA, DB, DC, DD, DE, DH, DI, DJ, DN to basic industries; DF, DG, DK, DL, DM to forward-looking industries; the sectors G, I, L, M, N, O, P, Q to basic services; H referred to tourism and J and K to business services.

Step 2 consisted of the actual grouping of the NUTS-2 regions according to the eight types of clusters. For this we followed a two-tier approach. In the first part we assigned the regions manually to the individual clusters basically following the rule

$$\max_s \left( \frac{\frac{E_{r,s}}{E_r}}{\frac{E_s}{E}} \right)$$

Hence we grouped the regions into the clusters according to in which sector  $s$  had the largest share relative to the national average.

As this assignment might be criticized for its *ad-hoc* nature and since we could not make a clear assignment to a certain cluster for a small number of regions, we also adopted, in the second part, a more technical approach to the grouping of regions, by performing a cluster analysis.

Without adopting *a priori* a particular similarity or dissimilarity measure that would be best suited for a grouping of regions, we performed the cluster analysis using a wide variety of these measures and selected those which gave the most clear-cut results with respect to the grouping of regions according to their sectoral structure.

This means that the cluster analysis was originally performed using the following measures, with  $x_{si}$  referring to the (relative) share of sector  $s$  (of a total of seven sectors) of a region  $i$  and  $x_{sj}$  being the group mean (relative) share of sector  $s$  for group  $j$ ; we pre-set the numbers of groups to 7 ( $j = 1, 2, \dots, 7$ ):

Euclidean distance ( $c_E$ ):

$$c_E = \left\{ \sum_{s=1}^p (x_{si} - x_{sj})^2 \right\}^{1/2}$$

Squared Euclidean distance ( $c_{SE}$ ):

$$c_{SE} = \sum_{s=1}^p (x_{si} - x_{sj})^2$$

Absolute value distance or the Minkowski distance metric with argument 1 ( $c_{M1}$ ):

$$c_{M1} = \sum_{s=1}^p |x_{si} - x_{sj}|$$

Minkowski distance metric with argument  $a$  ( $c_{Ma}$ ), with  $a = 3, 4$ :

$$c_{Ma} = \left( \sum_{s=1}^p |x_{si} - x_{sj}|^a \right)^{1/a}$$

Minkowski distance metric with infinite argument ( $c_{MI}$ ):

$$c_{MI} = \max_{s=1, \dots, p} |x_{si} - x_{sj}|$$

Minkowski distance metric with argument  $a$  ( $c_{Maa}$ ), raised to power  $a$ , with  $a = 3, 4$ :

$$c_{Maa} = \sum_{s=1}^p |x_{si} - x_{sj}|^a$$

Canberra distance measure ( $c_C$ ):

$$c_C = \sum_{s=1}^p \frac{|x_{si} - x_{sj}|}{|x_{si}| + |x_{sj}|}$$

Correlation similarity measure (ccor):

$$C_{cor} = \frac{\sum_{s=1}^p (x_{si} - \bar{x}_i)(x_{sj} - \bar{x}_j)}{\left\{ \sum_{s=1}^p (x_{si} - \bar{x}_i)^2 \sum_{s=1}^p (x_{sj} - \bar{x}_j)^2 \right\}^{1/2}}$$

Angular separation similarity measure (ca):

$$C_a = \frac{\sum_{s=1}^p x_{si} x_{sj}}{\left\{ \sum_{s=1}^p x_{si}^2 \sum_{s=1}^p x_{sj}^2 \right\}^{1/2}}$$

Hence in each cluster analysis seven groups were formed through an iterative process, with each region being assigned to the group whose mean or median was closest. For the distance measures this means that a region was assigned to a certain group for which the cluster measure c was minimized, whereas for the correlation and angular cluster measure the region was assigned to that particular group for which c was maximized. Based on this classification new group means or medians were formed until no region changed its group.

The initial group means or median were chosen arbitrarily. As results depended much on these initial group means and medians, we ran for each of these cluster measures 50,000 iterations with randomly chosen initial group means or medians, selecting those results as final for which the cluster measures summed over all regions i were minimized (or maximized for the correlation measures). The final clusters were chosen according to (with x being one of the cluster measures):

$$\left. \begin{array}{l} \min \\ \max \end{array} \right\} \sum_i c_x \quad \begin{array}{l} \text{for distance measures} \\ \text{for correlation measures} \end{array}$$

Of all the results (which are given in the Appendix), the Euclidean distance measures using the group means instead of the group medians provided the most sensible results, so that they were used to check our first step categorization of regions. As a tendency the correlation between the first step method and the cluster analytic grouping was rather high. In those cases where there were differences in the regions' assignment to particular groups, we relied on the results of the technical cluster analysis in most, but not all cases. As a result, the final grouping of regions that we use throughout the study is a mixture between the two types of approaches.

The characteristic sectoral structure of each cluster is given in Table 2 which shows the weighted shares of each sector averaged over all regions within a particular cluster; Table 3 shows the average (weighted) relative shares of each sector in that cluster. Apart from identifying the characteristics of the clusters containing all EU-27 regions, we made another distinction, separating in each cluster the EU-27 into NMS and OMS regions, and further the OMS regions into OMS Northern and OMS Southern regions, in order to show the characteristic differences between those groups of countries. This distinction will be maintained throughout the following analysis.

Table 2

**Cluster characteristics, (population weighted) average share of sectors, 2003**

Clusters	Sectors							
	Agriculture	Mining	Manufacturing	Basic industry	Fw looking industries	Basic services	Tourism	Business services
<b>ALL</b>								
Capitals	2.4	1.2	13.3	8.6	4.7	53.9	4.6	17.4
Agricultural	15.3	1.5	16.3	11.5	4.8	47.2	3.9	7.2
Mining	5.5	5.0	16.3	10.9	5.0	52.0	4.2	8.7
Basic industry	5.5	1.4	24.0	17.0	7.1	48.8	3.6	9.0
Fw looking industries	3.9	1.2	26.2	14.6	11.6	47.1	3.7	10.7
Basic services	5.1	1.5	15.6	9.3	5.9	55.2	3.7	10.5
Tourism	7.2	1.3	11.1	8.5	2.6	51.2	10.6	8.3
Business services	1.2	0.9	15.2	7.5	7.7	53.6	3.5	19.4
<b>NMS</b>								
Capitals	4.4	2.1	16.9	12.0	5.3	52.4	3.5	13.5
Agricultural	30.8	3.0	19.0	15.2	5.6	36.2	1.9	3.7
Mining	5.3	11.4	20.9	19.4	2.0	50.6	2.1	4.8
Basic industry	10.5	2.8	27.6	21.0	7.6	43.5	2.9	5.4
Fw looking industries	10.1	2.6	30.8	20.2	11.7	40.0	3.1	5.6
Basic services	11.1	3.5	22.6	17.3	8.0	46.3	2.5	6.8
Tourism	12.6	2.7	20.6	14.8	5.8	48.3	6.0	3.1
<b>OMS</b>								
Capitals	1.5	0.8	11.6	7.2	4.4	54.6	5.2	19.2
Agricultural	11.1	1.0	15.5	10.9	4.7	50.2	4.5	8.2
Mining	5.5	4.0	15.6	10.3	5.3	52.2	4.5	9.3
Basic industry	3.9	0.9	22.9	16.0	7.0	50.4	3.8	10.0
Fw looking industries	2.8	0.9	25.3	13.7	11.6	48.4	3.8	11.7
Basic services	4.0	1.2	14.3	8.7	5.8	56.9	3.9	11.2
Tourism	6.4	1.0	9.6	7.5	2.1	51.7	11.3	9.1
Business services	1.2	0.9	15.2	7.5	7.7	53.6	3.5	19.4
<b>EU-North</b>								
Capitals	1.3	0.7	10.9	6.3	4.5	54.6	5.2	21.4
Agricultural	6.2	1.0	17.1	11.0	6.1	53.9	3.7	9.7
Mining	3.3	3.7	16.4	10.3	6.1	55.2	4.1	10.1
Basic industry	2.5	0.9	22.4	14.6	7.8	52.5	3.3	10.7
Fw looking industries	2.5	0.9	24.4	12.5	11.9	50.1	3.5	11.9
Basic services	2.8	1.2	15.4	9.1	6.5	56.7	3.7	12.1
Tourism	4.4	1.1	11.6	8.0	3.6	56.9	6.4	12.1
Business services	1.0	0.8	15.2	7.4	7.8	53.6	3.4	19.8
<b>EU-South</b>								
Capitals	2.0	1.0	13.3	9.2	4.2	54.6	5.1	14.4
Agricultural	17.7	1.1	13.5	10.7	2.7	45.3	5.6	6.2
Mining	10.4	4.8	13.7	10.3	3.4	45.6	5.5	7.6
Basic industry	8.2	0.9	24.6	20.0	4.6	44.1	5.3	7.9
Fw looking industries	3.6	0.9	28.2	17.6	10.7	42.9	4.7	11.0
Basic services	11.5	1.2	8.6	6.6	2.0	57.9	5.2	6.3
Tourism	7.6	1.0	8.4	7.2	1.2	48.4	14.4	7.3
Business services	3.4	1.3	14.3	7.7	6.6	54.6	5.4	14.2

Table 3

**Cluster characteristics, (population weighted) average share of sectors –  
relative to country average, 2003**

Clusters	Sectors							
	Agriculture	Mining	Manufacturing	Basic industry	Fw looking industries	Basic services	Tourism	Business services
<b>ALL</b>								
Capitals	32.9	74	70.6	64.8	82.9	110.8	112	169.2
Agricultural	188.3	97	85.3	91.4	74.5	97.8	91.1	70.1
Mining	92.4	295.9	94.6	101.8	75.4	103.9	92.1	87.2
Basic industry	92.3	97.3	122	136.4	96.8	97.2	94.1	80.1
Fw looking industries	85.3	88.8	136.2	123.5	157.7	90.8	95.5	93.8
Basic services	112.6	111.6	84.2	82.3	80.6	108.7	95	88.5
Tourism	101.5	84.7	59.4	60.2	56.8	106.3	170.5	91.9
Business services	60.3	79.4	82.9	72.9	95.1	99.8	93.8	139.8
<b>NMS</b>								
Capitals	49.1	58.7	77.5	76.3	80.1	121.3	100.1	203.4
Agricultural	152.6	89.1	87.6	89.8	89.8	87.3	83.5	70.6
Mining	22.9	373.4	105.1	104.7	38	106.3	101.2	93.5
Basic industry	104.1	91.4	114.5	120.5	91.5	97.8	97.8	80.8
Fw looking industries	100.2	90	128.9	120.3	150.1	92.8	95.2	78.3
Basic services	68.7	106.6	104	98.8	105.3	109.5	116.1	101.1
Tourism	127.1	73.6	86.1	80.1	108.1	101	127.2	65.2
<b>OMS</b>								
Capitals	28.1	78.5	68.5	62.6	83.4	107.6	115.6	159
Agricultural	201.8	99.9	84.4	91.9	70.3	101.8	94	69.9
Mining	115.9	269.7	91.1	101.7	76.7	103.1	89.1	85
Basic industry	89.1	98.9	124	139.7	97.9	97	93.1	79.9
Fw looking industries	82.9	88.6	137.3	123.8	158.5	90.5	95.5	96.3
Basic services	121.7	112.7	80.1	81.1	78.8	108.5	90.7	85.9
Tourism	97.4	86.4	55.1	57.1	48.7	107.1	177.4	96.2
Business services	60.3	79.4	82.9	72.9	95.1	99.8	93.8	139.8
<b>EU-North</b>								
Capitals	27.4	71.4	65.1	60.2	72.8	102.3	130.1	160.1
Agricultural	209.7	96.7	92	99.8	81.7	102.8	97.8	70
Mining	106.4	258.7	96.8	109.2	81.7	102.8	86.2	87.6
Basic industry	89.5	103.6	123	138.9	102.2	98	91.5	78.2
Fw looking industries	96.6	88.6	135.8	119.8	156.4	92.7	95	87.1
Basic services	114.8	111.2	87.5	88.5	86.3	104.9	92.8	89.7
Tourism	99.3	85.9	62.4	60.5	65.2	107.9	143.8	103.9
Business services	59.6	77.3	84	74	95.6	99	91.7	140.4
<b>EU-South</b>								
Capitals	29.3	90.8	74.3	66.9	101.8	116.8	90.5	157.1
Agricultural	193.1	103.5	76.1	83.3	57.8	100.7	89.9	69.7
Mining	148.3	307.6	71.3	75.9	59.5	104.2	99.1	76.1
Basic industry	88	85.6	126.8	141.8	85.7	94.2	97.6	84.5
Fw looking industries	64	88.5	139.4	129.3	161.5	87.4	96.2	108.9
Basic services	147.9	118.3	51.7	52.9	50.4	122.2	82.4	71.4
Tourism	94.1	87.4	42.8	51.3	20.9	105.8	233.9	83.2
Business services	74.2	119.4	63.5	51.8	86.5	113	132.6	128.2

On average, the employment share of the agricultural sector within the regions of the agricultural cluster is at least approximately twice as high as in other regions; this proportion is very similar for the NMS and the OMS (North and South). In absolute terms though, the agricultural share is highest in the NMS agricultural regions and lowest in the OMS Northern regions. The fact that, apart from the NMS agricultural regions, the share of agriculture is – compared to the OMS regions – also high in other types of NMS regions, and partly so in certain types of OMS Southern regions, shows the extent of structural changes that – given the tendency for economic structures to converge – lie ahead of many regions of the NMS and some of the OMS South.

### **3 Regional income levels and growth by types of regions**

Differences in regional income levels and income growth are to a certain extent associated with differences in the sectoral specialization of regions.

With respect to income levels, the highest GDP per capita by far is found in the capital city regions within the EU-25.<sup>4</sup> Although the difference in income levels to other regions is quite significant across all EU-25 countries, the extent of these differences varies across country groups (i.e. the NMS, the Northern OMS and the Southern OMS regions).

The largest income gap between the capital city regions and the other regions is found in the NMS, which is consistent with the previous discussion regarding the high regional disparities in this group of countries.

Expressed in figures this means that the GDP per capita of the NMS capital city regions is on average 170% of the respective country average GDP per capita, while all other regions hardly reach, or are much below, the average income level (see Figure 6). In the OMS the gap is smaller, reflecting also the smaller income disparities across the OMS regions. Still, the dominant position of the capitals is also visible in the OMS, particularly so in the Northern OMS countries, where some of the capital cities are not only local centres of economic activity but even global ones (such as Inner London, Île de France, Brussels). This is one of the reasons why there is a larger gap between the capitals and other regions in the Northern OMS than in the Southern OMS. Another reason relates to the fact that, in the Southern OMS, there exists a relatively large number of comparatively prosperous regions besides the capital cities, particularly so in Northern Italy or the North-West of Spain, in addition to the important tourism regions in those countries, whose income per capita is similar to or even surpasses the income per capita of the capital cities in the respective countries. This is corroborated by Figure 6, which shows that in the Southern

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<sup>4</sup> The caveats with respect to the GDP per head of the capital cities mentioned in footnote 2 apply here, too.

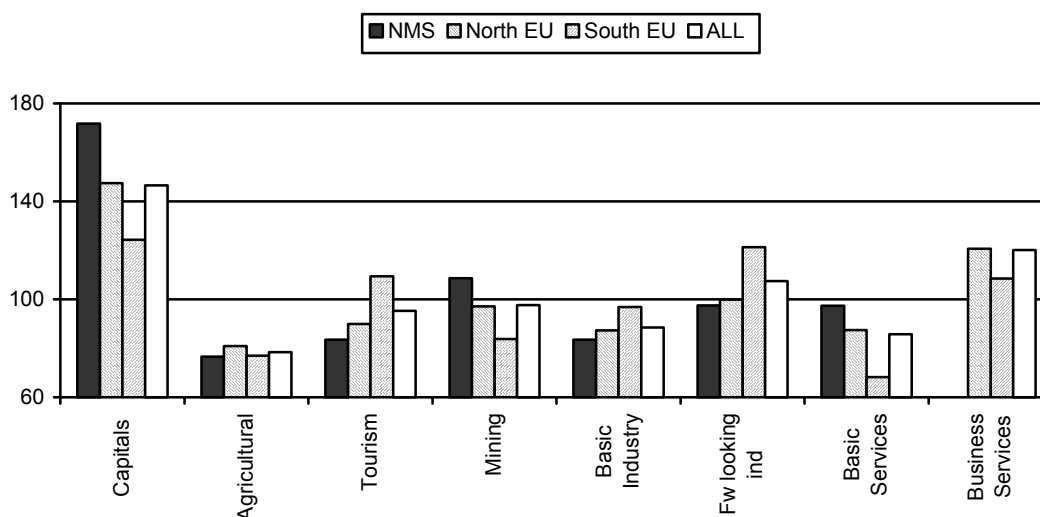
OMS regions that are specialized either on tourism or on engineering industries the GDP per capita is relatively close to that of the capital cities.

Figure 6 shows clearly that specialization in agriculture, basic industries and basic services is correlated with relatively low income levels. For all three country groups the regions within these types of clusters show income levels below the country average; incomes per capita are generally lowest in the *agricultural regions*, without much differentiation across the three country groups.

As regards the *basic industry regions*, their incomes are relatively low as well, not only compared to the country average but also to those regions which are also specialized in industry, but in the more high-tech set of industries. In contrast to the agricultural regions the differentiation across country groups is here slightly stronger. While in the Southern OMS basic industry regions show close to country average levels of GDP per capita, the same type of regions in the NMS are clearly below the average income level. In the latter case, though, the regions defined as basic industry regions are mainly those regions that were formerly centres of heavy industries, such as the Eastern regions of the Czech Republic, Slovakia and Hungary. Thus their low income levels rest on the fact that during the transformation process, their industrial base was largely eroded and was only to a small extent replaced by new industries (mostly through foreign direct investment) – which was the case in other NMS regions that had the advantage of being geographically closer to the OMS.

Figure 6

**Regional GDP, 2002, relative to country averages, cluster weighted averages**



A similar differentiation across country groups exists for the *basic services regions*, as well as for *mining regions*, where the NMS regions show an above-average income level. Thus

for both these types of regions, those which are located in the NMS perform relatively better than those in the OMS (particularly the Southern OMS). In the case of the NMS mining regions, it is not the competitiveness of the mining sector itself that generates the relatively high income levels, but rather the relatively strong industrial base, as well as the existence of major urban agglomerations in these regions (especially with regard to the Polish mining region), which in general exert positive economic effects (e.g. due to their market potential). In addition, in these regions there still exists a number of state-owned mines with traditionally well-paid workers, which also contributes to the relatively high regional income level.

The *basic services regions* in the NMS – as opposed to those in the Southern EU-15 – benefit from their geographically advantageous location close to the Western borders combined with a relatively strong industrial base. Thus, in comparison with most of the other (non-capital) regions in the NMS, they benefited over-proportionately from East-West integration (in particular in the form of FDI inflows), which in turn resulted in higher than average income levels.

By contrast, both the *mining* and the *basic services regions* in the Southern OMS represent problem regions, traditionally burdened by a geographically peripheral location (especially the mining regions); their particular specialization structure is to a large extent due to the lack of employment opportunities in other sectors.

Although incomes per capita are generally at higher levels across all regions in the Northern OMS than in the Southern OMS and the NMS, the pattern of income differentiation across types of regions is relatively similar to that of the NMS. The main exception to this is that within the Northern OMS, there exists a relatively large number of business services regions (in the NMS no region has been classified as this type of region, and in the Southern OMS only one region falls under this category). These are regions with major urban agglomerations, usually economic core regions. They are relatively similar to the capital cities not only in their sectoral structure but also in terms of income, which is about 20% higher than the average national income per capita. However, disregarding the capital city and the business services regions, in the Northern OMS – just as in the NMS – *agricultural regions* show on average the lowest income per capita, followed by the regions specialized in *tourism*, *basic industries* and *basic services*, while incomes per capita in the *mining* and *forward-looking industries regions* are close to the respective country average income.

As for *changes in income levels*, the NMS have outflanked the OMS in terms of income growth rates over the more recent period. Most NMS regions benefited from this, and hence the NMS regions within a specific specialization cluster grew on average ahead of the OMS regions in the same cluster – with the notable exception of NMS agricultural and tourism regions. Nevertheless, growth was unevenly distributed across the NMS regions



(see Figures 7a and 7b), quite in contrast to the EU-15 (North and South) regions. In the NMS, it was the capital city regions that grew ahead of all other regions, and as such they were the main source for the increasing regional disparities in the NMS. Even disregarding the capital cities, though, the differentiation in growth of income per capita was stronger than in the OMS. In particular those regions that specialized in forward-looking industries and/or are located close to the Western borders, such as the majority of the NMS basic services and forward-looking industries regions, experienced higher income growth than peripheral regions with an adverse sectoral structure, such as the basic industry regions and especially the agricultural regions.

Figure 7a

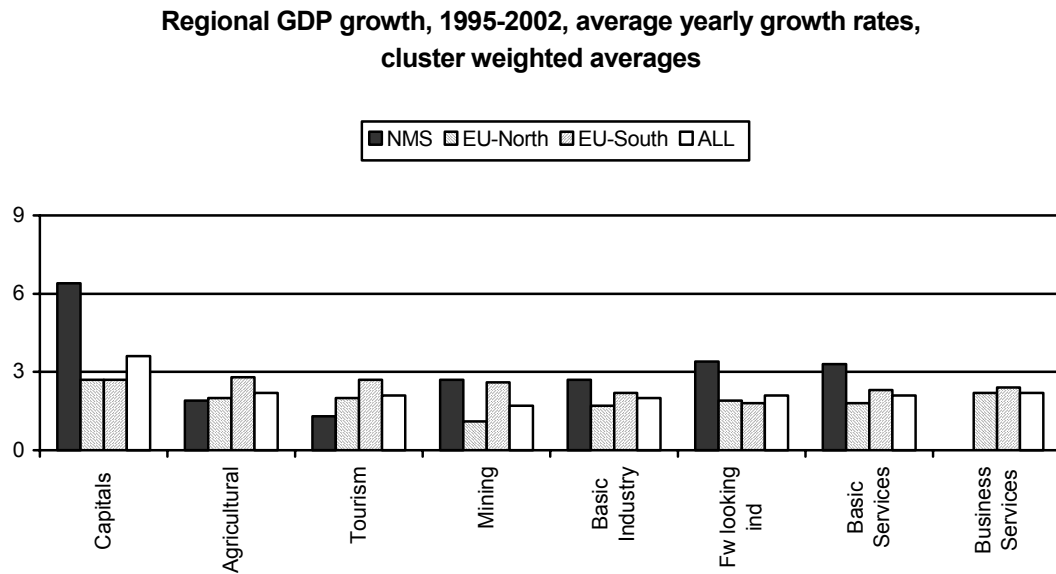
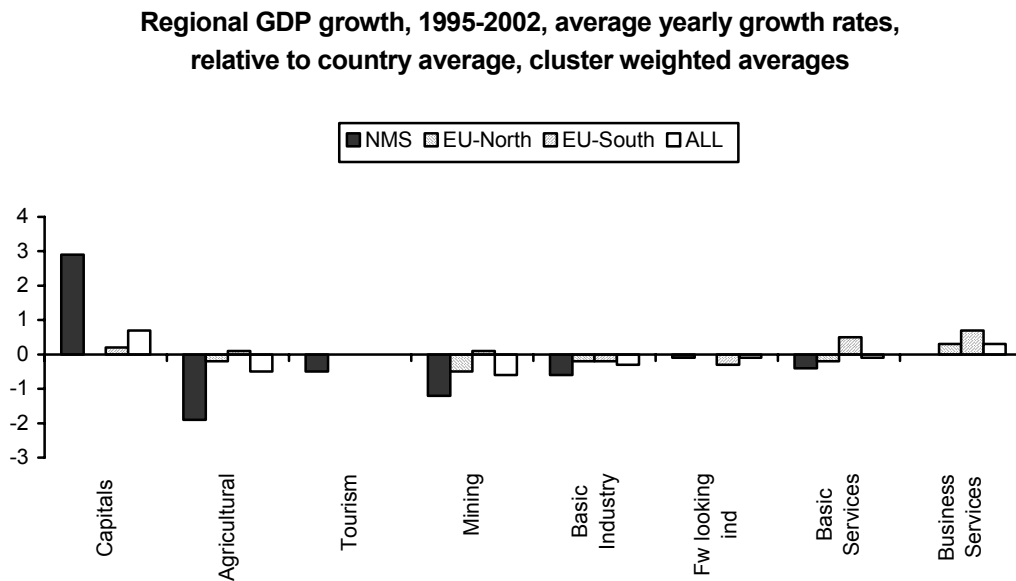


Figure 7b



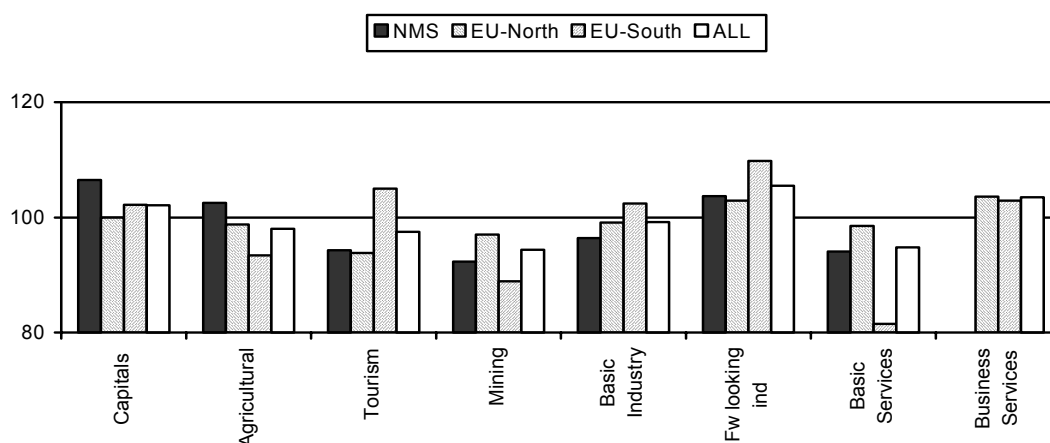
#### 4 Regional employment by types of regions

The current employment situation as well as the changes in employment in the NMS and OMS over the past few years have already been described in earlier sections. In this section we focus on the extent to which differences in regional specialization are related to differences in employment levels and changes in employment levels. Rather than using absolute employment numbers, we rely on calculating employment rates relative to the respective country average. This will allow us to demonstrate more clearly the relationship between the regional sectoral structure and regional employment.

Let us start with relative employment rates for the population aged 25 to 64 (Figure 8). Overall, we find that employment rates are highest in those regions that are specialized in modern, skill-intensive sectors such as financial services and engineering. Hence in both the NMS and the OMS employment rates are highest in the capital cities, the forward-looking industries regions as well as in the business services regions. Basic industry regions also show relatively high employment rates, though in the NMS and the Northern OMS they are below average, while in the Southern OMS they are above average, however, mostly because of distinctly low employment rates in some of the other types of regions. Notably and corresponding to the differences in income levels, the performance in employment terms of those regions that are specialized in modern industries was also better than that of the regions specialized in less skill-intensive types of industries.

Figure 8

**Employment rates, 2003, population aged 25-64, relative to country average, cluster weighted averages**



Low employment rates are found particularly in the mining and the basic services regions, though in both types of regions the Northern EU-15 are relatively better off than their counterparts in the NMS and the Southern EU-15, because of their greater diversification of economic activities. In both types of regions the Southern EU-15 regions show – on a relative basis – the lowest employment rates, which corresponds to their relative position in

income levels. Hence the structural weaknesses of both types of Southern EU-15 regions do not only show up in low income but also in relatively low employment levels.

As far as the agricultural and the tourism regions are concerned, there is a clear distinction between the three country groups.

The agricultural regions in the NMS show rather high relative employment rates, while in the Northern EU-15 they are close to the average level and in the Southern EU-15 they are only slightly higher than the employment rates of the mining regions. In the case of the NMS agricultural regions, the high employment rates are clearly due to the 'sponge' effect of the agricultural sector: Given the lack of employment opportunities in other sectors, many of those who are unable to find a job elsewhere are absorbed by the agricultural sector, mostly based on subsistence type of farming (see e.g. Landesmann and Römisch, 2005; Römisch and Ward, 2003). In the Northern EU-15 the employment rate in the agricultural regions (close to the national average) is due to the small role of the agricultural sector; here the downscaling of employment in agricultural activities and the sectoral diversification into the services sectors is at an advanced stage. The Southern EU-15 regions seem to take a position in between the NMS and the Northern EU-15 as their share of agricultural employment is on average only half that of the NMS, but at the same time still considerably higher than that of the Northern EU-15 regions, while services employment is less developed.

Concerning the tourism regions, employment rates are relatively low in the NMS and the Northern EU-15 regions, while the Southern EU-15 regions' extensive use of their tourism potential is reflected in employment rates that even surpass those of the capital cities. This could be indicative of future developments in some of the NMS regions with tourism potential.

### *Employment growth*

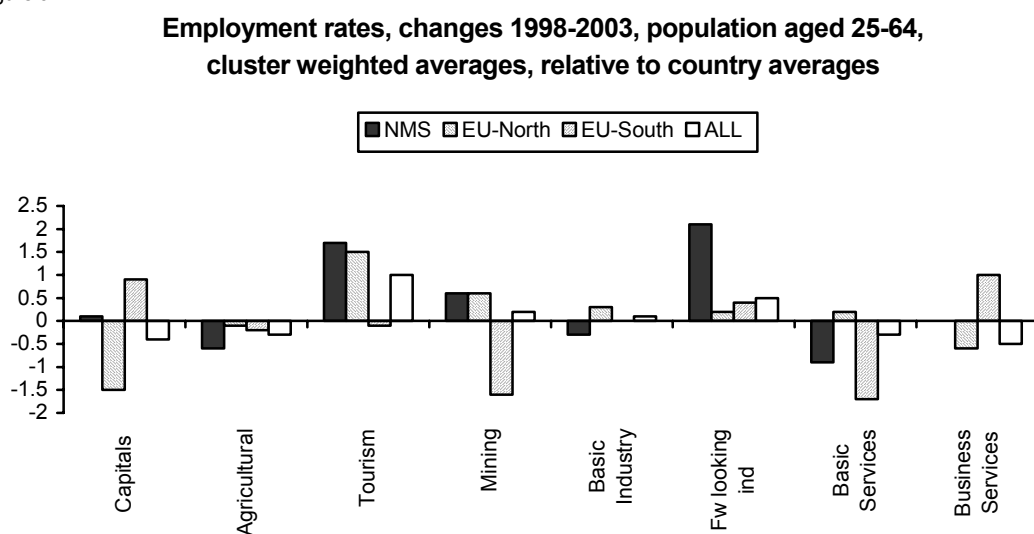
The extent to which employment rates in the EU-25 regions change over time depends, by definition, on the growth of employment and on changes in total population. Thus, while employment rates reflect the actual employment situation within a region, comparing employment rate changes across regions requires careful interpretation. For instance, it might be the case that in a prosperous region that experiences growth of income and employment, the employment rate still declines because the population in this region grows ahead of employment, e.g. through inward migration of workers from less prosperous regions. At the same time, in declining regions the employment rates might rise, despite a decline in absolute employment, because the population's potential labour force decreases more strongly than employment (e.g. through outward migration or ageing). As a consequence, we analyse the changes in the EU-25 regions' employment

situation not only in terms of changes in employment rates but also in terms of employment and population growth.

Figures 9 to 11 present the information on employment rate changes as well as on employment and population growth by types of regions. At first glance no clear-cut picture of developments emerges. Looking, e.g., at the cluster of capital city regions, the NMS regions experienced an increase in employment rates as compared to the national average, as did the Southern EU-15 capital cities, while in the Northern EU-15 employment rates declined strongly. At the same time, though, total employment decreased relative to the national average in the Northern EU-15 and even more strongly in the NMS capital cities; only in the Southern EU-15 did total employment increase. Hence the slight improvement of employment rates in the NMS capital city regions was attributable to the population decrease (relative to the respective country average) during that period, while in the Northern EU-15 capitals the strong decline of the employment rate was due to the decrease of total employment, which was reinforced by an increasing population.

Such divergent movements, which are not always easy to interpret, are frequently found across the various types of regions in the EU-25.

Figure 9



For example, among the regions specialized in tourism, the Southern EU-15 regions have been characterized as relatively high-income, high-employment regions, which surpass most other Southern regions in terms of economic performance. One aspect of this is that they generated quite a large number of new jobs over the past several years, yet this increase in demand for labour was lower than the increase in the supply of labour (i.e., the increase in population): thus the employment rate, and hence the probability to become employed in these regions, declined somewhat. The development in the tourism regions in the Northern EU-15 was exactly the opposite. Only in the NMS, the strong increase in

employment rates coincided with a strong increase in the actual number of people employed (with stationary population). Similar divergence is found amongst the mining regions, the forward-looking industries regions and the business services regions, without going further into detail as the trends are clearly shown in the respective figures.<sup>5</sup>

Figure 10

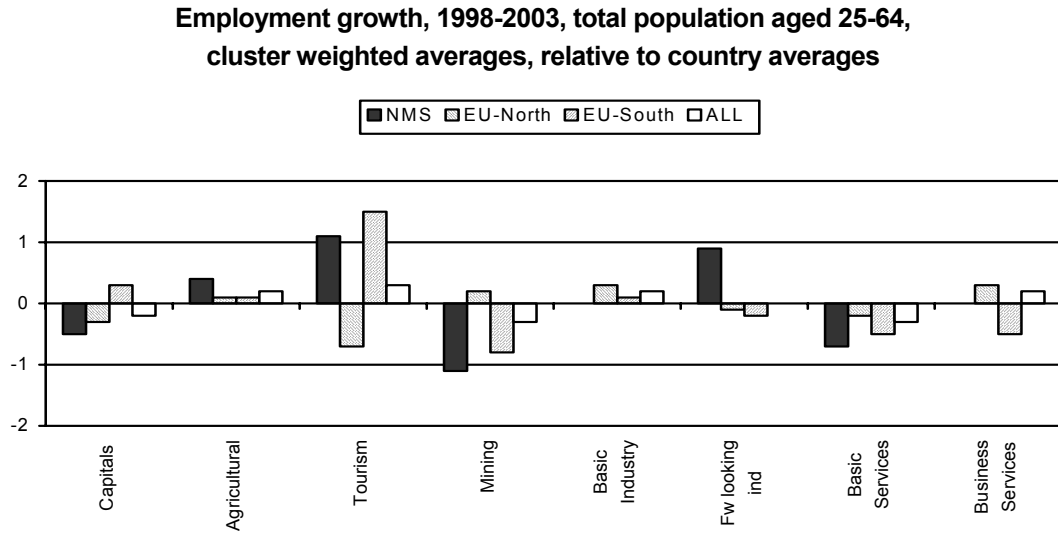
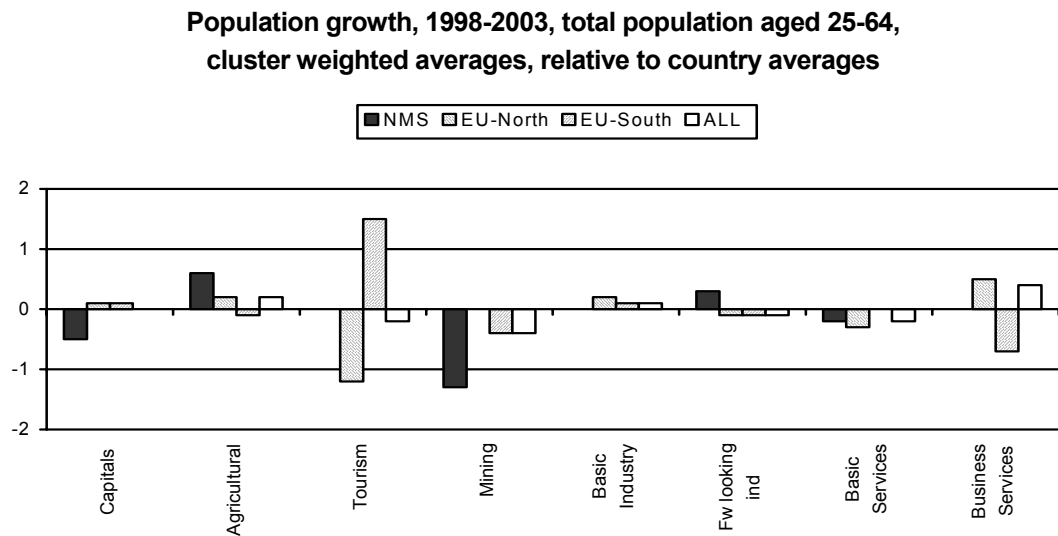


Figure 11



<sup>5</sup> As a matter of fact the presentation of these figures and numbers raises more questions than answers. Though it is certainly useful to show that changes in the employment rate are not necessarily a good indicator for the economic prosperity of a region, the lack of information, in particular with respect to the causes of population changes (e.g. migration), leaves this analysis rather descriptive without much explanatory power. We believe that additional data, in particular on interregional migration flows, would greatly improve the analysis.

## **Employment by educational attainment levels**

The likelihood of being employed depends to a large extent on acquired educational levels and skills. Thus the general assumption is that employment prospects increase, the higher the educational attainment level. In this section we investigate how far the educational level of the working-age population is related to their employment situation. This is firstly done at the country level, to show the general differences among countries and country groups. We then move to the regional level to analyse whether employment opportunities for certain segments of the population with different levels of education are related to the specialization patterns of the EU-27 regions.

For this purpose we separate the total working-age population (aged 25-64) into three educational groups: the first group consists of the population having completed primary education only, i.e. the 'low-educated'. The second group consists of those having completed secondary education, i.e. the 'medium-educated'. The third group comprises that part of the population with completed tertiary education, i.e. the 'highly educated'.

Looking first at the employment situation for these three educational groups by countries (Figures 12-14), it becomes obvious that there is indeed a strong correlation between the educational level and the probability of being employed, as the employment rates of the low-educated are without exception much lower than those of the medium-educated, which in turn are again lower than those of the highly educated.

At the regional level the situation concerning the dispersion of employment rates by educational level is similar to that at the country level (Figures 15-17). Across the regions, or type of regions, the differentiation is highest for the low-educated and lowest for the highly educated. Relatively high employment rates for the low-educated are found in the forward-looking industries and the business services regions across all country groups. Though it could be assumed that in both types of regions there is special demand for a better educated workforce, their economic strength in terms of income per capita and overall employment spills over to the low-educated, which may not necessarily be employed in those sectors where the regions are specialized, but rather in supporting activities.

Relatively high employment rates for the low-educated are also found in the agricultural regions in the NMS and the tourism regions in the Southern EU-15. In the NMS regions this is mainly because of the 'sponge' effect of agriculture described above and as such contains much 'hidden' unemployment, while in the Southern EU-15 regions it is yet another expression of the positive effects of a specialization in tourism in otherwise mostly agrarian regions.

Figure 12

**Employment rates, low-educated, 1998 and 2003, population aged 25-64**

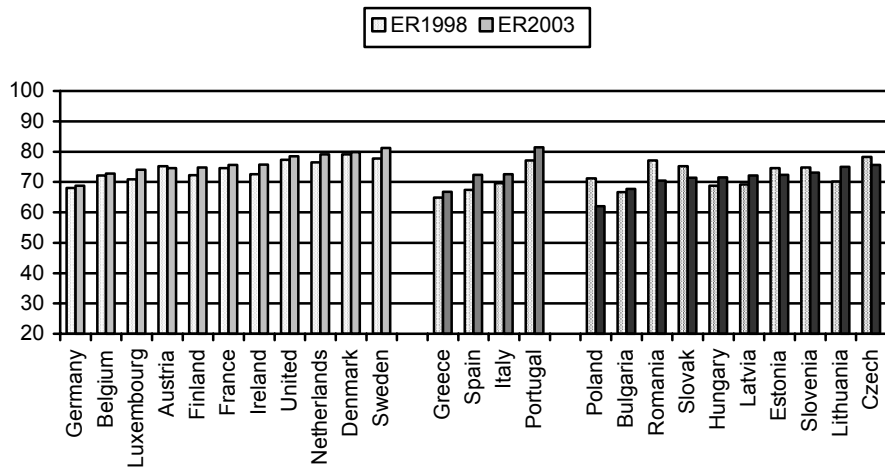


Figure 13

**Employment rates, medium-educated, 1998 and 2003, population aged 25-64**

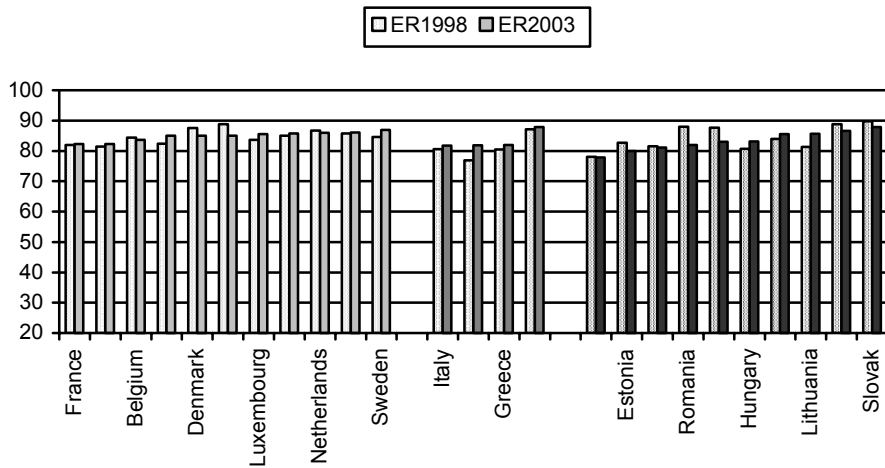


Figure 14

**Employment rates, highly educated, 1998 and 2003, population aged 25-64**

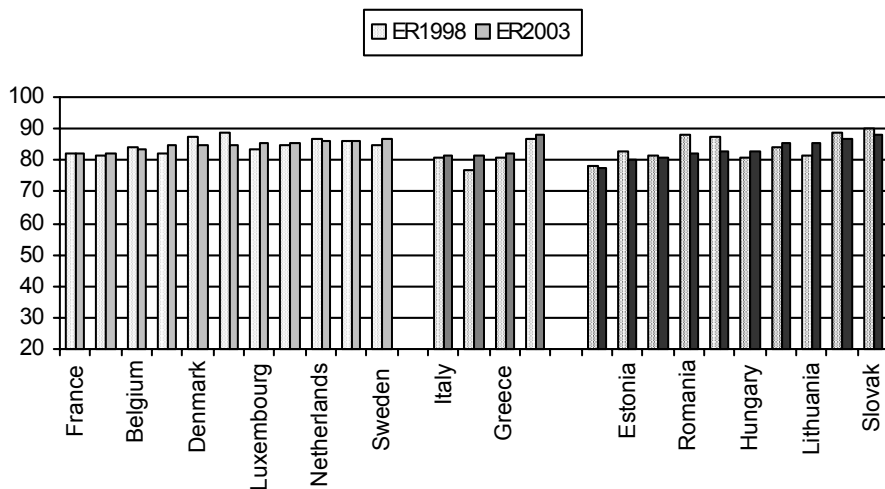


Figure 15

**Employment rates, 2003, low-educated population aged 25-64, relative to country average, cluster weighted averages**

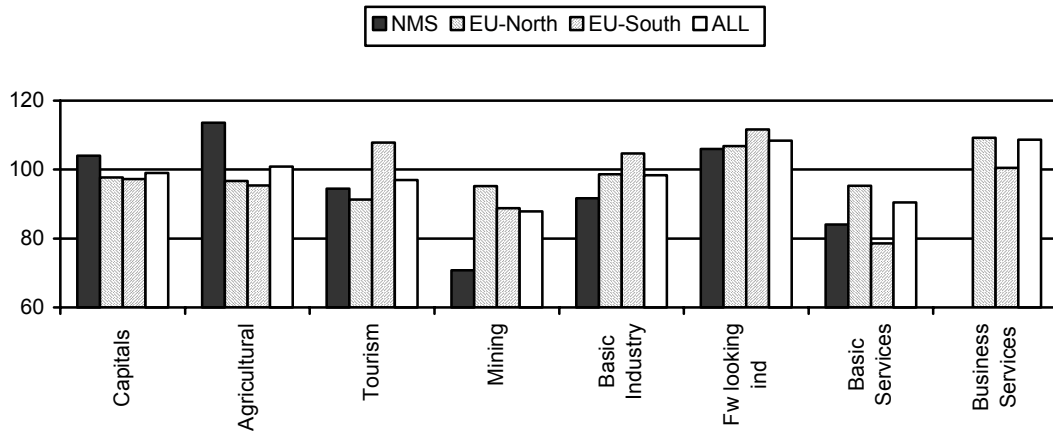


Figure 16

**Employment rates, 2003, medium-educated population aged 25-64, relative to country average, cluster weighted averages**

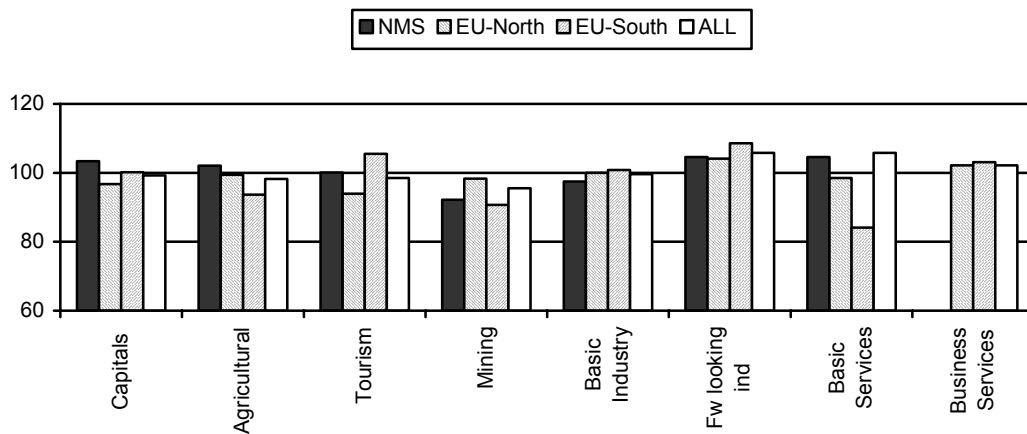
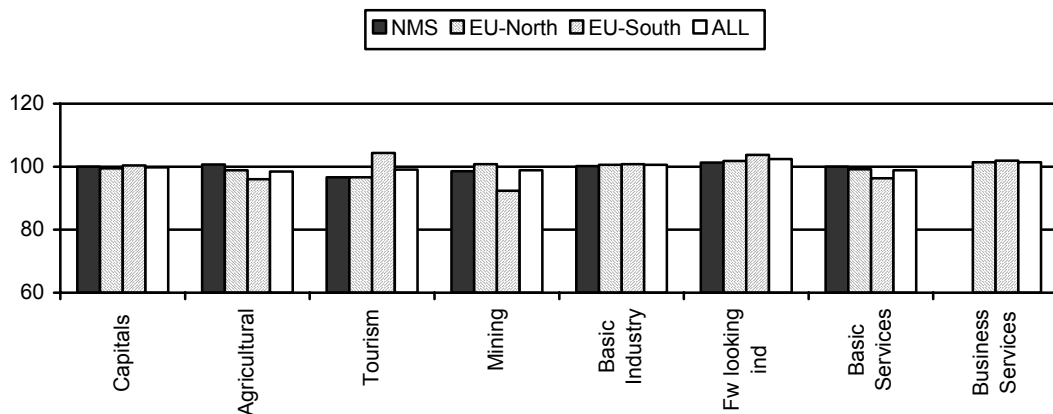


Figure 17

**Employment rates, 2003, highly educated population aged 25-64, relative to country average, cluster weighted averages**





In the mining and basic services regions, employment rates are particularly low across all three groups of countries. Interestingly, in the NMS the pattern for the low-educated correlates with the overall employment situation, while the patterns for the medium- and highly educated do not. This would imply that to a great extent the *overall* low employment level in these types of regions is largely due to low employment opportunities for the *low-educated*. In the Southern EU-15 mining and basic services regions, the pattern for the low-educated also correlates with the overall employment situation. Yet, as similar patterns are also found for the medium- and the highly educated, this reflects the general lack of job opportunities rather than the effects of sectoral restructuring as was the case in the NMS.

In the same way as employment rate levels differ most for the low-educated across the EU-25 regions, the changes in employment rates over time also vary most strongly for the low-educated.

In the NMS the development of employment rates of the low-educated was worst in the capital cities, mainly due to a strong decline of the available number of jobs for the low-educated despite the high share of services sector employment in these regions. As shown in Römisch and Ward (2003), the restructuring process in the NMS does not only affect individual industries or branches, but also affects the types of jobs that are on offer and the corresponding skill demand. Hence in the NMS, but also in the OMS, the occupational structure shifts increasingly from manual activities to non-manual activities, which *grosso modo* is disadvantageous for the low-educated segments of the labour market. As a matter of fact, in the NMS capital city regions these shifts have been among the strongest across all NMS regions, which is one explanation for the negative development of employment for the low-educated there.

In the NMS tourism, mining and forward-looking industries regions, employment prospects were comparatively better. The reasons differed across the individual types of regions, however. In the tourism and forward-looking industries regions, the overall number of jobs increased relative to other NMS regions, which corresponds to the overall good economic development in these regions. In the mining regions, on the other hand, given the decline of the mining sector, the number of available jobs for the low-educated decreased over-proportionately as compared to other regions. However, as the supply with low-educated labour decreased even more strongly than the number of jobs, the actual employment prospects and hence the employment rate for the low-educated increased (relative to other regions).

With respect to the medium and highly educated employment rates, major shifts are found in the tourism and mining regions in all of the three country groups. Without exception, medium-educated employment rates in the tourism regions increased over-proportionally in the NMS and the OMS, though only in the NMS and the Southern EU-15 this was caused by relatively

strong employment growth. In the Northern EU-15 actual medium employment declined relatively strongly, thus following the overall employment trend in these types of regions, but an even stronger decline of the population kept the employment rates from falling.

In the NMS tourism regions we observe a relative decline of the employment rate, caused by under-proportionate employment growth. The increasing specialization in the relatively less skill-intensive tourism sector in the NMS regions has in its first stages predominantly positive effects for the low- to medium-educated, while the demand for those with tertiary education is lower than in regions that specialize in skill-intensive industries and services. It can be expected though that with increasing income of the tourism regions, the demand for highly educated will also grow strongly, as is the case in the Northern and Southern EU-15 tourism regions.

As for the mining regions, we observe the interesting phenomenon that employment rates for medium-educated increase relative to other regions, while highly educated employment rates decrease, particularly in the NMS and the Southern EU-15 regions. In part this can be ascribed to their sectoral structure demanding a higher proportion of medium-educated and a lower proportion of highly educated labour than other regions. Hence this reflects the fact that the existing labour pool of a region adjusts in some way to the skill demands of the industries that the regions are specialized in and *vice versa*.

Medium-educated employment rates grew above average in the NMS forward-looking industry regions, due to an above average employment growth. Contrastingly in the NMS basic industries regions the situation was opposite, as employment rates as well as employment growth were below average.

With respect to the highly educated, employment rate changes as well as employment growth were higher than average in both, the NMS basic industry and the NMS forward-looking industry regions. In part this reflects the changes in the skill demand caused by the restructuring and up-grading of the NMS industries.

### **Employment gains/losses by sectors**

In this section of the study we analyse the extent to which individual sectors or branches of the economy contributed to the employment developments observed in the EU-25 regions.

To do this we grouped the existing NACE 2-digit sectors into nine aggregate groups in order to keep the analysis tractable.

The nine groups are:

- agricultural sectors: containing the NACE groups A: agriculture and B: fishing;
- mining sectors: NACE group C: mining and quarrying;
- energy supply: NACE group E: electricity, gas and water supply;
- manufacturing: NACE groups DA-DN;
- basic services: NACE groups G: wholesale and retail trade, I: transport, storage and communication, O: other community activities, and P: household activities;
- tourism: NACE group H: hotels and restaurants;
- health and education services: NACE groups M: education, N: health and social work;
- advanced services: NACE groups J: financial intermediation, and K: real estate, renting and business activities;
- public services: NACE groups L: public administration and defence, and Q: extra-territorial organizations.
- NACE group F: construction was excluded from the analysis, as its employment movements are considered to be highly cyclical and thus not to reflect longer-term structural changes.

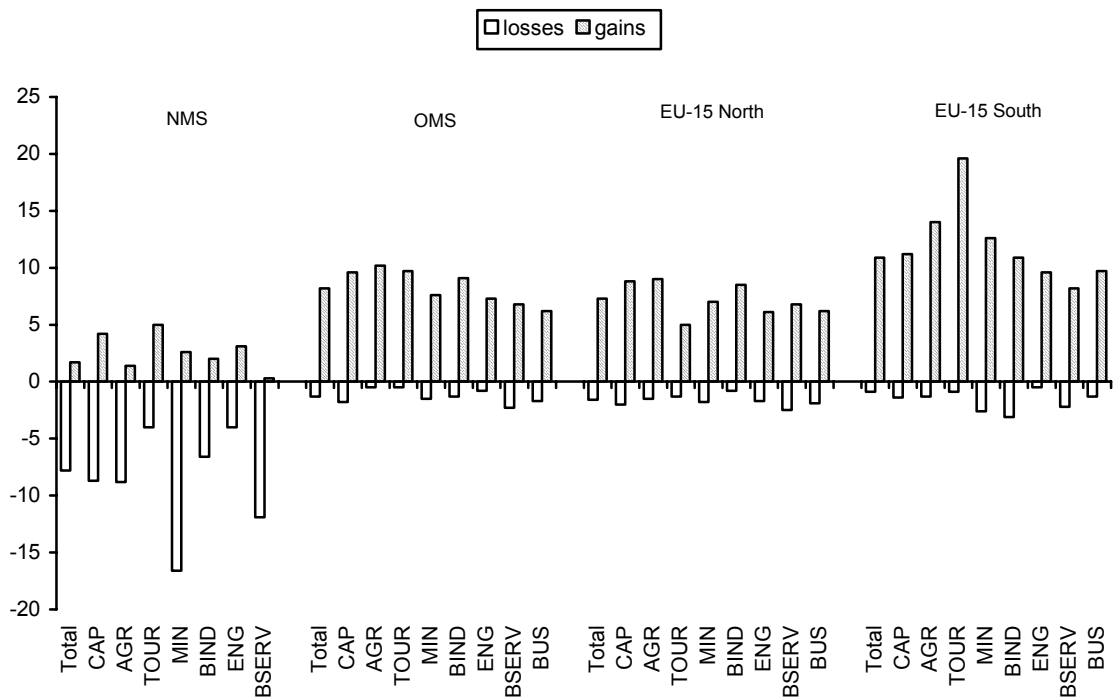
In the first part of the following analysis the manufacturing sector comprises all manufacturing industries, although there are major differences in the skill and technology intensity across sectors which are possibly reflected in employment trends. Yet, because of data constraints it is not possible to analyse manufacturing at a more detailed level for all countries and regions in the first part. Only in the second part of the analysis, after excluding the missing observations (i.e. the Polish regions), the employment trends in manufacturing will be investigated at a more detailed level. We shall then split the manufacturing sector into three sub-groups:

- basic industries, comprising: NACE groups DA: manufacture of food products, beverages and tobacco, DB: manufacture of textiles and textile products, DC: manufacture of leather and leather products, DD: manufacture of wood and wood products, DE: manufacture of pulp, paper and paper products, publishing and printing, DH: manufacture of rubber and plastic products, DI: manufacture of other non-metallic mineral products, DJ: manufacture of basic metals, DN: manufacture of furniture etc.;
- fuels and chemicals, comprising: NACE groups DF: manufacture of coke, refined petroleum products and nuclear fuel, DG: manufacture of chemicals, chemical products and man-made fibres;
- engineering, comprising: NACE groups DK: manufacture of machinery and equipment, DL: manufacture of electrical and optical equipment, DM: manufacture of transport equipment.

In the second step, rather than looking at the net employment gains or losses over all sectors, we separated those sectors that showed an increase in employment from 1998 to 2003 from those sectors where employment decreased. For both these groups we summed up all employment gains or losses, respectively, to get the total number of jobs that have been created and destroyed by these sectors (the difference between the two numbers gives the net employment gain or loss). It has to be noted that these sums do not represent the total number of jobs that have been created or destroyed in the whole economy, as the increase or decrease of employment in each sector is itself only a 'net' figure that shows the results of the employment increases and decreases within this sector. Figure 18 shows the graphic representation of the total sectoral employment gains and losses in per cent of 1998 total employment for the eight types of regions in the NMS and the OMS. As such the data presented in this graph are just another representation of the employment changes described above. But, the developments are shown from a different angle, as the summation of sectoral employment gains and losses gives an impression of the labour 'turnover' that occurred over that five-year period.

Figure 18

**Total 1998-2003 (non construction) employment losses and gains in per cent of 1998 total (non construction) employment, cluster totals**

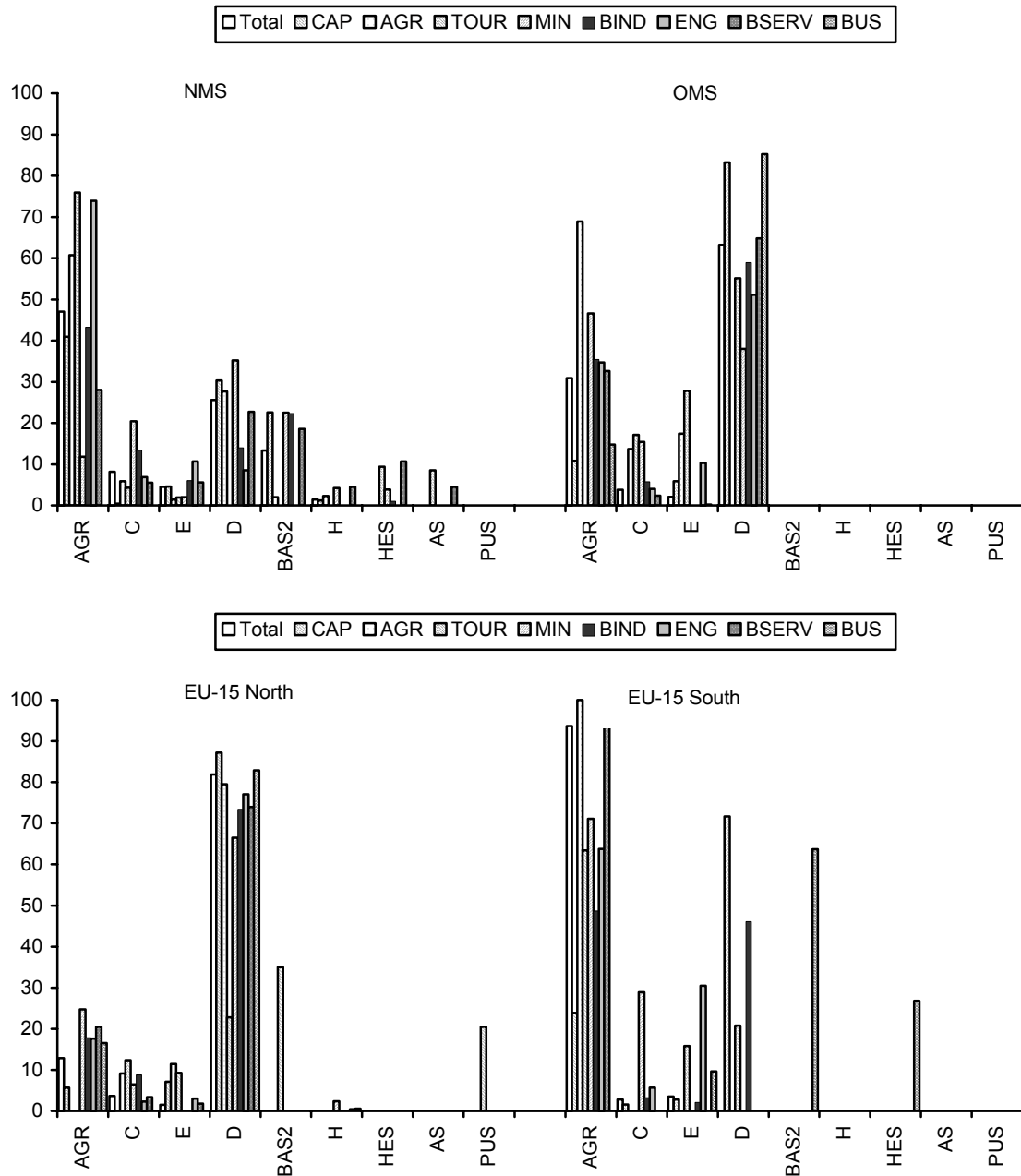


The fundamental difference between the NMS and the Northern and Southern EU-15 is that from 1998 to 2003, in most of the regions of the NMS much more jobs were destroyed than created. Thus in the NMS regions about 5% (in the tourism and forward-looking industries regions) to 17% (in the mining and basic services regions) of the jobs which had

existed in the year 1998 vanished, while the number of newly created jobs was particularly small throughout the NMS, except for the tourism and forward-looking industries regions. In the forward-looking industries regions the number of new jobs was almost as high as the number of lost jobs, while in the tourism regions the number of new jobs was even higher than the number of lost jobs.

Figure 19

**Contribution of sectors to total (non construction) employment losses, in per cent of total losses**

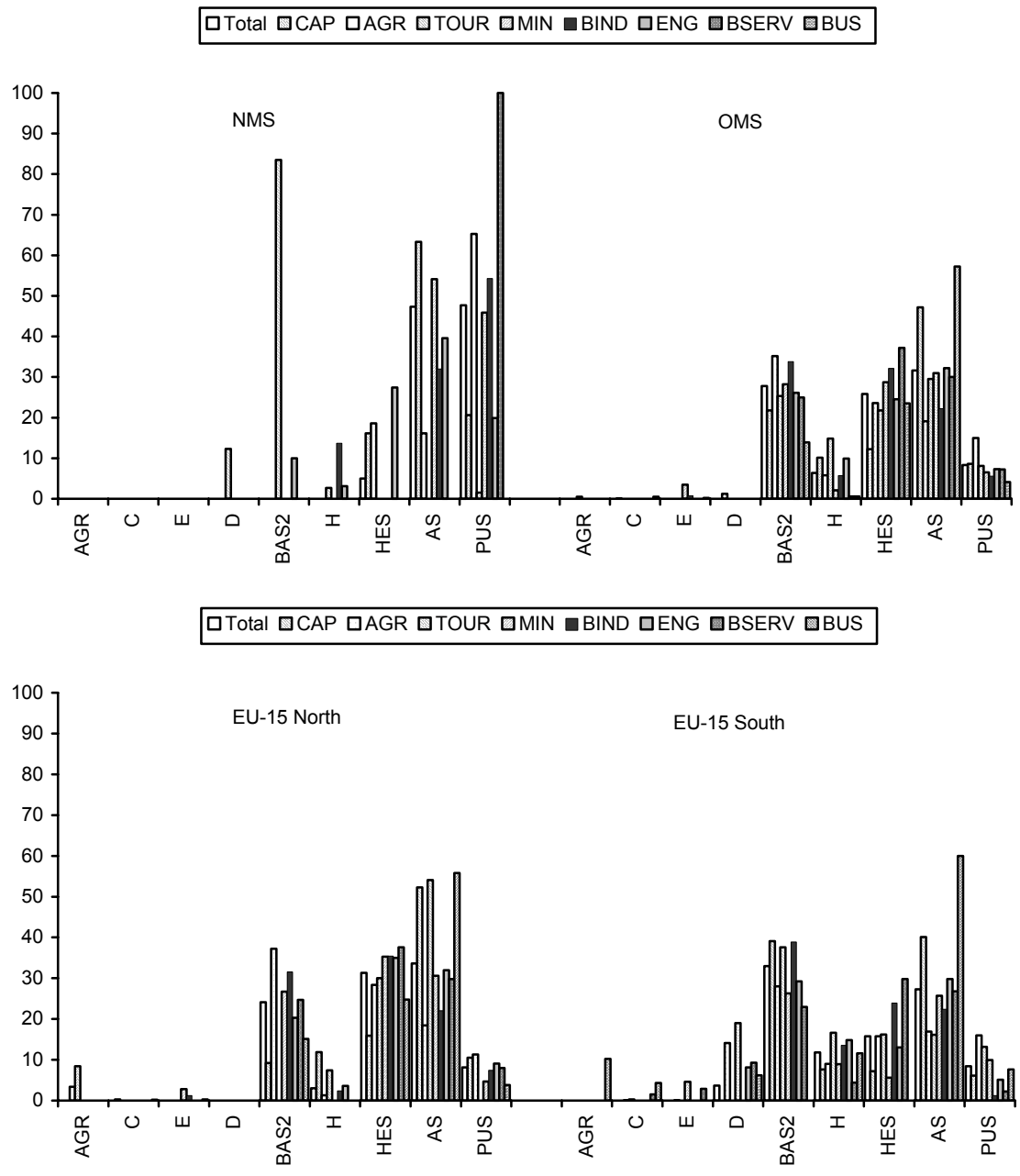


By contrast, both in the Northern and Southern EU-15 the job destruction was quite low, while job creation was high, with the number of jobs generally growing faster in the Southern EU-15 regions. The highest growth of jobs was observed in the Southern EU-15 tourism regions, followed by the agricultural and mining regions.

Given the total numbers of job gains or losses, we calculated the contribution of each sector to these gains and losses (see Figures 19 and 20).

Figure 20

**Contribution of sectors to total (non construction) employment gains, in per cent of total gains**



Looking at both the NMS and OMS regions, the general trend is that the loss of jobs is predominantly due to job losses in the primary and secondary sectors, while in the services sectors there was usually a (net) increase of jobs (that is why they show a zero contribution to employment losses). The sectoral pattern of contribution to employment losses differs across countries, though. In most NMS regions the agricultural sector was the main 'contributor' to the total job losses. Thus in the agricultural, tourism and forward-looking industries regions, the agricultural sector accounted for about 60% to 75% of all losses, while in the other regions its share was lower but, except for the mining regions, still ranged between about 30% and 47%.

Manufacturing also contributed significantly to the job losses in the NMS regions: its share in the losses was about 20% to 30%. Notable exceptions are the tourism regions, where manufacturing employment even increased, while in the case of the regions that are specialized in industry (basic industries and forward-looking industries) the employment losses in the manufacturing sector were considerably lower than elsewhere. In the NMS mining and basic industries regions the shake-out of labour was still high in the mining sector, which accounted for about 12% to 20% of all employment losses in those regions. In contrast to the general notion that the services sectors should become the major source of employment, in many regions it actually contributed to the decline of employment. Thus employment in basic services declined, predominantly in the tourism, mining, and basic industry regions, but also in the basic services regions and even in the capital cities.

Overall the size and the sectoral distribution of job losses clearly shows that structural change and the transformation process are substantially affecting jobs turnover in the NMS regions: the scope of labour shake-out in certain sectors is still large, while (as will be shown below) the services sector is not capable of generating enough jobs to relieve the strained employment situation, as is the case in the EU-15 and particularly in the Southern EU-15 regions.

Despite the relatively small number of jobs that have been lost in the OMS, there is still a clear distinction between the Northern and Southern EU-15 regions with respect to the different sectors' contributions to these losses.

In the Northern EU-15 it was mainly the manufacturing sector where jobs were lost. With the exception of the tourism regions, the manufacturing sector accounted for between 65% and 80% of total losses, followed by the agricultural sector with a share of about 10% to 20% for most regions. By contrast, in the Southern EU-15 it was mainly the agricultural sector that caused the highest number of job losses. In two types of regions – agricultural and basic services regions – agriculture was the only sector where job losses occurred, while in the other regions (except for the capital cities) its share in total job losses was about 50% to 70%. The contribution of manufacturing to the employment decline was

weaker in the Southern EU-15 than in the Northern EU-15 and limited to some of the regions, in particular the tourism and basic industry regions. Other sectors that contributed in certain regions to the decline in the number of jobs were the mining sector (foremost in the mining regions), the energy sector (in the forward-looking industries regions) as well as basic and health and education services (in the business services regions).

As opposed to losses of jobs, increases in the number of jobs are with minor exceptions found only in the services sectors, in both the NMS and OMS regions.

The major difference between the NMS regions and the OMS (both Northern and Southern) regions is that in most of the NMS regions, increases in the number of jobs occurred only in advanced services and in public services, while in the OMS the increase of jobs was much more evenly distributed across all services sectors. For various reasons this difference is another expression of the weakness of the NMS services sector to generate jobs:

First, the overall number of newly created jobs is quite low throughout the NMS. Second, the majority of new services jobs were created in sectors that have a relatively small labour absorption capacity, at least compared to other services sectors. Only few jobs were created by those services sectors that are expected to be the main sources of employment (in particular also of the low-educated labour force), namely the basic services, tourism and health and education services. With but a few exceptions (especially the tourism regions) these three services sectors have so far generated no, or insufficient, new employment opportunities, which is one of the main reasons for the precarious employment situation in many of the NMS regions.

However, given the fact that the NMS regions are economically catching up with the OMS regions, it is to be expected that their sectoral structure will be increasingly shifting towards the services sector: as income in the NMS regions are rising, that sector will become an equally important source of employment as it is in the OMS.

With respect to the current trends in the OMS, in both the Northern and Southern EU-15 regions each services sector contributes to the growth in the number of jobs. There is still some differentiation across the two country groups. In the Northern EU-15 regions, the most important services sectors for employment growth are the health and education services as well as the business services, while in the Southern EU-15 it is the basic services sector (followed by business services). Interestingly, tourism and also manufacturing contribute in most of the Southern EU-15 positively and relatively strongly to the increase of jobs, while in the Northern EU-15 regions that contribution is either much weaker (in the case of tourism) or negative (in the case of manufacturing). Common to both country groups in the OMS are the weak employment gains in public services.



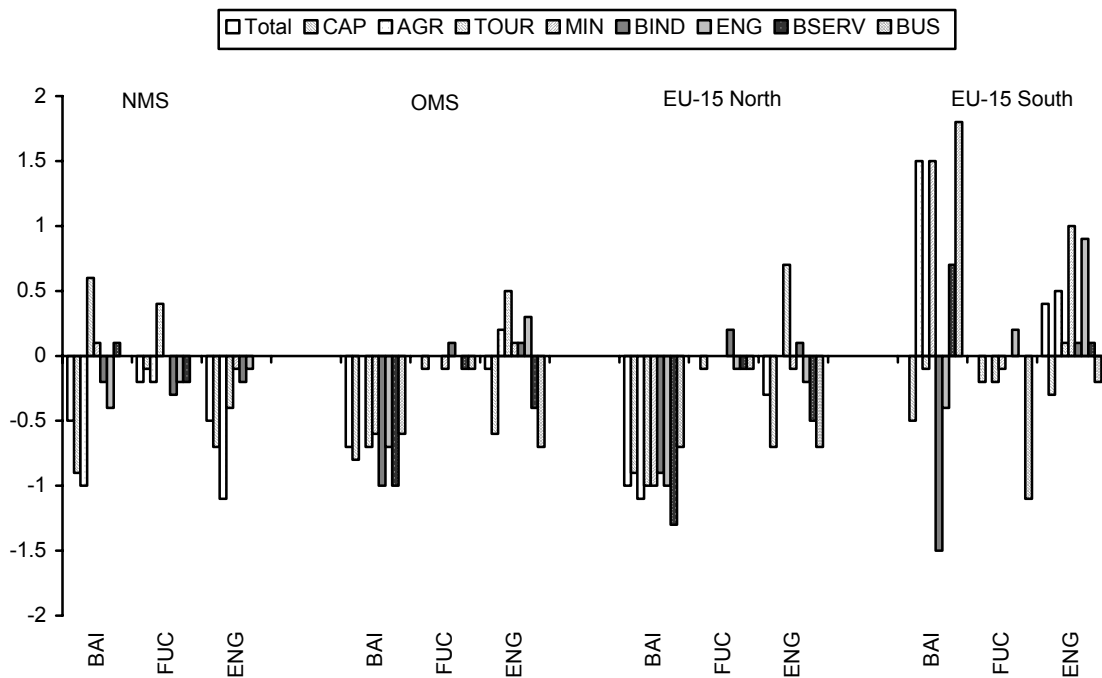
Looking at the manufacturing sector in more detail (through the exclusion of Polish regions because of lack of information at the NACE 2-digit level), Figure 21 shows the contribution of the three manufacturing sub-sectors defined above to overall employment developments in the EU-25 regions.

In the NMS regions the overall decline of manufacturing employment is basically driven by all three sub-sectors; particularly basic industries and forward-looking industries contribute significantly to this. One major exception is represented by the tourism regions, where additional jobs were created in basic industries and in chemical industries.

With no exception the Northern EU-15 predominantly lose employment in the less skill- and technology-intensive basic industries, while in the forward-looking industries the situation is more heterogeneous. While the decrease of employment in this sub-sector is relatively strong in the capital city, basic and business services regions, it is much weaker in the regions specialized in forward-looking industries as well as in the mining regions. In the tourism and basic industries regions, the forward-looking industries sector contributes to the increase of jobs.

Figure 21

**Employment losses and gains (1998-2003) in basic industries, fuel and chemicals and engineering, in per cent of 1998 total (non construction) employment, cluster totals**



In the Southern EU-15 regions experiences are mixed as far as the basic industries are concerned. On the one hand a relatively strong labour shake-out in this sub-sector is

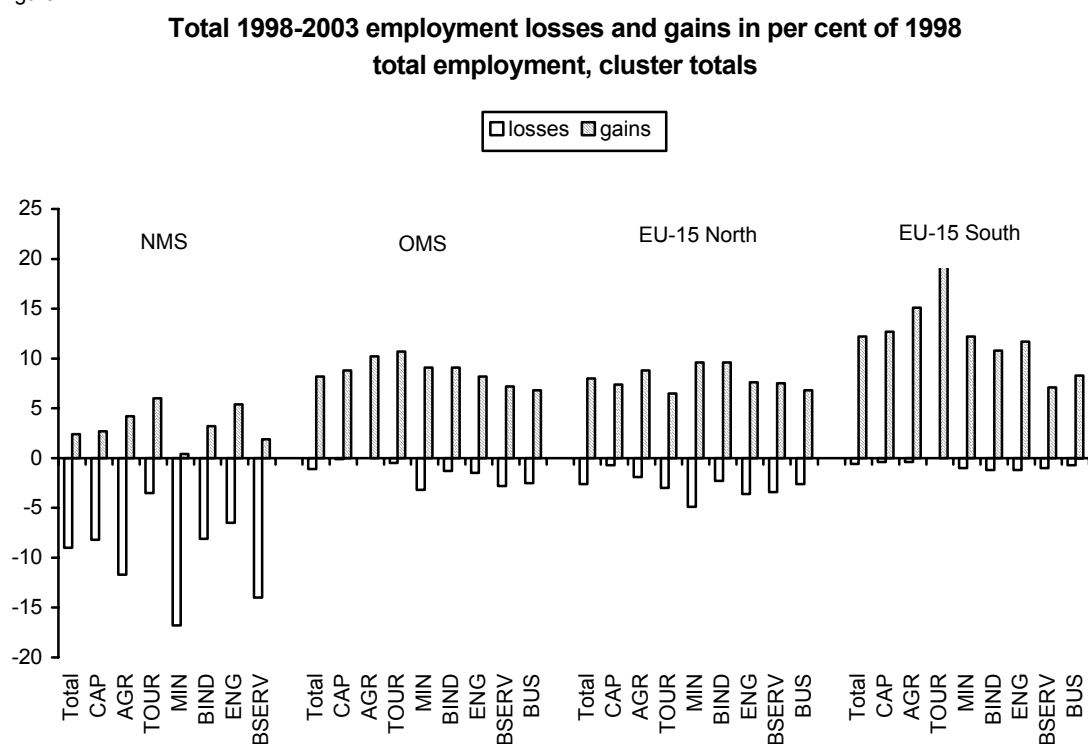
observed in the tourism, basic industries and forward-looking industries regions, while on the other hand strong increases in employment are found in the agricultural, mining and business services regions. In contrast to the situation in the NMS, the forward-looking industries sector contributes positively to the number of jobs in most of the Southern EU-15 regions, except for the tourism and business services regions.

### Employment by age

Structural changes are always connected with compositional changes in the labour market, as new activities emerge while simultaneously other activities are on the decline. The extent to which workers are affected by this depends among other factors also on their age.

The first step of the analysis is similar to the analysis of the sectors' contributions to the employment developments in the EU-25; rather than using data on sectoral employment, however, we use employment data by age cohorts.

Figure 22



Total employment is split into ten five-year age cohorts, starting with the youngest group of employed, aged 15-19, and ending with oldest group, aged 60-64. We again look at employment gains and losses, and at the contribution of each age cohort to these changes. Thus we separate the age cohorts that showed an increase in employment from 1998 to 2003 from those which showed a decrease, and sum up all employment gains or

losses. This gives us the total number of jobs that have been created and destroyed for the age cohorts. As the increase or decrease within each age cohort is itself only a 'net' figure again, the total gains and losses by age cohorts do not represent the total number of jobs that have been created or destroyed in the whole economy, nor do they necessarily correspond to the sums derived in the analysis of the sectors above.

Figure 22 shows total employment gains and losses summed up over all age cohorts in per cent of 1998 total employment for the eight types of regions in the NMS and the OMS; it is similar to Figure 19 but not identical.<sup>6</sup> The main trends observed above apply here, too: the NMS lose many more jobs than new jobs are being created, while in the OMS it is *vice versa*. Interestingly, though, seen from an age-cohorts point of view, certain regions such as the Southern EU-15 tourism regions do not show any employment loss at all, while in the NMS mining regions almost no new jobs were created.

Looking at the contribution of individual age cohorts to the employment losses and gains, we find a significant difference between the NMS and the Northern and Southern EU-15 regions.

In the regions of the latter two groups of countries the employment losses were, with few exceptions, concentrated on two age cohorts only, whereas in the NMS regions the losses occurred in a broader range of age cohorts.

In the Northern EU-15 a decline of employment is found almost exclusively for those aged 25 to 29 and 30 to 34 across all regions. Only in the tourism regions, which showed a poor overall development record of employment, an older age group (40-44 years) was also affected by employment losses.

In the Southern EU-15 employment declined in even younger age cohorts (15-19 and 20 to 24). As mentioned earlier, however, this is not necessarily related to declining job opportunities for the young age cohorts, but is likely to reflect an extension of education within the Southern EU-15 regions.

In the NMS the broad distribution of employment losses across age cohorts can in many instances be traced back to the ongoing transformation process and the accompanying structural changes. In fact the large number of age cohorts that show a decrease in employment suggests that this decrease was largely independent of age and rather determined by other factors such as skills and education.

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<sup>6</sup> The net figures, i.e. the difference between employment gains and losses, should be identical for both figures. In practice, though, they are not, because construction employment was left out in the sectoral analysis, while it is incorporated in the analysis with respect to the age cohorts for data reasons.

The employment gains of the young to middle-age cohorts (25 to 29 and 30 to 34) in the NMS regions support this conjecture: these two age groups could already adapt to the new skill demands so that the skill-mismatch for these two groups was much lower than for others. By contrast, the increase of old-age employment in the NMS regions is usually not related to skill-mismatches or other reasons, but rather caused by changes in retirement regulations, especially with respect to the retirement age.

### **Employment by young and old age cohorts**

We now investigate more closely the relationship between regional sectoral specialization and the regional employment situation and its changes for two age cohorts which are perceived to be quite sensitive to structural changes: a young and an old age cohort. The young age cohort is represented by the population aged 25-29, the old age cohort by those aged 50-54. Thus we exclude the even younger segment of the labour market (i.e. population aged 15-24) since a large part of this segment is enrolled in education, and an inclusion of this group would bias the analysis. For similar reasons we also exclude the population aged 55 and above in order to avoid the differences in (early) retirement schemes and retirement behaviour across countries.

Looking first at the current employment situation of both age groups by types of regions (Figures 23 and 24), we find that in many cases the pattern of employment rates across the eight types of regions for both the young and the old age cohorts are similar to the employment pattern of the total population. Yet, there are some interesting differences.

The first difference relates to the agricultural regions in the NMS and the Southern EU-15. In both country groups the employment rates for the young are at a lower level than for the older age group. On the one hand this is related to the high employment share of the agricultural sector, providing employment to those unable to find a job elsewhere, presumably mostly the older age group. On the other hand, the underdevelopment of other sectors, in particular the services sector, results in a lack of employment opportunities for those entering the labour market.

In the NMS and Southern EU-15 tourism regions the situation is the opposite. Here the high or (in the case of the NMS) growing share of the tourism sector and of services in general are particularly favourable to the young age cohort and less so for the old age cohort. Furthermore, in the NMS regions the distribution of employment differs across age cohorts in the mining and the basic industry regions. Both types of regions were formerly centres of heavy industry and mining, but were struck hard by the decline of these industries during the transition phase. Data show that the decline of these industries affected mostly the older age cohorts, which due to their rather specialized but by then obsolete skill structure were laid off *pari passu* with the closure or restructuring of industrial plants. Conversely, the

emergence of new branches (both in industry and services) or new technologies favoured the more flexible young age cohorts. As a result employment opportunities in those two types of regions are significantly higher for the young than for the older-age population.

Figure 23

**Employment rates, 2003, population aged 25-29, relative to country average, cluster weighted averages**

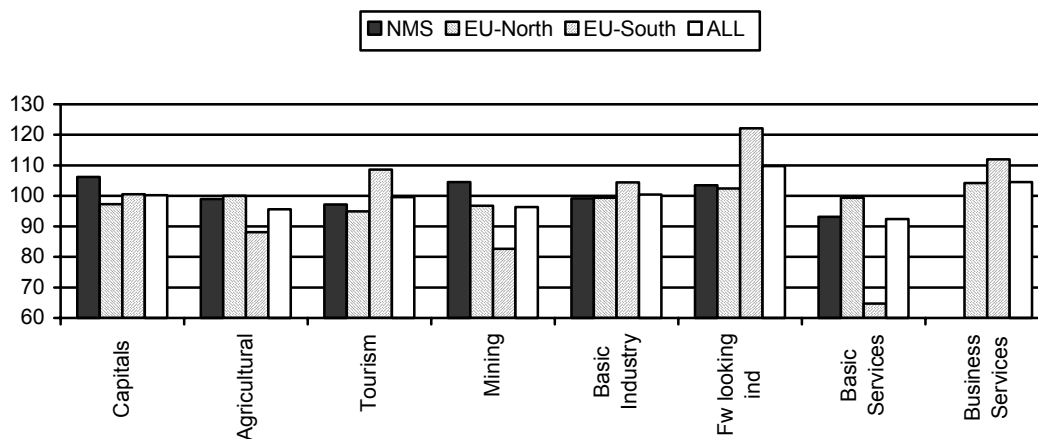
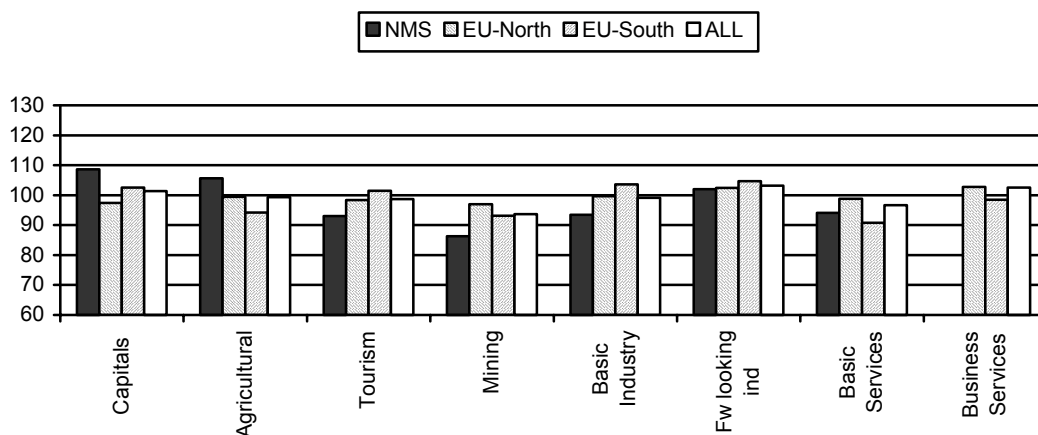


Figure 24

**Employment rates, 2003, population aged 50-54, relative to country average, cluster weighted averages**



Similar developments, though with opposite signs, can be found in those regions that have been characterized as problem regions in the Southern EU-15, i.e. the mining and the basic services regions. Given their peripheral location and their adverse sectoral structure (lack of employment opportunities in industry and in advanced services), the employment rates for the total population in those regions were the lowest among all regions. The lack of job opportunities and the overall decline of employment in those regions is especially disadvantageous for the young: they have problems getting employed as the majority of existing jobs are occupied by older age cohorts. Hence in those types of regions the

employment rates for the younger age cohorts are significantly below those of the older aged cohorts, and moreover amongst the lowest in the Southern EU-15 regions.

As in the case of employment rates, the pattern of employment rate changes for the young and the old age cohorts are similar to those of the total population. If there are deviations, their extent is negligible in most cases. The only major differences are found for the tourism and mining regions in the Southern EU-15 countries, where the employment rates of the young age cohorts developed (relatively) well, as opposed to the general trend.

An interesting differentiation across the two age groups and general trends is visible in employment and population growth.

The most striking observation is visible for the capital cities in all three country groups. As the data show (Figures 25-28), absolute employment as well as population of the young age cohort grew over-proportionately in the capital city regions, while both employment and population of the old age cohorts declined. Similar tendencies are found for the business services regions (with the exception of the Southern EU-15 business services regions), which indicates that large urban agglomeration offer a more favourable environment to the more mobile younger age cohorts, both in terms of employment opportunities and living conditions, than for older age cohorts.

Another aspect is the divergence of employment and population growth in the less advanced, less prosperous regions, such as the agricultural, mining and basic services regions. In these NMS regions young-age employment develops relatively poorly, while employment of older age cohorts grows above average, except for the mining regions. On the other hand, in the Southern EU-15 regions, in all three types of regions young-age employment grows above average while employment of old age cohorts declines.

Figure 25

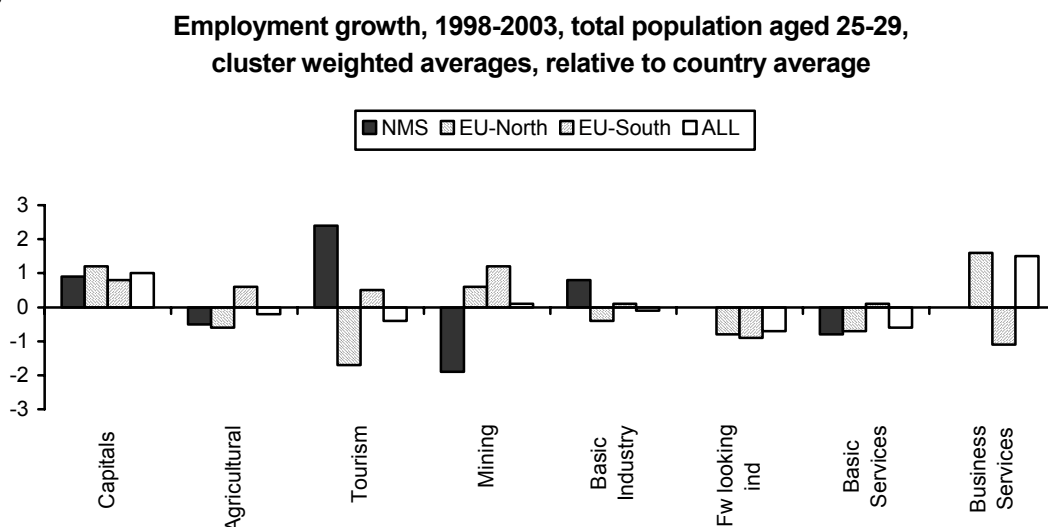


Figure 26

**Employment growth, 1998-2003, total population aged 50-54, cluster weighted averages, relative to country average**

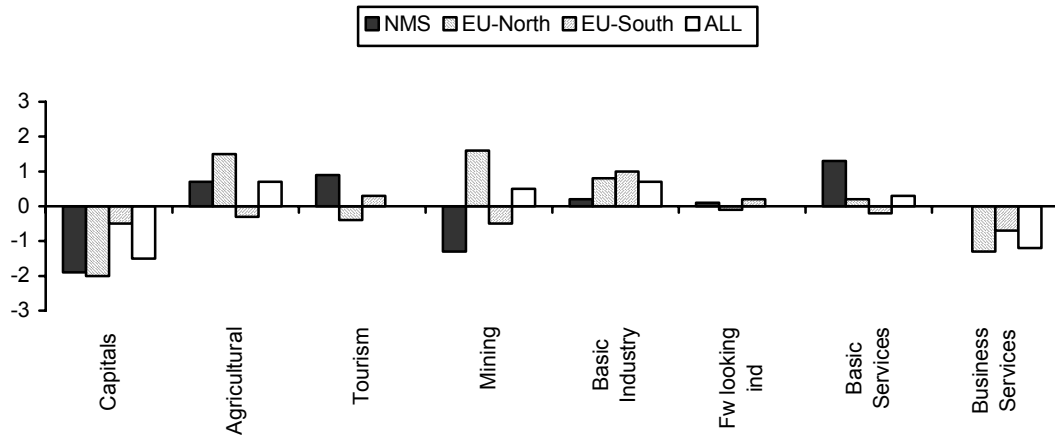


Figure 27

**Population growth, 1998-2003, total population aged 25-29, cluster weighted averages, relative to country average**

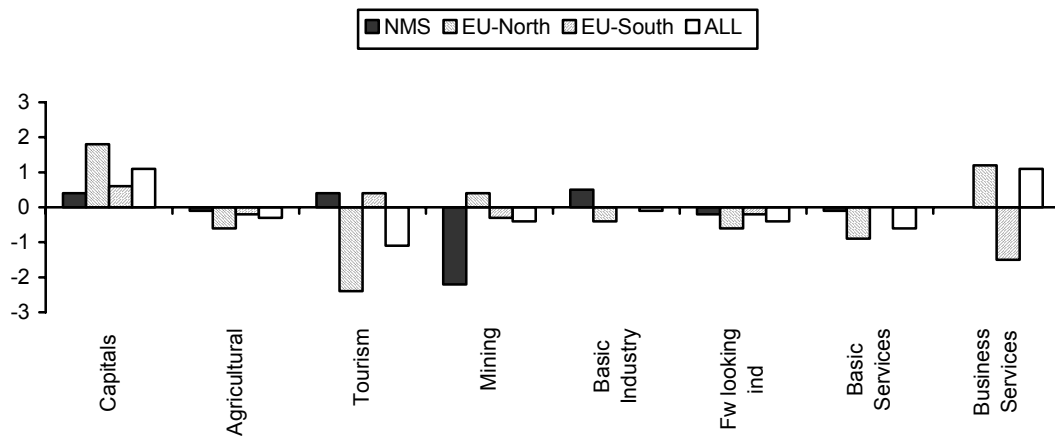
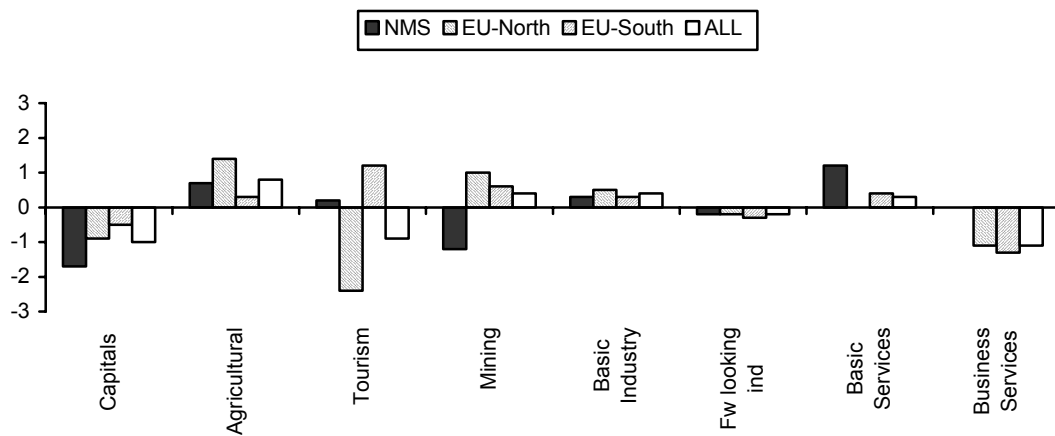


Figure 28

**Population growth, 1998-2003, total population aged 50-54, cluster weighted averages, relative to country average**



As far as population trends are concerned, they are much more similar across country groups. The young-age population declines in all three types of regions (with the exception of the Northern EU-15 mining regions), most likely because of outward migration into the capital cities or business services regions, while the population of an older age increases relatively strongly, counterbalancing the population decline in the urban agglomeration areas.

## **Conclusions**

The above analysis has shown significant disparities in income per capita and employment within the EU-27, both at the national and at the regional level. Still, another finding was that at the national level – at least in income terms – the less developed countries, i.e. the NMS and partly the Southern OMS, converge towards the Northern OMS, although the speed of convergence is such that it will take some decades in order for the NMS to fully catch up. The faster growth of incomes per capita in the NMS, however, is unevenly distributed across the regions within the NMS: in practice only few NMS regions, mainly the capital cities, converge quickly towards the EU-27 average income (or, on rare occasions, even surpass that level), while the bulk of the NMS regions is lagging behind. Given the latest trends and the economic prospects of the NMS regions, it seems likely that these gaps across the NMS regions will widen even further.

With respect to employment, the analysis has found significant differences in employment rates as well as in employment rate changes between the NMS and the Northern and Southern OMS. Thus, not only are the employment rates in the latter two country groups higher than in the NMS, they also grow in the Northern and Southern OMS over the observed period, while in the NMS the employment rate changes were much more heterogeneous across the NMS and their regions. To a large extent this heterogeneity is the result of the ongoing restructuring process in the NMS combined with a catching-up in (labour) productivity to OMS levels. Hence while there is still a shake-out of labour, predominantly in traditional industries and in agriculture, there are too few new jobs created in most economic sectors, except for advanced business services and public services.

This situation poses the greatest threat to those with no education beyond basic schooling: Firstly, they are heavily dependent on employment in those sectors that are to be restructured in the NMS, in particular the agricultural sector. Secondly, given the strained situation on the NMS labour market, it may be difficult for them to find work as they face competition for existing or newly created jobs from those with higher educational attainment levels.

Though this might be a general trend across the NMS regions, the analysis also has shown that labour market prospects differ across the various types of regions. Employment prospects for workers in all educational categories seem to be more favourable in the NMS



capital cities or in the regions that are specialized in modern industries, whereas prospects in the agricultural regions and partly also in the old-industry regions are bleaker, given those regions' peripheral location as well as their low attractiveness for domestic and foreign investors.

Irrespective of the type of region, however, what is more important for the future prospects on the NMS labour markets is the development of the services sector, as shown by the experiences in the Southern and Northern OMS regions. Hence it is expected that, with rising incomes in the NMS regions, a broader range of services will be developed that will generate new employment opportunities for people of all educational attainment levels, but most importantly for those with only basic schooling.

At the same time the development of the manufacturing sector in some of the Southern OMS regions also indicates that, despite a general decline of this sector, Western NMS regions that are specialized particularly in modern industries may be on the verge of becoming industrial core regions, with relatively high incomes per capita and good employment prospects.

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## Appendix 1

Figure A/1a

### Annual average employment and population growth, population aged 25-64, 1998-2003

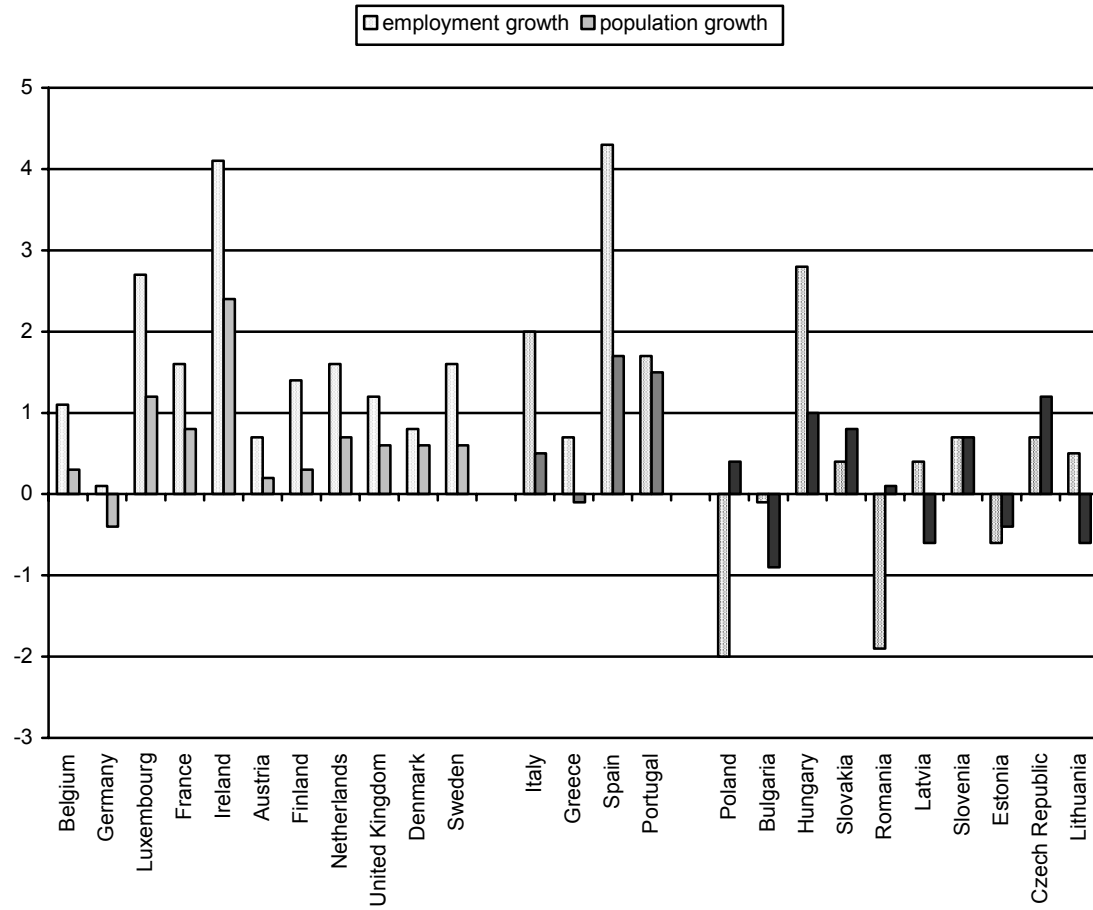
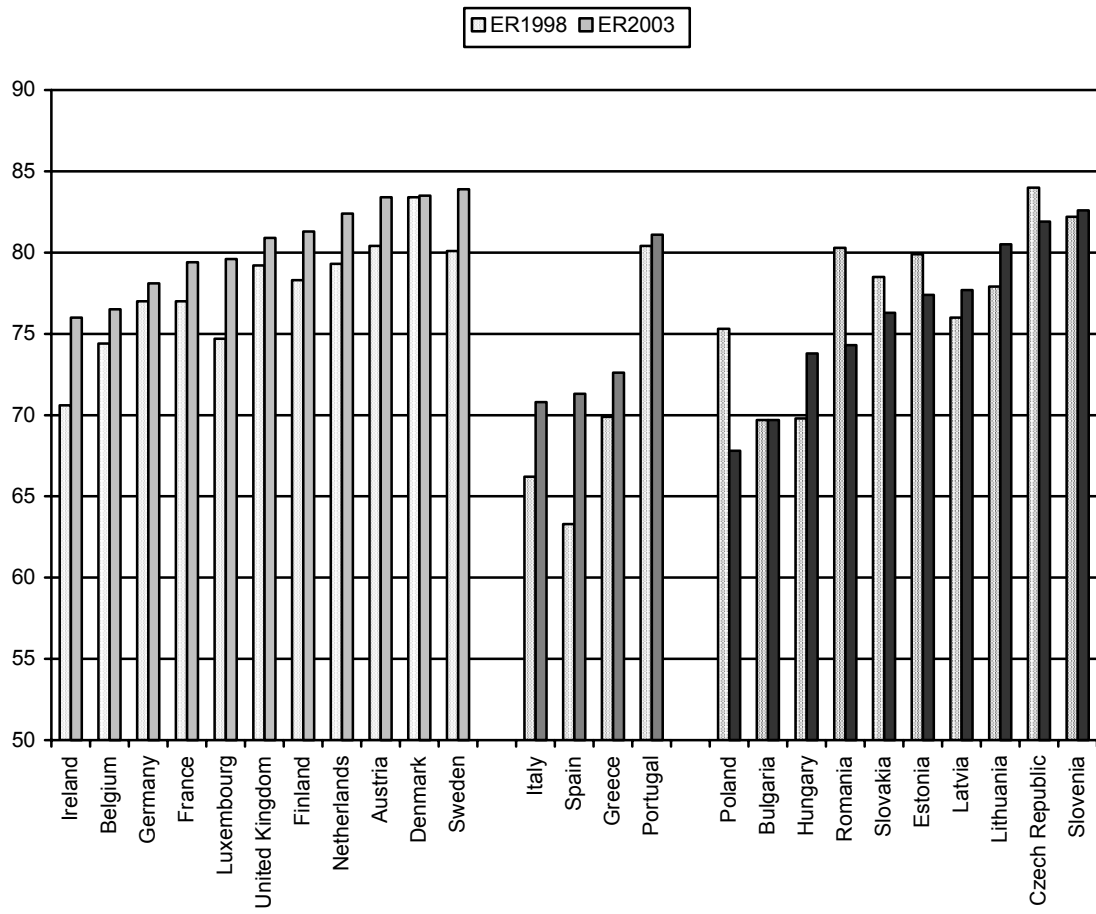
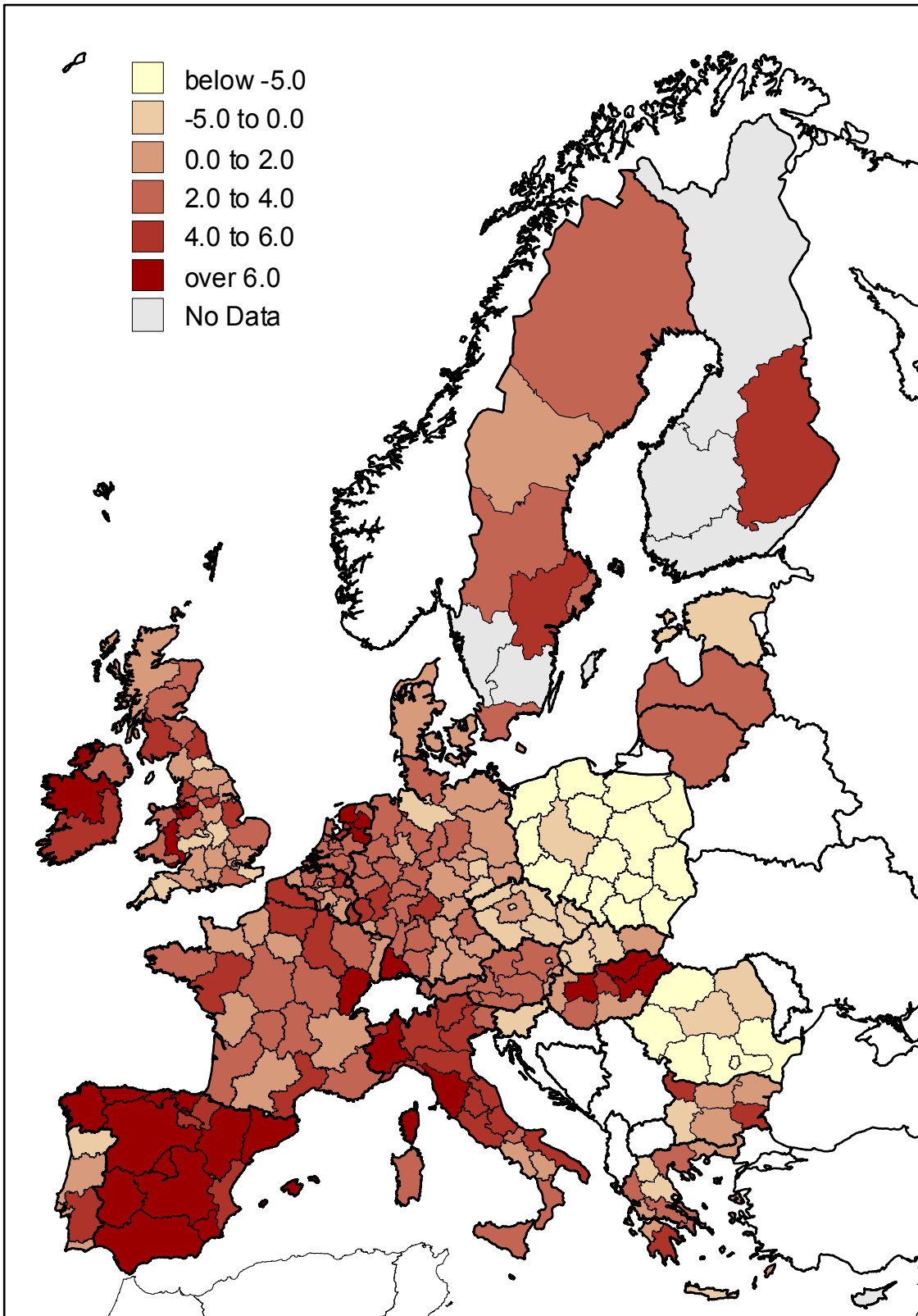


Figure A/1b

Employment rates, 1998 & 2003, population aged 25-54



Employment rate changes, 1998-2003, percentage points



Employment growth, 1998-2003, annual average growth

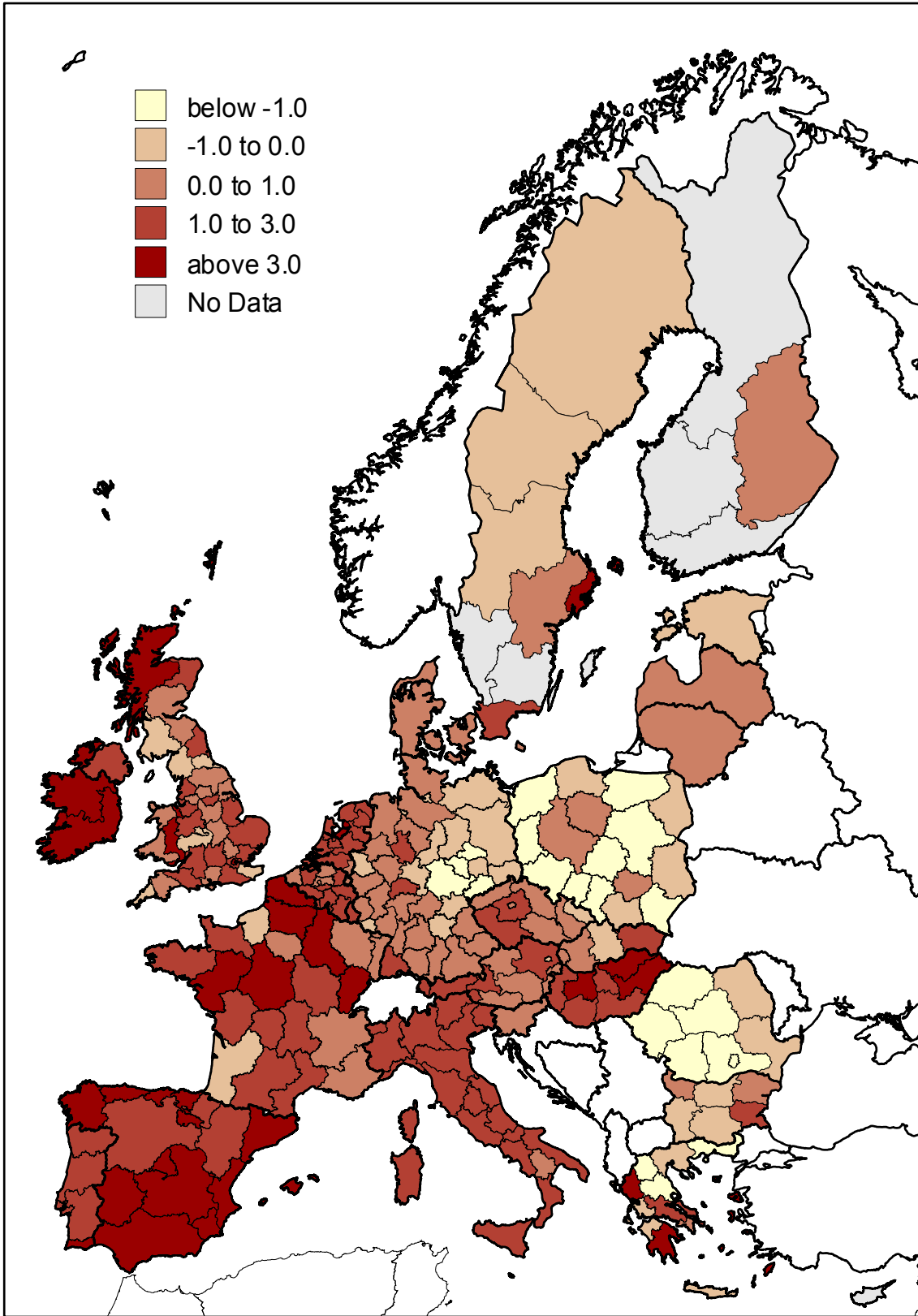


Figure A/2

**Employment rates, changes 1998-2003, population aged 25-29, cluster weighted averages**

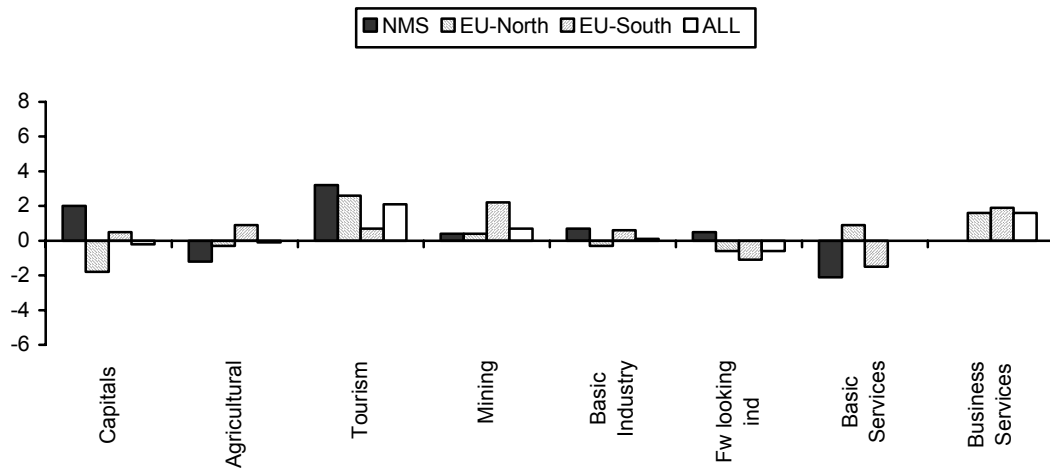


Figure A/3

**Employment rates, changes 1998-2003, population aged 50-54, cluster weighted averages**

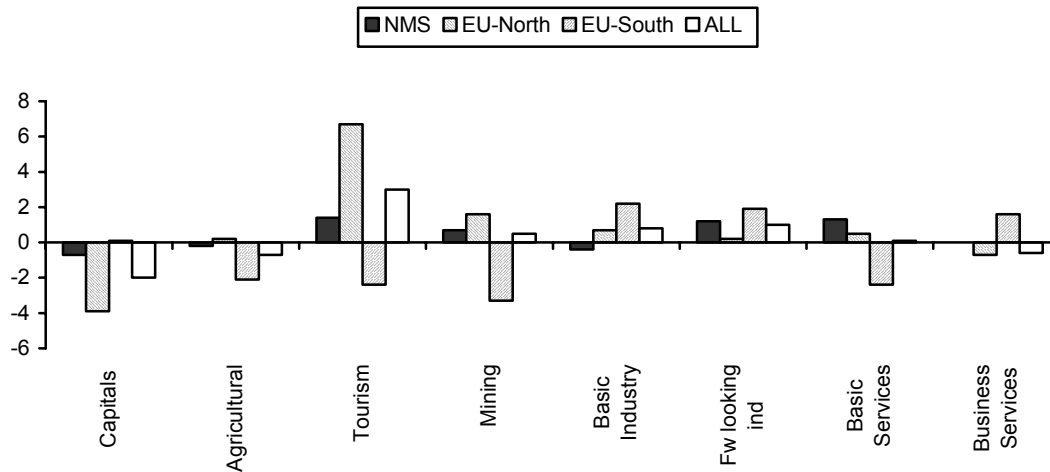


Figure A/4

**Employment rates, changes 1998-2003, low educated population aged 25-64, cluster weighted averages**

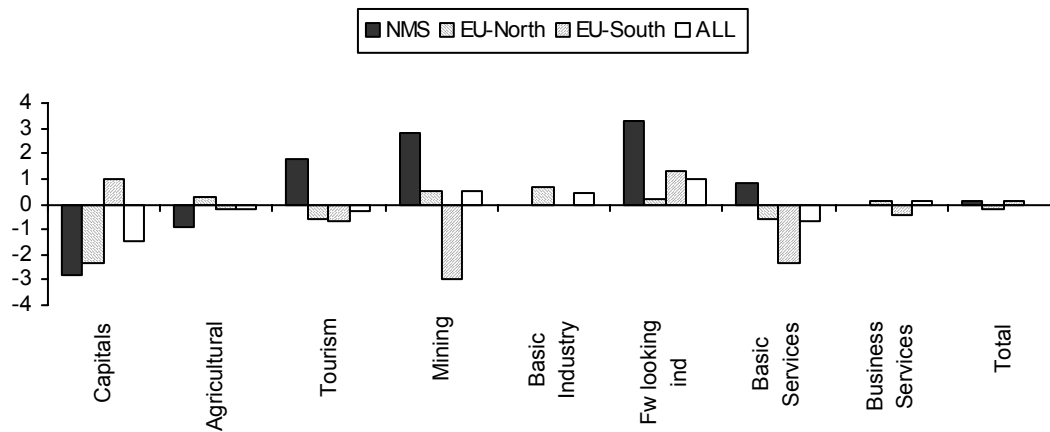




Figure A/5

**Employment rates, changes 1998-2003, medium-educated population aged 25-64, cluster weighted averages**

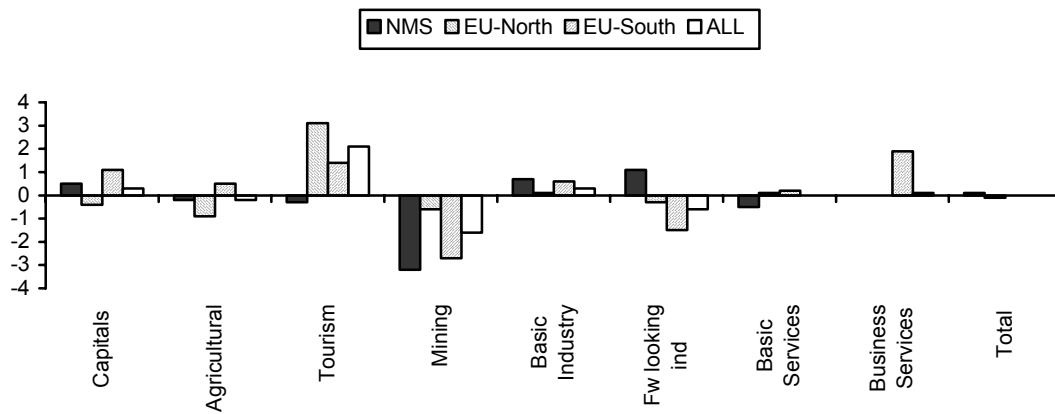


Figure A/6

**Employment rates, changes 1998-2003, highly educated population aged 25-64, cluster weighted averages**

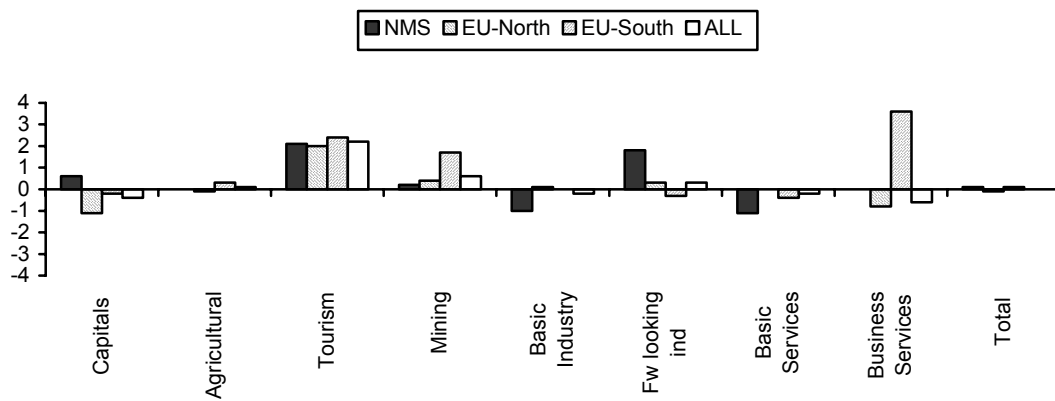


Figure A/7

**Employment growth, 1998-2003, low-educated population aged 25-64, cluster weighted averages, relative to country average**

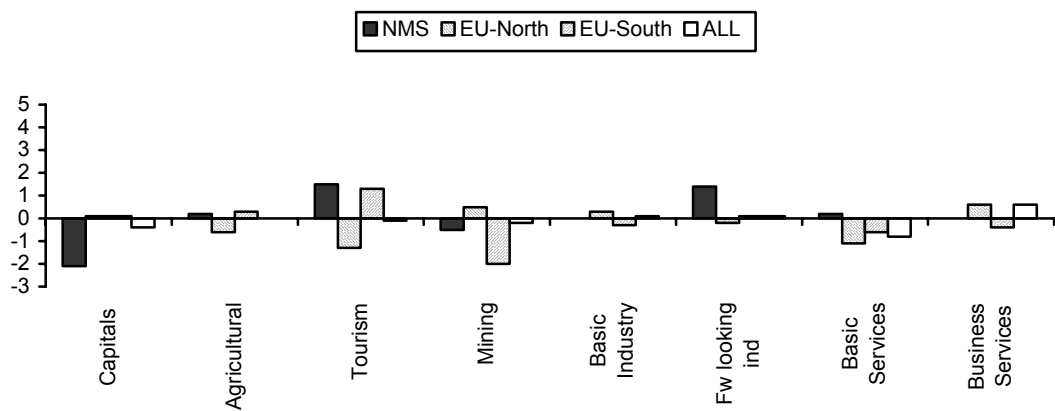


Figure A/8

**Employment growth, 1998-2003, medium-educated population aged 25-64, cluster weighted averages, relative to country average**

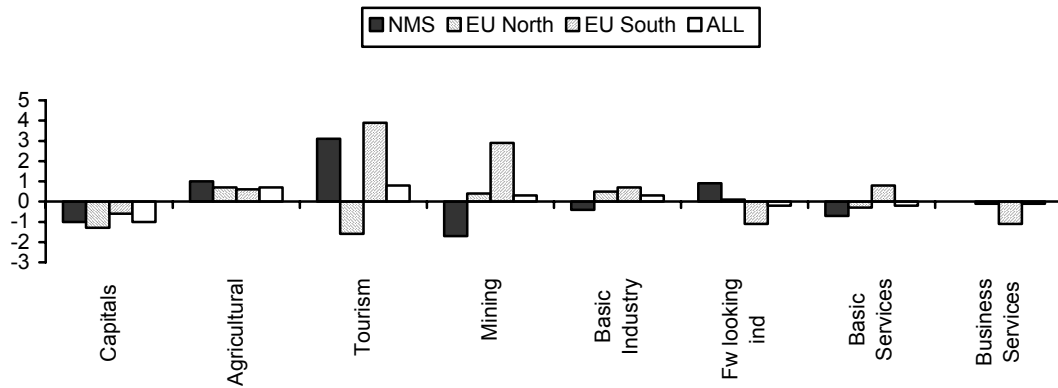


Figure A/9

**Employment growth, 1998-2003, highly educated population aged 25-64, cluster weighted averages, relative to country average**

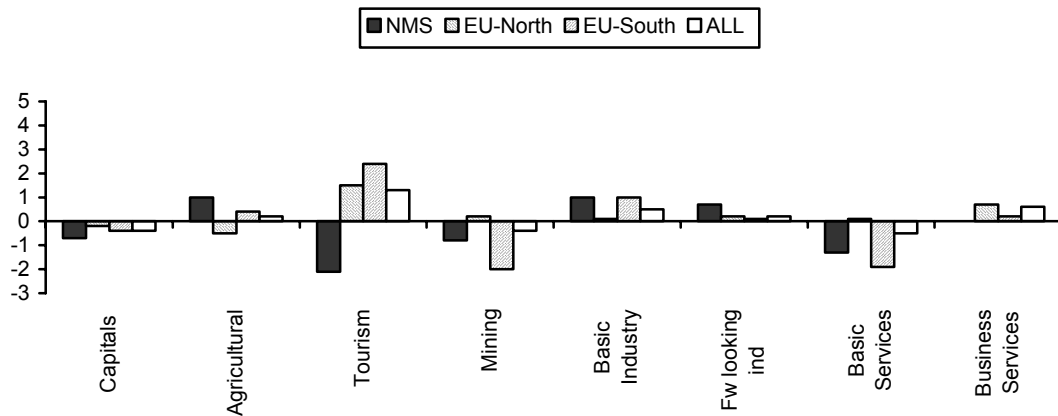


Figure A/10

**Population growth, 1998-2003, low-educated population aged 25-64, cluster weighted averages, relative to country average**

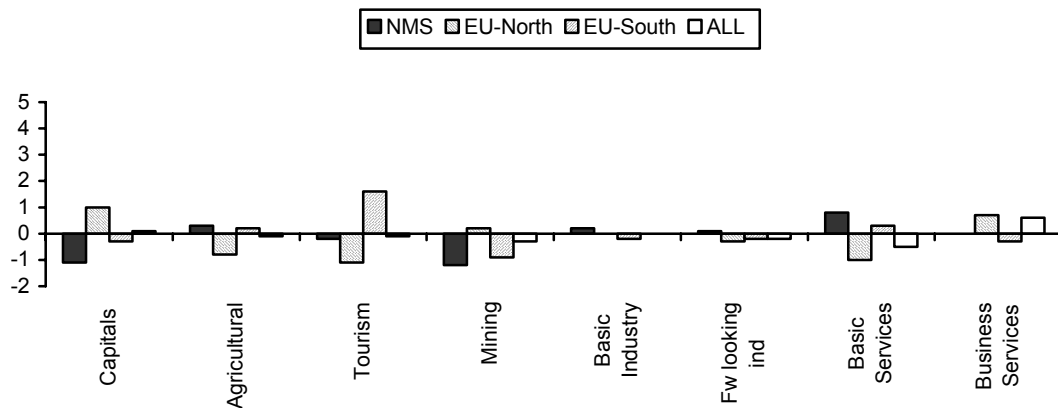


Figure A/11

**Population growth, 1998-2003, medium-educated population aged 25-64, cluster weighted averages, relative to country average**

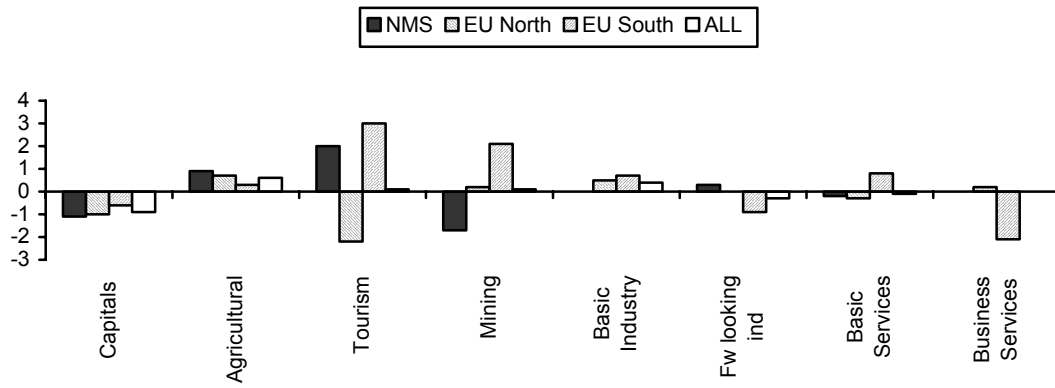


Figure A/12

**Population growth, 1998-2003, highly educated population aged 25-64, cluster weighted averages, relative to country average**

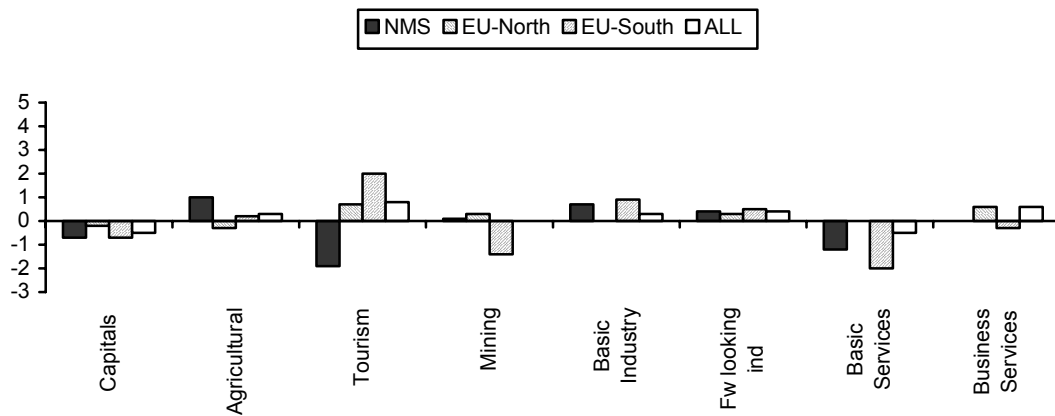


Figure A/13

**Contribution of age cohorts to total employment losses, in per cent of total losses**

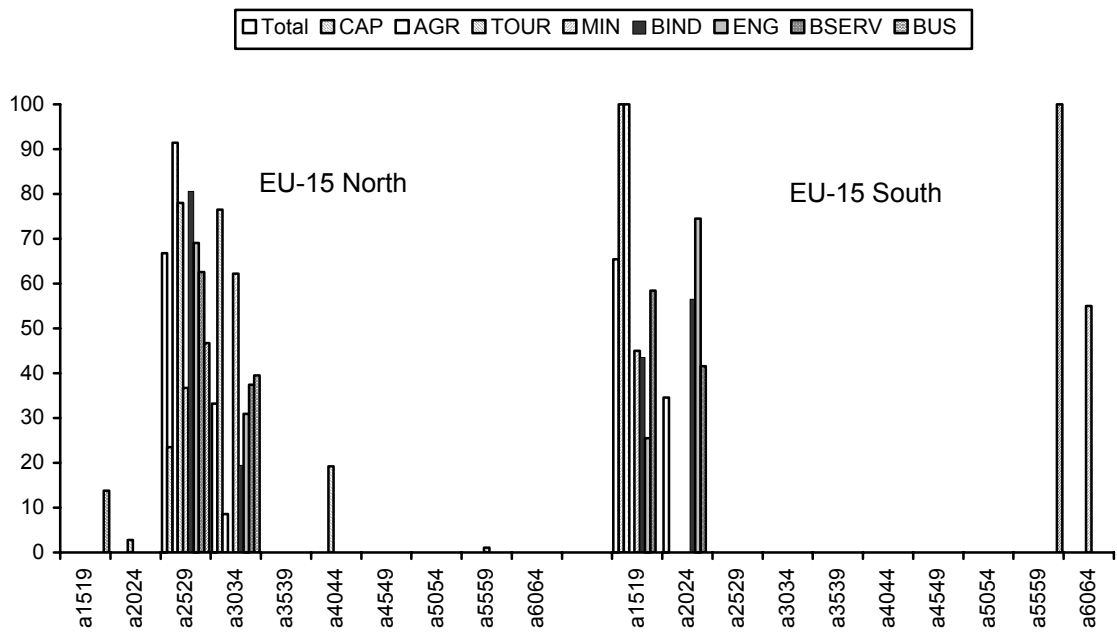
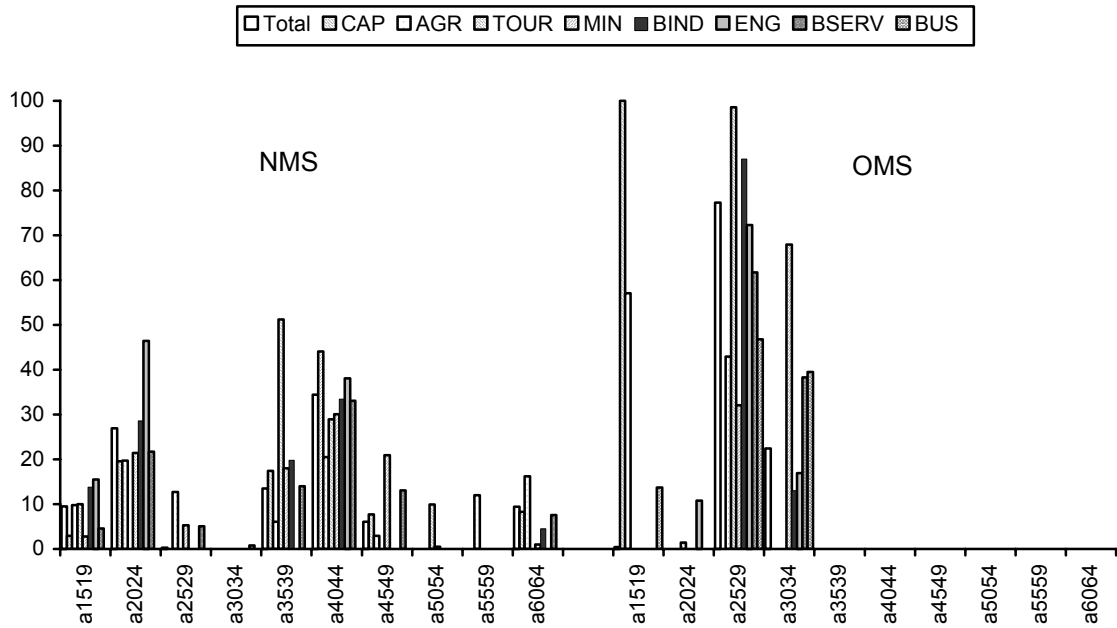


Figure A/14

**Contribution of age cohorts to total employment gains, in per cent of total gains**

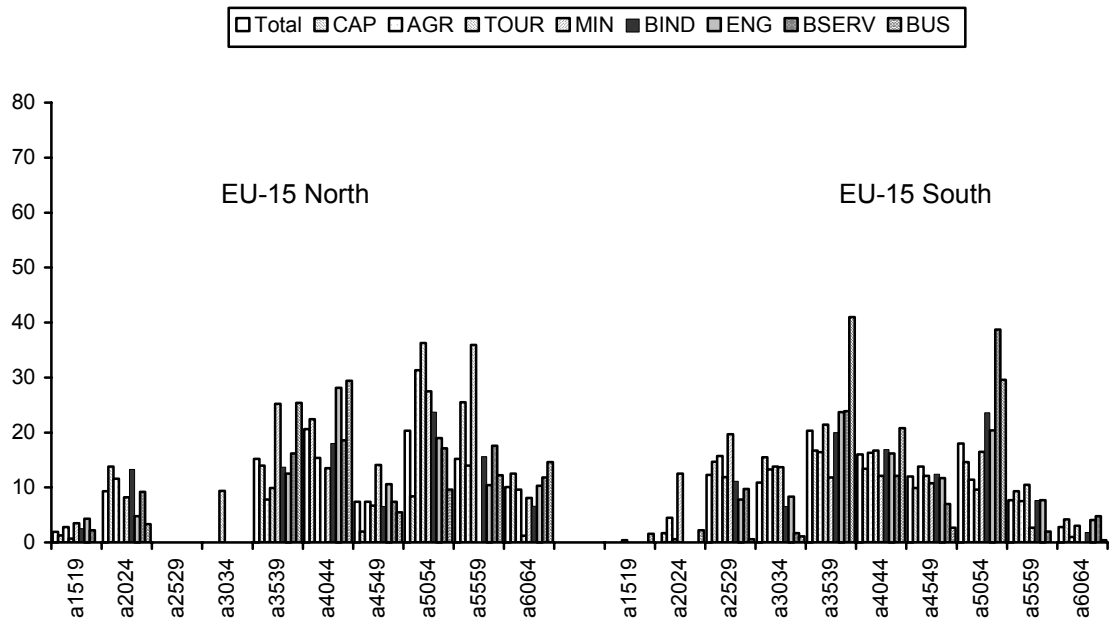
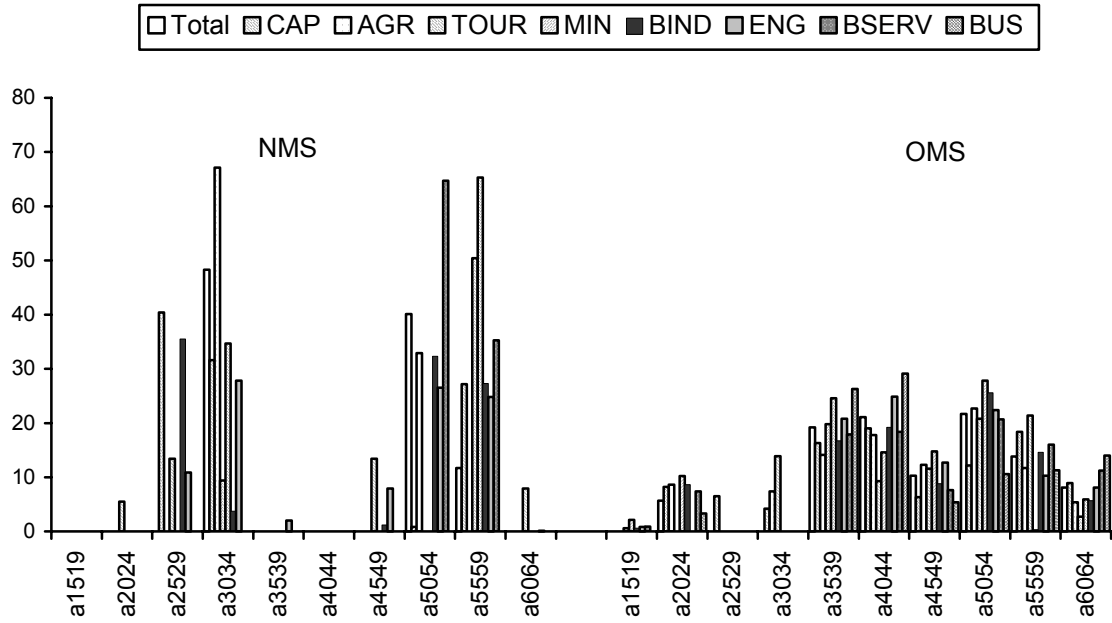


Figure A/15

Population by education, share in population aged 25-64, 2003

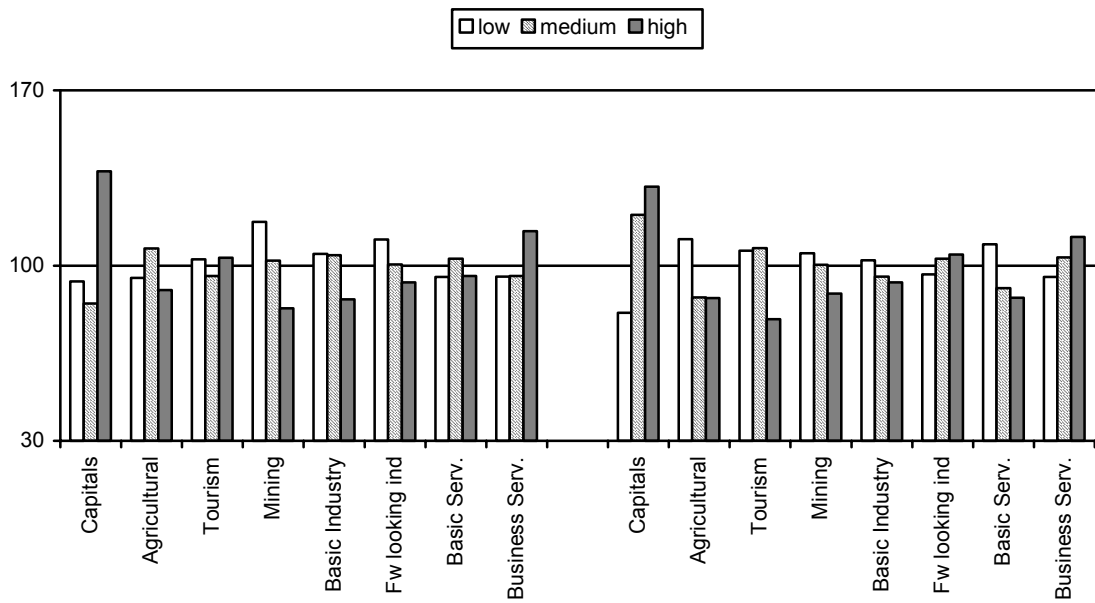
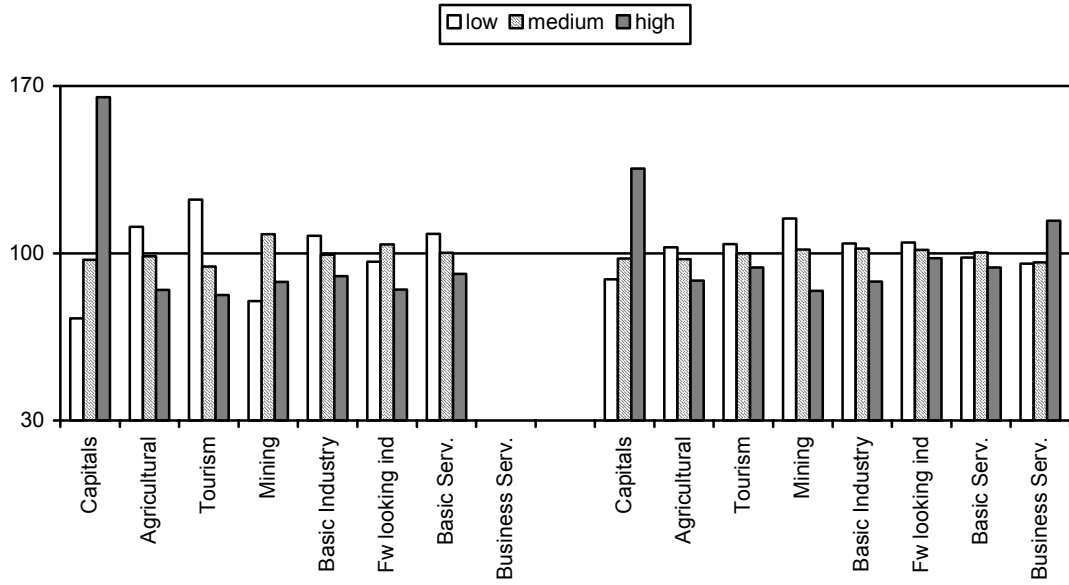


Figure A/16

**Population by education, share in population aged 25-29, 2003**

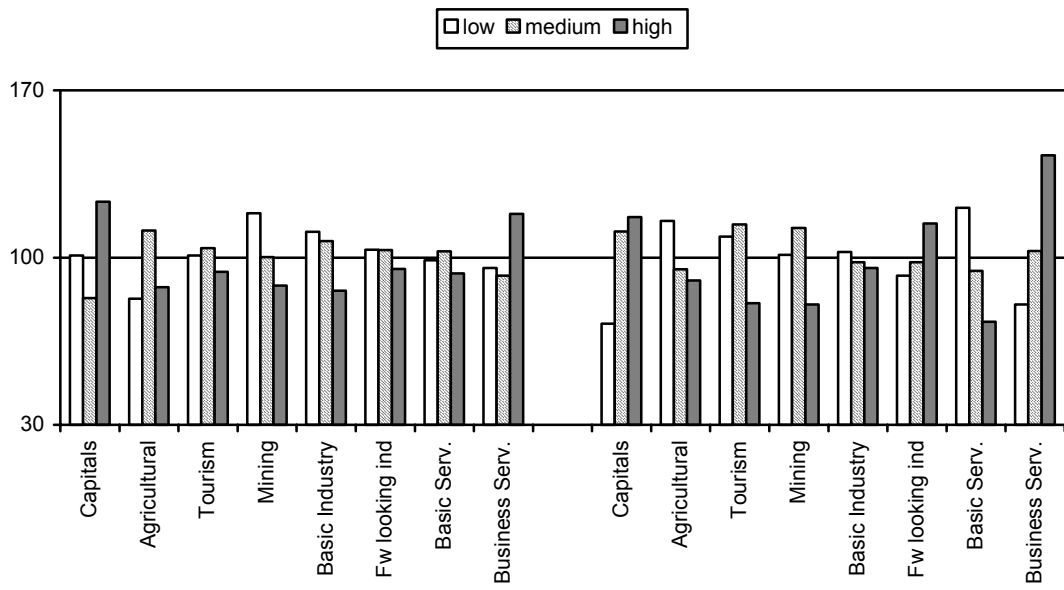
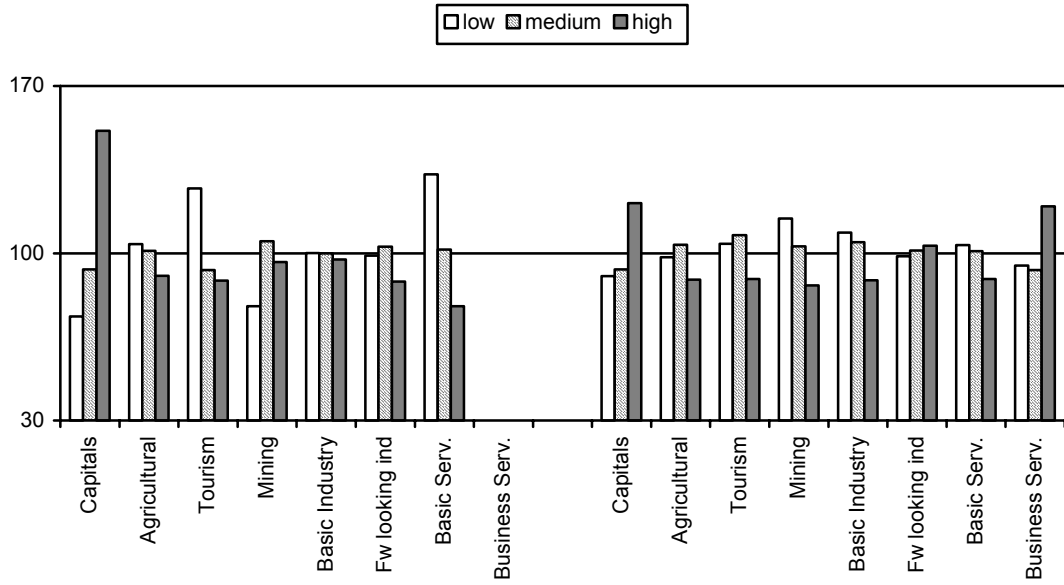


Figure A/17

Population by education, share in population aged 50-54, 2003

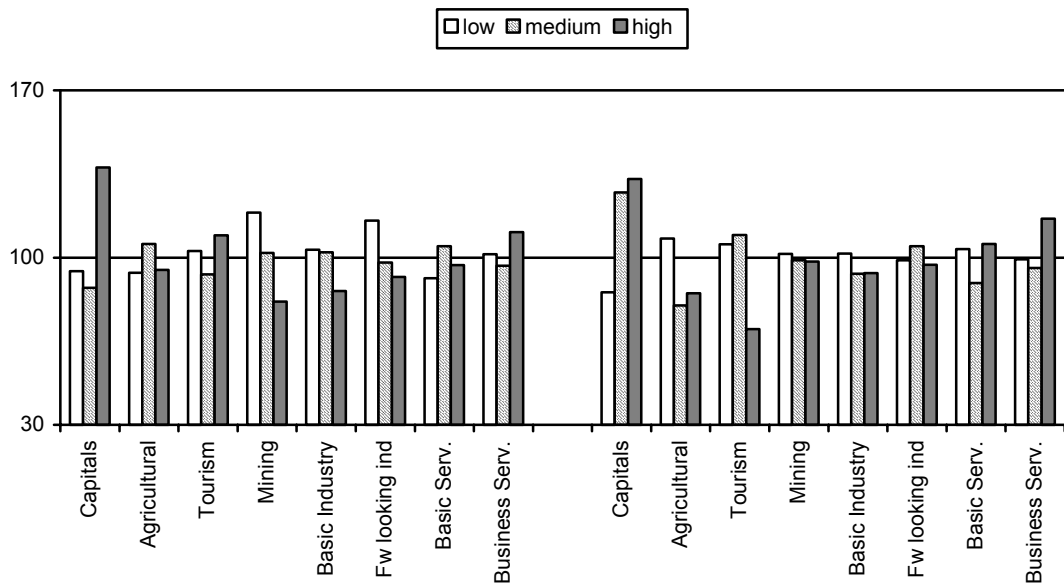
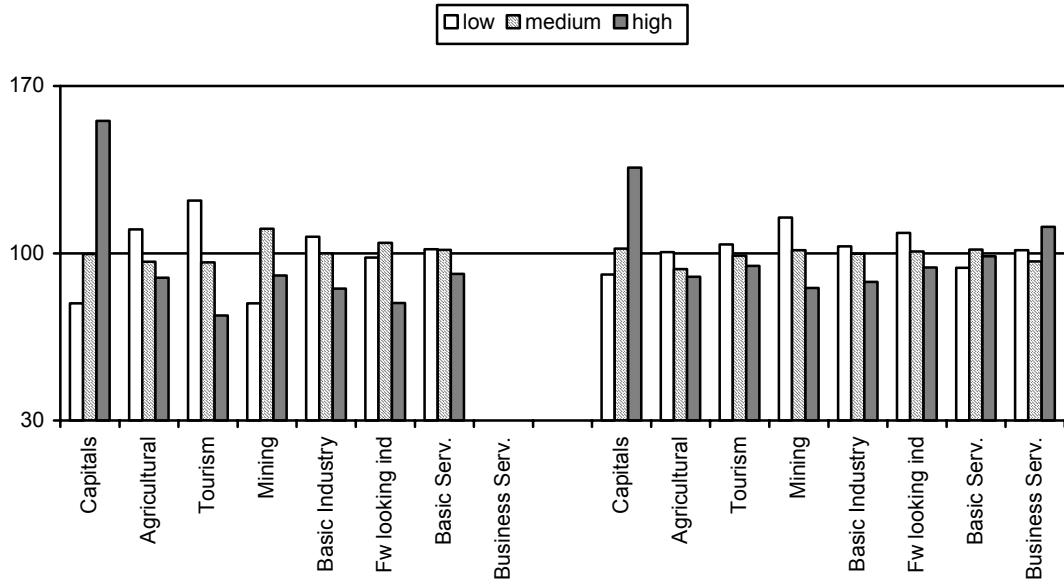




Figure A/18

**Regional labour productivity, 1998 (GDP at PPS per employed),  
cluster weighted averages**

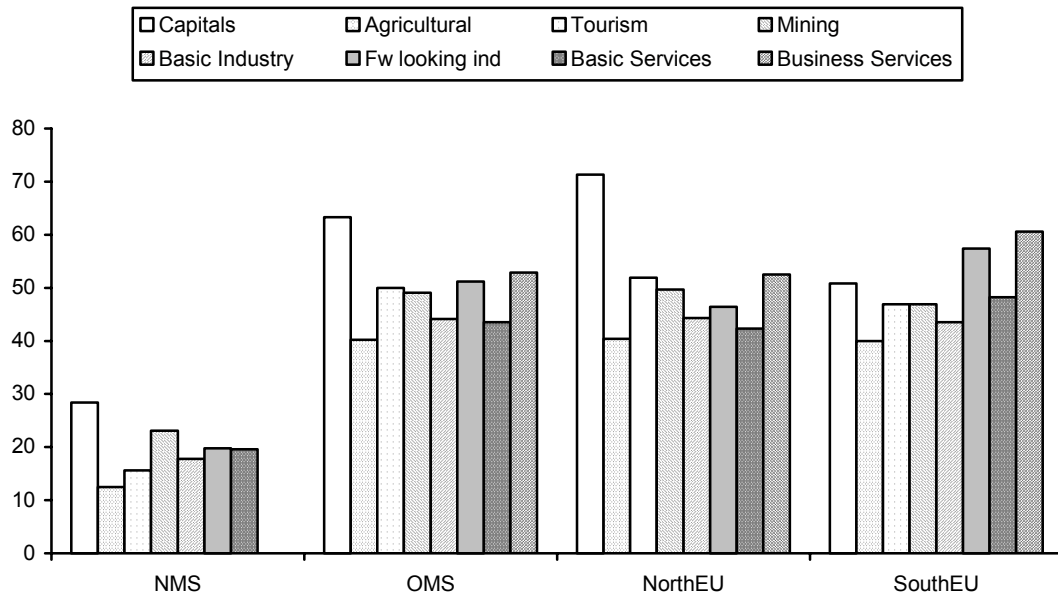
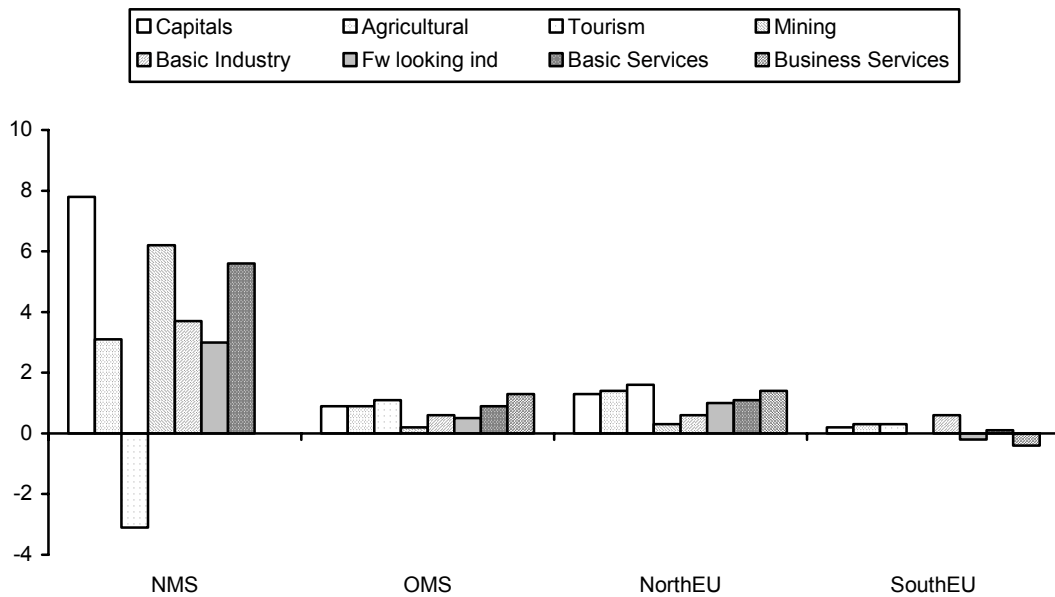


Figure A/19

**Regional labour productivity growth, 1998-2002 (GDP at PPS per employed,  
average annual growth rates), cluster weighted averages**



## **Appendix 2**

In the following we show the results of the cluster analysis with respect to the different cluster measures. Since for the NMS the breakdown of regions according to the type of regions was taken from an earlier study (Landesmann and Römisch, 2005), only the detailed results for the OMS are shown here, whereas for the NMS solely the result that has been used for the study is given.

In the tables below the following abbreviations are used:

CAP: capital city regions or cluster

AGR: agricultural regions or cluster

MIN: mining regions or cluster

BIND: basic industries regions or cluster

ENG: forward-looking industries regions or cluster

BSERV: basic services regions or cluster

TOUR: tourism regions or cluster

BUS: business services regions or cluster

Table A/1

**Cluster assignment of the OMS NUTS 2 regions, by the various cluster methods**

	<b>final clusters</b>	manual assignment	Euclidean distance	Squared Euclidean distance	Absolute value distance or the Minkowski distance metric with argument 1	Minkowski distance metric with infinite argument (cMI),	Minkowski distance metric with argument 2	Minkowski distance metric with argument 3	Minkowski distance metric with argument 4	Minkowski distance metric with argument 2, raised to power 2	Minkowski distance metric with argument 3, raised to power 3	Minkowski distance metric with argument 4, raised to power 4	Canberra distance measure	Correlation similarity measure	Angular separation similarity measure
<b>be</b>															
be10	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
be21	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
be22	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
be23	<b>BIND</b>	BIND	BSERV	BIND	BIND	BIND	BSERV	BSERV	BIND	BIND	BIND	ENG	BSERV	BIND	BIND
be24	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
be25	<b>BIND</b>	BIND	AGR	BIND	BIND	AGR	AGR	AGR	BIND	BIND	AGR	AGR	BIND	BIND	BIND
be31	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
be32	<b>BSERV</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
be33	<b>BSERV</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	MIN
be34	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
be35	<b>MIN</b>	MIN	MIN	BSERV	MIN	MIN	MIN	MIN	MIN	BSERV	BSERV	BIND	MIN	MIN	MIN
<b>dk</b>															
.															
<b>de</b>															
de11	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
de12	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
de13	<b>ENG</b>	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
de14	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
de21	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
de22	<b>ENG</b>	ENG	AGR	BIND	BIND	BIND	AGR	AGR	BIND	BIND	BIND	AGR	BIND	BIND	BIND
de23	<b>AGR</b>	AGR	AGR	BIND	BIND	AGR	AGR	AGR	BIND	BIND	AGR	AGR	BIND	BIND	BIND
de24	<b>BIND</b>	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	ENG	ENG	BSERV	BIND
de25	<b>ENG</b>	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND
de26	<b>ENG</b>	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND
de27	<b>BIND</b>	BIND	AGR	BIND	BIND	BIND	AGR	AGR	BIND	BIND	BIND	AGR	ENG	BIND	BIND
de30	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
de40	<b>AGR</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	AGR	MIN
de50	<b>BUS</b>	BSERV	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
de60	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
de71	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
de72	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	BUS	ENG	BSERV	BIND
de73	<b>BSERV</b>	.	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
de80	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR

(Table A/1 contd.)

Table A/1 (contd.)

de91	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG	ENG
de92	<b>BSERV</b>	.	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV
de93	<b>BSERV</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV
de94	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
dea1	<b>MIN</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN
dea2	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
dea3	<b>MIN</b>	MIN	MIN	BSERV	BSERV	MIN	MIN	MIN	MIN	BSERV	BSERV	BIND	BSERV	MIN	MIN
dea4	<b>BIND</b>	BIND	BIND	BIND	ENG	BIND	BIND	BIND	BUS	BIND	BIND	ENG	ENG	BSERV	BIND
dea5	<b>BIND</b>	BIND	BIND	ENG	BSERV	BUS	BIND	BIND	BUS	ENG	ENG	ENG	BSERV	BSERV	BSERV
deb1	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	BUS	BSERV	BSERV	BSERV
deb2	<b>BSERV</b>	BIND	TOUR	BIND	TOUR	BSERV	TOUR	BSERV	BSERV	BIND	BIND	BSERV	AGR	TOUR	TOUR
deb3	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BUS	ENG	ENG
dec0	<b>BSERV</b>	MIN	BSERV	BUS	BSERV	BUS	BSERV	BUS	BUS	BUS	BUS	BUS	BSERV	MIN	BSERV
ded1	<b>BIND</b>	BIND	BIND	BIND	BIND	BUS	BIND	BIND	BUS	BIND	BIND	BUS	ENG	BIND	BIND
ded2	<b>BSERV</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
ded3	<b>BSERV</b>	BSERV	BSERV	BUS	BSERV	BSERV	BSERV	BSERV	BSERV	BUS	BSERV	BSERV	AGR	TOUR	BSERV
dee1	<b>BSERV</b>	BSERV	BSERV	BSERV	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	AGR	AGR
dee2	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
dee3	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
def0	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	AGR	BSERV
deg0	<b>BIND</b>	BIND	BSERV	BIND	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	BIND	BSERV	BIND	AGR	BSERV
<b>gr</b>															
gr11	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
gr12	<b>BIND</b>	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	ENG	BIND	BIND
gr13	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
gr14	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
gr21	<b>AGR</b>	AGR	BSERV	AGR	AGR	BSERV	BSERV	BSERV	BSERV	AGR	BSERV	BSERV	AGR	AGR	AGR
gr22	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR
gr23	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
gr24	<b>BIND</b>	BIND	BSERV	BIND	BIND	BSERV	BSERV	BSERV	BSERV	BIND	BIND	BSERV	BIND	AGR	BIND
gr25	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
gr30	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
gr41	<b>BSERV</b>	BSERV	TOUR	BUS	TOUR	BUS	TOUR	TOUR	BUS	BUS	BUS	BUS	AGR	TOUR	TOUR
gr42	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	AGR	TOUR	TOUR
gr43	<b>AGR</b>	AGR	TOUR	AGR	TOUR	BSERV	TOUR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
<b>es</b>															
es11	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
es12	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	BIND	MIN	MIN
es13	<b>MIN</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV
es21	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG

(Table A/1 contd.)

Table A/1 (contd.)

es22	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
es23	<b>BIND</b>	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND
es24	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
es30	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
es41	<b>AGR</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	BSERV
es42	<b>AGR</b>	AGR	BSERV	AGR	AGR	BSERV	BSERV	BSERV	BSERV	AGR	BSERV	BSERV	BIND	AGR	AGR
es43	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
es51	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
es52	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	BUS	ENG	BSERV	BIND
es53	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR
es61	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
es62	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
es63	<b>BSERV</b>	BSERV	BUS	BUS	TOUR	BUS	BUS	BUS	BUS	BUS	BUS	BUS	TOUR	TOUR	BUS
es70	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR
<b>fr</b>															
fr10	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
fr21	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	BIND	MIN	MIN
fr22	<b>BIND</b>	BIND	ENG	ENG	ENG	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	BSERV
fr23	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
fr24	<b>BSERV</b>	BIND	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV
fr25	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR	AGR	BIND	AGR
fr26	<b>AGR</b>	AGR	AGR	AGR	BIND	AGR	AGR	AGR	BIND	AGR	AGR	AGR	AGR	BIND	AGR
fr30	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	ENG	ENG	BSERV	BIND
fr41	<b>BIND</b>	BIND	ENG	ENG	ENG	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG
fr42	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
fr43	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
fr51	<b>BIND</b>	BIND	BSERV	BIND	BIND	BIND	BSERV	BSERV	BIND	BIND	BIND	ENG	BIND	BIND	BIND
fr52	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
fr53	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
fr61	<b>BSERV</b>	BSERV	BSERV	BSERV	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	AGR
fr62	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
fr63	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR
fr71	<b>BIND</b>	BIND	ENG	ENG	ENG	BSERV	ENG	BSERV	BSERV	ENG	ENG	BSERV	ENG	MIN	BSERV
fr72	<b>BIND</b>	BIND	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR	AGR	BIND	BIND	AGR
fr81	<b>TOUR</b>	TOUR	TOUR	BSERV	TOUR	BSERV	TOUR	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	TOUR	TOUR
fr82	<b>TOUR</b>	TOUR	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	TOUR	BUS
fr83	<b>BSERV</b>	BSERV	TOUR	BUS	TOUR	BSERV	TOUR	BSERV	BSERV	BUS	BUS	BUS	TOUR	TOUR	TOUR
<b>ie</b>															
ie01	<b>AGR</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	AGR
ie02	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	BSERV

(Table A/1 contd.)

Table A/1 (contd.)

<b>it</b>																	
itc1	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG		
itc2	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	AGR	TOUR	TOUR	
itc3	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	TOUR	BUS	
itc4	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	
itd1a	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	AGR	TOUR	TOUR	
itd3	<b>ENG</b>	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	
itd4	<b>ENG</b>	BIND	ENG	ENG	ENG	ENG	BUS	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	
itd5	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	
ite1	<b>BIND</b>	BIND	BIND	BUS	ENG	BUS	BIND	BIND	BUS	BUS	BUS	BUS	BUS	BSERV	TOUR	BSERV	
ite2	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	BUS	BSERV	BSERV	BSERV	BSERV	
ite3	<b>BIND</b>	BIND	BIND	BIND	ENG	ENG	BIND	BIND	ENG	BIND	BIND	BIND	ENG	ENG	BSERV	BIND	
ite4	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	
itf1	<b>BIND</b>	.	BIND	BIND	BSERV	BIND	BIND	BIND	BUS	BIND	BIND	BUS	BSERV	BIND	BIND	BIND	
itf2	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
itf3	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	AGR	BSERV
itf4	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
itf5	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
itf6	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
itg1	<b>BSERV</b>	BSERV	BSERV	BSERV	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	AGR	AGR
itg2	<b>MIN</b>	AGR	MIN	BSERV	MIN	MIN	MIN	MIN	MIN	MIN	BSERV	BSERV	BIND	AGR	MIN	MIN	
<b>lu</b>																	
<b>nl</b>																	
nl11	<b>BIND</b>	BIND	BIND	BIND	ENG	BIND	BIND	BIND	BUS	BIND	BIND	BUS	BSERV	BSERV	BSERV	BSERV	
nl12	<b>ENG</b>	ENG	BSERV	BIND	BIND	BIND	BSERV	BSERV	BIND	BIND	BIND	BSERV	BSERV	BIND	BSERV		
nl13	<b>AGR</b>	AGR	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	BIND	MIN	MIN	MIN		
nl21	<b>BIND</b>	BIND	BIND	BIND	BIND	BIND	BIND	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND		
nl22	<b>BIND</b>	BIND	BIND	BIND	ENG	BIND	BIND	BIND	BUS	BIND	BIND	BUS	BSERV	BIND	BIND		
nl23	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV	
nl31	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	
nl32	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	
nl33	<b>BSERV</b>	BSERV	BSERV	BUS	BSERV	BSERV	BSERV	BSERV	BSERV	BUS	BUS	BUS	BSERV	MIN	BSERV		
nl34	<b>ENG</b>	ENG	ENG	ENG	BSERV	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	MIN	BSERV	
nl41	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	
nl42	<b>ENG</b>	ENG	ENG	ENG	BSERV	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG	ENG	
<b>at</b>																	
at11	<b>BSERV</b>	BSERV	BSERV	BUS	BSERV	BSERV	BSERV	BSERV	BUS	BUS	BUS	BUS	BSERV	AGR	BSERV		
at12	<b>BSERV</b>	AGR	BSERV	BIND	BSERV	BSERV	BSERV	BSERV	BIND	BIND	BIND	BSERV	BSERV	AGR	BSERV		
at13	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP		
at21	<b>MIN</b>	MIN	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV	
at22	<b>AGR</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	BSERV	

(Table A/1 contd.)

Table A/1 (contd.)

at31	<b>ENG</b>	ENG	ENG	ENG	ENG	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
at32	<b>TOUR</b>	TOUR	TOUR	BUS	TOUR	TOUR	TOUR	TOUR	TOUR	BUS	BUS	BUS	BUS	TOUR	TOUR
at33	<b>TOUR</b>	TOUR	TOUR	BUS	TOUR	TOUR	TOUR	TOUR	TOUR	BUS	BUS	BUS	BUS	TOUR	TOUR
at34	<b>BIND</b>	BIND	BIND	BIND	ENG	ENG	BIND	BIND	ENG	BIND	BIND	ENG	ENG	BSERV	BIND
<b>pt</b>															
pt11	<b>BIND</b>	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	BIND	ENG	ENG	BSERV	BIND
pt16	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
pt17	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
pt18	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	MIN
pt15	<b>TOUR</b>	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR
pt20	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	TOUR	MIN
pt30	<b>TOUR</b>	BSERV	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR	TOUR
<b>fi</b>															
fi13	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
fi18	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
fi19	<b>ENG</b>	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND	BIND	ENG	BSERV	BIND	BSERV
fi1a	<b>AGR</b>	AGR	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV
fi20	<b>TOUR</b>	BSERV	TOUR	BUS	TOUR	BSERV	TOUR	BSERV	BSERV	BUS	BUS	BUS	TOUR	TOUR	TOUR
<b>se</b>															
se01	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
se02	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG	ENG
se04	<b>BSERV</b>	.	BSERV	BIND	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	BSERV	BSERV	BSERV	MIN	BSERV
se06	<b>BIND</b>	BIND	BSERV	BIND	BSERV	BIND	BSERV	BSERV	BIND	BIND	BIND	ENG	BSERV	BIND	BSERV
se07	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
se08	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	BIND	MIN	MIN
se09	<b>AGR</b>	BIND	AGR	BIND	BIND	BIND	AGR	AGR	BIND	BIND	BIND	AGR	BIND	BIND	BIND
se0a	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
<b>uk</b>															
ukc1	<b>BIND</b>	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG
ukc2	<b>BSERV</b>	.	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	BSERV
ukd1	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
ukd2	<b>ENG</b>	ENG	ENG	ENG	ENG	BSERV	ENG	ENG	BSERV	ENG	ENG	BSERV	ENG	MIN	BSERV
ukd3	<b>BSERV</b>	BSERV	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BSERV	BUS
ukd4	<b>BIND</b>	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
ukd5	<b>BSERV</b>	BSERV	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BIND	BSERV
uke1	<b>BIND</b>	BIND	BIND	BIND	ENG	BIND	BIND	BIND	BIND	BUS	BIND	BIND	ENG	BUS	BSERV
uke2	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR
uke3	<b>BIND</b>	BIND	BIND	BIND	ENG	BUS	BIND	BIND	BUS	BIND	BIND	BUS	ENG	BSERV	BIND
uke4	<b>BIND</b>	BIND	BIND	BUS	ENG	BUS	BIND	BIND	BUS	BUS	BUS	BUS	ENG	BSERV	ENG
ukf1	<b>BIND</b>	BIND	ENG	ENG	ENG	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	BSERV	ENG

(Table A/1 contd.)

Table A/1 (contd.)

ukf2	<b>ENG</b>	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND
ukf3	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
ukg1	<b>ENG</b>	ENG	ENG	ENG	BIND	BIND	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
ukg2	<b>ENG</b>	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND	BIND	ENG	ENG	BIND	BIND
ukg3	<b>ENG</b>	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
ukh1	<b>AGR</b>	BSERV	AGR	AGR	BSERV	BIND	AGR	AGR	BIND	AGR	AGR	AGR	BIND	AGR	AGR
ukh2	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
ukh3	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
uki1	<b>CAP</b>	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
uki2	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
ukj1	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
ukj2	<b>BUS</b>	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS
ukj3	<b>ENG</b>	ENG	BUS	ENG	BUS	ENG	BUS	ENG	ENG	ENG	ENG	ENG	BUS	ENG	ENG
ukj4	<b>BSERV</b>	BSERV	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BUS	BIND	BIND
ukk1	<b>BSERV</b>	.	BSERV	BUS	BSERV	BSERV	BSERV	BSERV	BSERV	BUS	BUS	BUS	BSERV	BUS	BSERV
ukk2	<b>BSERV</b>	BSERV	BSERV	BIND	BSERV	BSERV	BSERV	BSERV	BSERV	BIND	BIND	BSERV	BSERV	AGR	BSERV
ukk3	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	MIN	MIN	MIN
ukk4	<b>BSERV</b>	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	BSERV
ukl1	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR
ukl2	<b>BSERV</b>	.	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	BSERV
ukm1	<b>MIN</b>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
ukm2	<b>BSERV</b>	BUS	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	BSERV	AGR	BSERV
ukm3	<b>BSERV</b>	BSERV	BSERV	BUS	BSERV	BUS	BSERV	BSERV	BUS	BUS	BUS	BUS	BSERV	TOUR	BSERV
ukm4	<b>MIN</b>	BSERV	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	BIND	MIN	MIN	MIN
ukn0	<b>AGR</b>	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	AGR	BIND	AGR	AGR



Table A/2

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**Cluster assignment of the NMS NUTS 2 regions that has been used in the study**

	final clusters
<b>cz</b>	
cz01	CAP
cz02	BSERV
cz03	ENG
cz04	BSERV
cz05	ENG
cz06	BIND
cz07	BIND
cz08	BIND
<b>ee</b>	.
<b>lv</b>	.
<b>lt</b>	.
<b>hu</b>	
hu10	CAP
hu21	ENG
hu22	ENG
hu23	AGR
hu31	BIND
hu32	BIND
hu33	AGR
<b>pl</b>	
pl51	BSERV
pl61	BIND
pl31	AGR
pl43	BSERV
pl11	BIND
pl21	.
pl12	CAP
pl52	.
pl32	AGR
pl34	AGR
pl63	BSERV
pl22	MIN
pl33	AGR
pl62	.
pl41	ENG
pl42	BSERV
<b>si</b>	.
<b>sk</b>	
sk01	CAP
sk02	ENG
sk03	BIND
sk04	BIND
<b>bg</b>	
bg11	MIN
bg12	BIND
bg13	TOUR
bg21	CAP
bg22	AGR
bg23	TOUR
<b>ro</b>	
ro01	AGR
ro02	AGR
ro03	AGR
ro04	AGR
ro05	BSERV
ro06	BIND
ro07	ENG
ro08	CAP

---

Table A/3

**Cluster characteristics, (population weighted) average share of sectors –  
relative to country average, 2003, clusters used in the analysis**

<b>OMS</b>	<b>final clusters</b>						
	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	207	100	96	72	99	95	67
MIN	149	277	94	76	101	101	73
BIND	96	89	142	98	97	92	77
ENG	95	92	122	158	93	96	88
BSERV	115	114	82	75	108	96	82
TOUR	94	97	57	36	118	209	85
BUS	63	80	72	95	100	93	138
<b>NMS</b>							
	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	
CAP	35	68	70	74	123	111	
AGR	161	89	93	88	88	83	
MIN	46	316	105	38	107	80	
BIND	104	97	119	97	98	95	
ENG	102	96	118	146	93	101	
BSERV	73	103	96	103	110	116	
TOUR	127	78	80	112	103	127	

Table A/4

**Cluster characteristics, (population weighted) average share of sectors –  
relative to country average, 2003, by alternative clustering methods**

<b>manual assignment</b>							
<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	206	104	93	71	99	95	68
MIN	132	244	99	79	100	95	76
BIND	97	91	142	101	96	95	78
ENG	97	94	120	159	93	93	88
BSERV	110	111	71	62	112	102	79
TOUR	94	91	59	41	117	220	87
BUS	73	84	71	95	100	94	139

<b>Euclidean distance</b>							
<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	213	89	101	77	99	95	67
MIN	168	303	95	72	101	100	68
BIND	82	75	145	92	97	89	82
ENG	88	100	125	154	94	95	86
BSERV	133	126	93	83	103	94	80
TOUR	102	90	60	30	116	197	77
BUS	57	74	71	92	104	94	125

<b>Squared Euclidean distance</b>							
<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	215	91	94	67	99	95	65
MIN	179	333	102	74	97	101	67
BIND	117	79	138	102	96	91	79
ENG	80	103	123	155	94	97	87
BSERV	137	146	85	79	106	98	79
TOUR	94	96	51	23	120	247	79
BUS	68	84	76	78	106	101	111

<b>Absolute value distance or the Minkowski distance metric with argument 1</b>							
<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	213	95	91	66	100	91	65
MIN	176	310	93	70	100	102	67
BIND	142	76	142	117	92	91	75
ENG	75	93	129	135	95	94	87
BSERV	126	133	95	89	103	97	83
TOUR	96	90	57	29	119	189	77
BUS	60	74	74	96	102	95	128

<b>Minkowski distance metric with infinite argument</b>							
<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	219	91	97	72	99	94	66
MIN	168	303	95	72	101	100	68
BIND	123	91	140	120	95	89	77
ENG	75	85	123	159	93	94	90
BSERV	130	127	88	76	104	101	79
TOUR	92	93	59	34	118	232	81
BUS	64	81	93	85	103	95	109

(Table A/4 contd.)

Table A/4 (contd.)

**Minkowski distance metric with argument 2**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	213	89	101	77	99	95	67
MIN	168	303	95	72	101	100	68
BIND	82	75	145	92	97	89	82
ENG	88	100	125	154	94	95	86
BSERV	133	126	93	83	103	94	80
TOUR	102	90	60	30	116	197	77
BUS	57	74	71	92	104	94	125

**Minkowski distance metric with argument 3**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	213	88	100	76	98	97	66
MIN	168	303	95	72	101	100	68
BIND	79	75	146	91	97	89	83
ENG	89	97	124	154	94	95	86
BSERV	130	125	92	78	104	98	80
TOUR	95	88	58	34	117	223	79
BUS	58	78	73	88	105	91	125

**Minkowski distance metric with argument 4**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	223	92	90	64	100	97	65
MIN	168	303	95	72	101	100	68
BIND	151	80	140	114	93	87	77
ENG	80	95	125	156	94	96	87
BSERV	129	131	88	76	105	100	79
TOUR	92	93	59	34	118	232	81
BUS	69	79	98	86	103	93	105

**Minkowski distance metric with argument 2, raised to power 2**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	215	91	94	67	99	95	65
MIN	179	333	102	74	97	101	67
BIND	117	79	138	102	96	91	79
ENG	80	103	123	155	94	97	87
BSERV	137	146	85	79	106	98	79
TOUR	94	96	51	23	120	247	79
BUS	68	84	76	78	106	101	111

**Minkowski distance metric with argument 3, raised to power 3**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	216	89	96	71	99	97	66
MIN	179	333	102	74	97	101	67
BIND	114	79	139	102	96	90	79
ENG	80	103	123	155	94	97	87
BSERV	137	142	86	77	105	97	79
TOUR	94	96	51	23	120	247	79
BUS	67	83	76	79	106	101	112

(Table A/4 contd.)

Table A/4 (contd.)

**Minkowski distance metric with argument 4, raised to power 4**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	213	88	100	76	98	97	66
MIN	216	400	88	69	88	112	64
BIND	150	267	97	73	106	96	69
ENG	91	90	133	141	94	92	84
BSERV	133	131	92	81	103	99	79
TOUR	94	96	51	23	120	247	79
BUS	71	82	87	81	105	98	106

**Canberra distance measure**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	176	103	67	42	108	129	75
MIN	168	295	94	75	102	106	62
BIND	188	90	112	86	97	89	65
ENG	83	88	136	137	94	92	85
BSERV	118	126	104	100	101	94	86
TOUR	75	100	38	7	127	185	74
BUS	67	74	79	96	102	105	122

**Correlation similarity measure**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	190	101	90	70	101	97	70
MIN	131	202	94	85	102	97	78
BIND	147	76	135	112	95	88	77
ENG	81	88	120	162	93	96	90
BSERV	64	89	144	98	98	88	80
TOUR	89	94	61	40	117	174	86
BUS	65	79	75	96	99	91	137

**Angular separation similarity measure**

<b>OMS</b>	Agriculture	Mining	Basic Industries	Forward looking industries	Basic services	Tourism	Business services
CAP	31	77	63	78	108	120	156
AGR	209	93	91	67	100	94	66
MIN	158	263	88	67	104	103	66
BIND	116	68	144	105	94	91	78
ENG	78	94	123	157	94	96	88
BSERV	117	127	102	94	101	95	86
TOUR	96	93	59	31	118	198	79
BUS	54	77	70	88	105	93	128

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