

# Economic Performance and Labour Productivity in Dutch Regions

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*One of the most important policy goals of the Dutch Ministry of Economic Affairs is of increase labour productivity. From international comparative studies it is well known that The Netherlands is a country with one of the highest labour productivity levels in the world. However, compared to other countries the growth in labour productivity has been rather low in recent years. Until now most studies deal with the analysis of labour productivity at the country level and the regional level is largely neglected. Partly this is due to lack of suitable data. The results of an explorative study show that within the Netherlands there are substantial differences in labour productivity between regions. The next step is to explain these differences. In this paper we will relate the regional differences in labour productivity to the regional economic structure, the level of education, labour cost and the presence of agglomeration effects. The paper will be concluded by a discussion of the implications of the empirical results to policy measures at the national and regional level.*

Keywords: *labour productivity, regional labour markets*

## 1. Introduction

During the 1990s the labour market situation in the Netherlands underwent quite dramatic changes and was dubbed the “Dutch miracle”. Unemployment fell from 8 percent in 1994 to a mere 3 percent in 2001. At the same time employment increased by more than one million jobs between 1994 and 2001. In fact, the growth of employment in the Netherlands was more or less equal to the U.S. and much higher than in the rest of Europe.<sup>11</sup> In the

U.S. this strong employment growth was however accompanied by even stronger GDP growth rates, whereas this was hardly the case for The Netherlands. A flexible labour market has enhanced these high employment growth rates in the U.S., whereas in The Netherlands it was mainly attributed to a sustained policy of wage moderation. This led to a fall in labour costs relative to competitive countries. Besides low labour costs a high level of labour productivity is an important factor of competitiveness for countries. One of the major goals of current Dutch economic policy is to increase labour productivity

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<sup>11</sup> Employment growth in this context measured in persons employed. In The Netherlands a high share of the new entrants on the labour market work part time and, therefore, the growth in em-

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ployment measured in full-time equivalents is substantially lower.

growth. In order to achieve this goal a Dutch Innovation Platform is established, chaired by the Dutch Prime Minister Balkenende, with the aim to reinforce the innovativeness of the Dutch economy. Innovation has a positive effect on productivity growth (Donselaar et al., 2004). Besides this macro policy goal, the most recent memorandum on regional policy "Pieken in de Delta" (EZ, 2004) makes it clear that enhancing productivity growth is an important goal of regional policy as well. Although in the nineties all Dutch regions had growing employment and falling unemployment there remained substantial regional differences in unemployment (Atzema and Van Dijk, 2005). So, besides for countries, differences in labour productivity may also be an important determinant for the explanation of regional differences in economic performance of regions and, hence, of the competitiveness of regions. However, until now there is hardly information about the spatial variation in labour productivity.

In the remaining text we will first give an international perspective of labour productivity by comparing the level and growth of labour productivity in the Netherlands with several other countries both at the country level and at the regional level. In the rest of this paper we will analyze the labour productivity in more detail at the region level. In section 3 we relate regional labour productivity, in terms of GDP per hour, to welfare, in terms of GDP per capita in 2001 for Dutch regions at NUTS-2 levels. In section four, we discuss factors that explain regional differences in labour productivity between 1990-2001 at NUTS-3 levels. As a final step we briefly go into

the recent policy measures that aim to stimulate productivity growth.

## 2. Labour productivity in The Netherlands in an international perspective

From international comparative studies it is well known that The Netherlands is a country with one of the highest labour productivity levels in the world (McGuckin and Van Ark, 2004). Figure 1 shows the relation between the level of labour productivity in 1989 and the growth of labour productivity over the period 1989 – 2004 for a broad variety of countries.<sup>12</sup> The fat regression line, referring to all countries, shows a negative slope and this indicates that countries with a high productivity level generally show low growth rates. However, for individual countries and groups of countries the picture can be quite different. The Netherlands is located in the lower right hand corner and its position is rather close to other European countries like Switzerland, Spain, Italy and France. In all these countries a high level of labour productivity in 1989 goes together with relatively low growth rates of labour productivity. Another group of European countries consisting of the Nordic countries, the U.K., Ireland and Germany has a slightly lower level of labour productivity, but the growth rate is substantially higher especially for Ireland. The non-European countries Japan, Australia and Canada can also be found in this part of Figure 1. The U.S. is

<sup>12</sup> In this case labour productivity is defined as GDP per employed person instead of GDP per hour, because total hours worked are not available for all countries under consideration.

located more to the right and combines a higher level of labour productivity with a much higher growth rate than the Netherlands. The growth rate in the Netherlands is on a decreasing growth path for a long period of time and during the second half of the nineties it became evident that there was an increase in the productivity gap between Europe and the U.S., as the European productivity growth rate further decelerated, whereas that of the U.S. started to increase. The central and eastern European countries can be found in the left part of the diagram with lower productivity levels, but enormous differences in the growth rate. Romania stands out with a very low level of labour productivity that goes together with also a low growth rate. Bulgaria, Czech, Hungary and Slovenia show in this order both a higher level and growth rate of productivity. Latvia and Lithuania combine relative high productivity levels with lower growth rates, where Estonia and Slovakia have much higher growth rates. Poland stands out with a very high growth rate compared to all other countries, with the exception of Korea. The dotted regression line in Figure 1 with the positive slope clearly indicates that in the central and eastern European countries higher growth rates are associated with higher levels of productivity. This is in marked contrast with the general picture from the regression line for all countries that shows a negative relation between the level of labour productivity and the growth rate. The negative slope becomes even more outspoken when this relation (faint regression line in Figure 1) is estimated for

all countries except the central and eastern European countries. It seems plausible that at lower levels of productivity there is a positive effect on labour productivity growth, because these countries are catching up to the more productive countries. This effect flattens considerably with higher levels of productivity.

As mentioned in the introduction for the Netherlands labour productivity is not only an important issue at the national level, but also at the regional level. However, studies dealing with the analysis of labour productivity at the regional are much scarcer than studies at the country level. Bökermann and Maliranta (2002) performed an analysis for Finland, a country with a strong productivity growth in the second half of the nineties. They found regional differences with the same magnitude as Broersma and Van Dijk (2003) for the Netherlands. When we compare this with the results of a study by Ciccone (2002) in which at the NUTS-2 region of several European countries regional differences in productivity were analyzed (see Table 1) we can conclude that regional disparities in the Netherlands are relatively large. From Table 2 it is clear that the regional differences in The Netherlands remain more or less constant during the last decade. Because of uniform regulations over the country we expect that regional variations in the government sector will be very small. This is confirmed by the higher regional variation reported in the last row of Table 2, where the government related sectors are excluded.

*Table 1: Differences in labour productivity between NUTS-2 regions.*

Country	Year	Standard deviation regional labour productivity
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France	1988	3.6
Germany	1986	5.7
Italy	1987	3.7
Spain	1986	3.2
Great Britain	1987	1.6
Netherlands	1990	5.0

Table 2: Regional variation in labour productivity per province

	1990-1995	1996-2000	1990-2000
Standard deviation labour productivity			
Including non-commercial services	3.3	3.6	3.4
Excluding non-commercial services	4.5	5.0	4.8

Source: Statistics Netherlands, own calculations

### 3. Regional differences in welfare and the role of labour productivity

The most commonly used indicator for labour productivity in the scientific literature is GDP per hour worked. However, it is interesting to compare this indicator with the GDP per employed worker or GDP per capita, because the latter are commonly used to compare regional disparities and serve, for instance, as indicators on which the entitlement for regional policy measures of the European Union is based. The fifth column of Table 3 shows that regional GDP per capita as percentage of the national GDP per capita ranges from 73% in the province of Flevoland to 126% in Utrecht.<sup>13</sup> Regional disparities in

GDP per capita can also be due to a low level of labour participation or to a high share of children and retired people in the total population. Therefore, we also calculated the GDP per employed worker taking into account differences in participation and age composition. Column four shows the difference in percent point with GDP for the total population. For the three Northern provinces Groningen, Fryslân and Drenthe about one third to half of the difference in GDP per capita from the national average can be attributed to the relatively low share of active participants on the labour market in the total population and for the island province Zeeland it is even more. Lower participation rates in the age group 15-64 are much more important than differences in the share of children and retired people. The effect of a greying population is most important for the provinces Zeeland and Drenthe with 2.6 and 1.8%-point respectively, but even for these provinces the

<sup>13</sup> In some publications the province of Groningen is listed with a very high GDP per capita due to the large amount of natural gas originating from this region. Because natural gas is easy to transport the profits are used nationwide and the benefits for the province of Groningen are rather limited. To avoid this possible statistical bias that also may occur in some other regions in a minor

way the sector mining is excluded from all analysis in this article.

lower participation rates are much more important.

GDP per worker living in a region differs from GDP per hour worked in a region for two reasons: working hours and commuting. The total effect of these two factors is shown in column 3 of Table 3. It is clear that the production of a worker will vary with the number of working hours. Part-time work is very popular in the Netherlands: almost 45% (75% for females and 22% for males) of the labour force works part-time and this is almost three times as much as the EU-average (EU, 2004, p.29, chart 18). Within the Netherlands there are substantial regional differences in part-time work. The most outspoken differences are found for the provinces Groningen and Zuid-Holland. The share of part-time workers is 7%-point higher in Groningen and 6%-point lower in Zuid-Holland than the national average.

Relative high shares of part-time workers are furthermore found in the provinces Fryslân, Drenthe and Zeeland, who have relatively low GDP's per capita. Another disturbance is caused by the fact that people who live in a region can be productive in another region. Because GDP is measured at the work location and the size of the population and the labour force at the place of residence this may cause a bias because there is substantial cross border commuting between provinces. The effect of commuting takes by far the largest part of the 27.3%-point calculated for the province of Flevoland, located on reclaimed land from the IJsselmeer, a lake that used to be part of the former Zuiderzee. The high number of commuters from Flevoland to the provinces Noord-Holland and Utrecht accounts for a large part the opposite effect of commuting in these provinces.

*Table 3: Regional differences in GDP and disposable income in 2001 (Netherlands = 100; mining excluded)*

province	GDP per hour worked (labour productivity)	Effect of part-time work and commuting	Effect of participation and age composition	GDP per capita	Disposable income per capita
	% of Nederland	%-point	%-point	% of Nederland	% of Nederland
Groningen	101.6	-6.3	-5.4	89.9	90.9
Fryslân	92.3	-10.2	-4.6	77.5	90.0
Drenthe	87.9	-9.2	-4.8	73.9	93.6
Overijssel	89.1	-2.1	-2.5	84.5	91.8
Flevoland	98.9	-27.3	1.2	72.7	91.8
Gelderland	93.2	-6.4	-1.0	85.9	97.3
Utrecht	105.7	12.1	8.2	126.0	107.3
Noord-	102.4	9.2	5.1	116.7	102.7

Holland					
Zuid- Holland	101.9	2.5	-0.7	103.7	107.3
Zeeland	101.6	-8.3	-9.3	84.0	96.4
Noord- Brabant	95.3	1.2	1.9	98.3	99.1
Limburg	94.6	-5.5	-2.8	86.2	97.3

Starting with the GDP per capita in column 5 of Table 3 we are now able to compare this with GDP per worked hour (column 2) taking into account differences in active labour market participation, working hours and commuting. GDP per capita is not a proper measure for labour productivity in terms of competitiveness of workers' performance for which GDP per hour worked is more suited. When we compare those measures in column 2 and column 5 we may conclude that regional disparities are now much smaller and range from 87.9% to 105.7%. However, with the exception of the new province of Flevoland and Zeeland, the rank order of the provinces is more or less the same implying that on average the regions with a high level of GDP per capita also show a high level of GDP per hour worked. This ranking of provinces in terms of economic performance corresponds also quite close to the ranking we get when we use the disposable income per capita as indicator of welfare. The regional variation in disposable income is of the same magnitude as GDP per hour worked. This is remarkable because GDP per hour worked can be seen as a measure of regional productive performance at the workplace, whereas disposable income per capita is measured at the place of residence and includes the redistribute effect of taxes, subsidies and social security. The most notable exception

is the province of Groningen, which is in terms of GDP per hour worked above the national average but ranks in terms of disposable income together with Fryslân at the lowest level. Table 3 shows that this is caused by relatively low participation rates in combination with a relatively low number of working hours. These low participation rates are due to the high number of young persons in university and higher vocational education and the high number of non-participating females over 40 years of age. The low number of working hours, resulting in a high share of part time workers, is partly caused by the high share of government services, like education and health care, where part time work is very common. Lower participation and less working hours are most likely also due to a lower demand for labour due to the remote location of Groningen. In addition, social security benefits, pensions and so on are incorporated in the disposable income, but not in regional GDP. These secondary income components mitigate regional differences in GDP per capita even further.

From column 2 in Table 3 we may conclude that the regional disparities in GDP per hour worked are smaller than in GDP per capita. However, we may also conclude that the regional differences in labour productivity are substantial in 2001. GDP per hour worked in the centrally located province of Utrecht is 1.2 times

higher than in the province of Drenthe in the northern part of the country. At the NUTS-3 level of 40 COROP-regions the difference between the highest and the lowest level is 1.5 and thus substantially larger. Therefore, in the next section we will analyse the regional differences in labour productivity during the last decade in more detail at the spatial level of the 40 COROP-regions (NUTS3).

#### 4. Regional differences in labour productivity

Figure 2 shows the regional variation in the level of labour productivity in 2001 for COROP-regions in The Netherlands (see Appendix A for the demarcation of the COROP-regions).<sup>14</sup> GDP per labour year ranges from € 51,000 in Zuidoost-Drenthe to € 78,000 in Zeeuws-Vlaanderen, whereas the average for the Netherlands is € 64,000. Two types of regions show the highest level of productiv-

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<sup>14</sup> For the analysis by COROP-regions we use GDP per labour year as indicator for labour productivity. This is because employment in terms of number of hours worked is unavailable by region before 1995. Instead we use the labour volume as measure of employment, expressed as the number of labour years. This means that (part time) jobs are converted to their full time equivalent, i.e. two part time jobs of 20 hours a week each equal one full time job of 40 hours a week. GDP per labour year is very close to GDP per hour, but may slightly differ because the definition of full time is not exactly the same for each sector due to differences in collective agreements (CAO's) with regard to the length of the standard working week, days-off etc. Because the sectoral distribution differs by region, labour productivity in terms of output per hour worked may slightly differ from output per labour year divided by the average annual full time working hours.

ity. The area consisting of Amsterdam, Gooi- en Vechtstreek and Utrecht is highly specialised in financial and business services, especially in ICT and creative industries. The other regions with high productivity levels are found in both the central part of the country around Rotterdam and IJmond and in the peripheral areas of Zeeuws-Vlaanderen and Delfzijl. These regions have in common that capital-intensive industries in basic metal and chemistry are very important. The regions with low levels of productivity are located in the periphery, especially in the east along the German border.

Figure 3 shows the average annual real growth rate of labour productivity over the period 1991-2001.<sup>15</sup> In all regions real labour productivity growth is positive, ranging from 0.2 per year in Alkmaar e.o. to 1.7 % per year in Delft en Westland. The average annual growth is 1.1%. Of the regions with the highest level of productivity in Figure 1 only Delfzijl is also in the highest growth category in Figure 3. In general the regions with growth rates above the national average are also the regions with a level of productivity above the national average. However, the relation is not very strong as becomes clear from the rather low value of 0.26 for the correlation

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<sup>15</sup> We measure the growth of labour productivity in real terms because the growth in nominal terms includes changes in prices in GDP and this gives biased information about the performance of labour as production factor. In the period 1991-2001 prices in services increased substantially where the price levels in the industrial sector remained more or less constant. When we should have used the nominal figures instead of the real figures the increase in labour productivity in regions with a high share of services should have been overestimated.

coefficient between level and growth. The regions with a strong service sector and located in the middle of the country on the border or just outside the Randstad show the fastest growth in labour productivity. In the regions in the Randstad and the province of Brabant the main cause of this growth is an increase in GDP. In the regions with high productivity growth in Gelderland and Overijssel and in the traditional trouble spots of Oost-Groningen and Zuid-Limburg lagging productivity growth is mainly a consequence of the slow growth of employment. Instead of an increase in economic activity, the high labour productivity growth for these regions may indicate the removal of slack capacity. This implies that regional disparities in productivity levels increase slightly over time. Especially the peripheral regions with low levels of productivity are lagging behind more and more. The case of Delfzijl clearly shows that regions with a high level of productivity and a high growth rate are not always very prosperous regions: during the whole period 1991-2001 the peripheral region of Delfzijl shows the highest unemployment rate of all Dutch regions.

### **5. The explanation of regional differences in labour productivity**

As a next step we will shed some light on the explanation of the observed regional differences in labour productivity. As will be clear from the description of Figure 2 and 3 the sector structure plays a role. Regions with an overrepresentation of capital-intensive industries or specialized services do better in terms of productivity. There is also an obvious relation be-

tween the level of education and labour productivity reflected in the variation in wages by educational level. From the viewpoint of competitiveness of a region a lower level of payment can compensate a lower level of labour productivity, because a low level of productivity, combined with a low wage, might lead to the same unit labour cost that a high level of productivity combined with a high wage would yield. Therefore, Figure 4 and 5 provide maps with the share of higher educated in the labour force and the cost of labour per labour year.<sup>16</sup> Finally, the map in Figure 6 reflects the density of the number of jobs per square kilometre, which can be seen as an indicator for the presence of agglomeration effects. All maps in Figures 4-6 are based on average values for the period 1991-2001.

In the discussion about the regional differences shown on the maps the sectoral composition in a region is several times mentioned as a possible explanatory factor. From recent studies by Broersma and Van Dijk (2003) and Broersma and Oosterhaven (2004) who analyse Dutch data for 1990-2000, it becomes clear that regional deviations from the national sectoral composition account for about 25% of the regional variation in the levels of productivity. From a shift-share-analysis based on 20 sectors (mining is excluded) it becomes clear that the high productivity level in the area Amsterdam, Gooi- en Vechtstreek, Utrecht and 's-Gravenhage (The Hague) is partly caused by an overrepresentation of service sectors with high levels of productivity. The regions with

<sup>16</sup> Like the labour input in our productivity measure, this implies that all jobs are converted to full time equivalent jobs.



high productivity levels due to the presence of capital-intensive industries in IJmond and Rijnmond and the peripheral areas Delfzijl and Zeeuws-Vlaanderen also show positive effects of the sectoral composition. The negative sectoral component for most of the peripheral regions with low productivity levels indicates that low productivity sectors are over-represented.

Figure 4 shows the regional variation in the average share of higher educated (academics and higher vocational graduates) over the period 1990-2001. The share ranges from 36% in Amsterdam to 12% in Oost-Groningen, where the share of higher educated in the national labour force is 25%. The regions with a high share of higher educated outside the Randstad are mainly the regions where institutes for higher education are located. When this map is compared with Figure 1 it is clear that regions with low productivity levels (often located in the periphery) usually have a lower than average share of higher educated in the labour force and vice versa. This positive relation is confirmed with the value of 0.42 for the correlation coefficient. As is clear from a comparison of Figure 4 with Figure 2 there is no clear relation between the shares of higher educated and the growth rate of labour productivity and this is confirmed by the correlation of 0.03 between these two variables.

From the map in Figure 5 reflecting the regional differences in labour costs, measured in thousand € per labour year, and a correlation coefficient of 0.69 with regional difference in labour productivity, it is clear that lower levels of productivity are partly compensated by lower average wages. The highest labour costs are found

in Amsterdam (€ 33,400 per labour year) and the lowest in Zuid-Limburg (€ 28,500 per labour year), whereas the national average equals € 30,200. The correlation coefficient of 0.56 suggests that a lower average wage in a region is related to the lower share of higher educated in that region. Most probably this effect is even stronger because wage cost is in this comparison measured at the work location and education at the place of residence and thus a bias may occur due to commuting effects. The positive relation between wage costs and the level of productivity indicates that low productivity does not necessarily lead to higher unit labour costs and thus might not have a negative effect on the regions competitiveness. In line with the result for education, comparison of Figure 5 with Figure 2 does not indicate that there is a relation between wage cost level and the growth rate of labour productivity and this is confirmed by the correlation of -0.03 between these two variables. Instead we expect wage growth to correlate with productivity growth, but regional wage growth rates are largely similar due to the fact that in The Netherlands collective wage bargaining results on wage growth rates apply to all regions. Therefore differences in regional labour productivity growth and regional wage growth are not related.

In Figure 6 the job density per square kilometre is shown. Job density can be seen as indicator for the presence of agglomeration and cluster effects that may have a positive influence on labour productivity (Ciccone, 2002). By far the highest spatial concentration of jobs is found in the government centre s'Gravenhage (The Hague), with 1483 jobs per km<sup>2</sup>, where in Oost-Groningen and Zuidwest-Friesland

there are only 52 jobs per km<sup>2</sup>. The areas with a high concentration of jobs are all located in the Randstad and correspond largely to high productivity areas. In the peripheral regions job density is substantially lower than the national average of 186 per km<sup>2</sup>. The positive relation between job density and the level of productivity is also confirmed by the value of the correlation coefficient of 0.70. Job density is also positively correlated with the share of higher educated in Figure 4 ( $r=0.70$ ) and labour cost in Figure 5 ( $r=0.56$ ). When Figure 6 is compared with the growth of productivity in Figure 3 the similarities are less clear and the correlation coefficient is even negative ( $r=-0.13$ ). It seems likely that the growth of productivity is hampered when the spatial concentration of jobs is extremely high and causes congestion, as is the case in the Randstad-area. Regression results obtained by Broersma and Oosterhaven (2004) confirm this hypothesis. They find that higher spatial concentrations of jobs are significantly positive related to the level of productivity, but are significantly negative related to productivity growth.

## 6. Conclusions and policy implications

Even though the level of labour productivity in The Netherlands is very high compared to most other countries, the rate of growth of Dutch labour productivity has decreased compared to its competitors in Europe (EU-15) and to the U.S.<sup>17</sup> This causes the competitive advan-

tage of The Netherlands on other countries to erode. When labour productivity remains at this declining growth path additional labour input will yield increasingly smaller additional output. However, a further increase in labour supply, especially for women and elderly, is precisely what the Dutch government is aiming at by means of tax policy, increasing the statutory working week and with revisions of the social security and disability arrangements. This call for additional labour supply does not stop the downward trend in productivity growth. It is therefore necessary that productivity growth is stimulated in another way to make this additional labour also more productive labour. An important policy handle in this respect is stimulation of innovative behaviour of both companies and government. We focus here on regional issues that may help to enhance productivity growth, since productivity growth is not only the goal of macroeconomic policy in The Netherlands, but also of regional policy (see EZ, 2004).

At the NUTS-2 level of twelve provinces, regional differences in economic performance measured in GDP per capita are substantial in the Netherlands. GDP per capita in the richest province of Utrecht is 1.7 times higher than in the 'poorest' province of Flevoland. We have shown that a substantial part of this inequality can be attributed to regional differences in participation rates, commuting and working hours. When we control for these variables we end up with GDP per hour as an appropriate measure of labour productivity. Labour productivity in Utrecht and Drenthe are still the most extreme cases, but the difference goes down

<sup>17</sup> See Groningen Growth and Development Centre, Total Economy Data Base, at [www.ggdc.net](http://www.ggdc.net).

from 1.7 to 1.2. At the NUTS-3 level of 40 COROP-regions the regional differences are substantially larger with a factor of 1.5. The highest level of productivity is found in the Randstad regions that are highly specialised in financial and business services and in a few regions with capital-intensive industries in basic metal and chemical industries. The regions with low levels of productivity are located in the periphery, especially in the east along the German border.

Traditionally the main aim of Dutch regional policy was to reduce regional disparities by stimulating the economy in peripheral regions. Over time this goal of equity between regions has more and more been substituted by the goal of enhancing national efficiency. In the most recent regional policy plans of the Dutch government the focus is on regions with a national interest and the main aim is to remove barriers in those regions that hamper productivity growth. Because of the national interest of these regions this helps to stimulate national productivity growth. The government suggests that these regions are basically the Randstad and the southeastern parts of The Netherlands and not the peripheral regions that were subject to regional policy for decades. The main reason for focusing on the core regions is the assumption that they have agglomeration advantages due economies of scale, spillovers and vicinity to other economic activities. Allocating regional policy measures to these regions is supposed to give the highest return on investment and to lead to an extra boost of productivity growth. A crucial question in this debate is the relation between agglomeration effects and productivity. There is indeed a positive

relation between job density, as approximation of agglomeration effects, and the level of labour productivity. However, we found a negative relation between job density and the growth of labour productivity. This suggests that investing in already highly dense regions will lead to more congestion and less space, which in the end leads to even a further slowing down of productivity growth. Instead investing in less dense regions (the light areas in Figure 6) seems to be a much more promising route to get the productivity growth rate back on track. These results severely doubt the assumption of the government that the allocation of the major part of the budget for regional policy to the congested regions in the Randstad and southeast Netherlands will lead to higher returns for the Netherlands as a whole than investing in the more peripheral regions in the northern and eastern part of the Netherlands. Besides higher returns at the national level, investments in peripheral regions may also help to reduce regional disparities in welfare, although this is no longer an official goal of regional policy for the present government.

Regions with high levels of labour productivity can be characterised by a high share of higher educated in the labour force and a high concentration of jobs. From the positive correlation between labour productivity and labour cost we can conclude that the advantage of higher productivity is partly offset by higher cost. This implies that in terms of competitiveness the regional differences are substantially smaller than the figures about labour productivity suggest. It is clear, however, that regions with lower levels of labour productivity also show lower levels of

GDP per capita and this often also goes together with lower participation rates and a higher share of part time workers in these regions. Labour productivity and participation rates are both positively correlated with education. In accordance with the work of Barro (1991) this may suggest that a policy aiming to increase the level of education in a region should be advocated. The latter is only a good recipe if the higher educated can indeed find employment within the region. Otherwise the only effect will be an increase in out-migration of higher educated, because recent empirical evidence suggests that causality may run mainly from employment growth to education and not vice-versa (see Bils and Klenow, 2000 and Van Dijk and Bosch, 2003). In this case a policy aiming to diminish the share of workers with the lowest level of education via formal education or via on-the-job-training might be more successful to reduce regional differences in welfare than a policy focusing on the increase of the share of highly educated, who might leave the region after finishing the education. Instead of a policy focusing on education, a policy aiming to create new jobs for both low and high skilled might be a better alternative to solve the problem.

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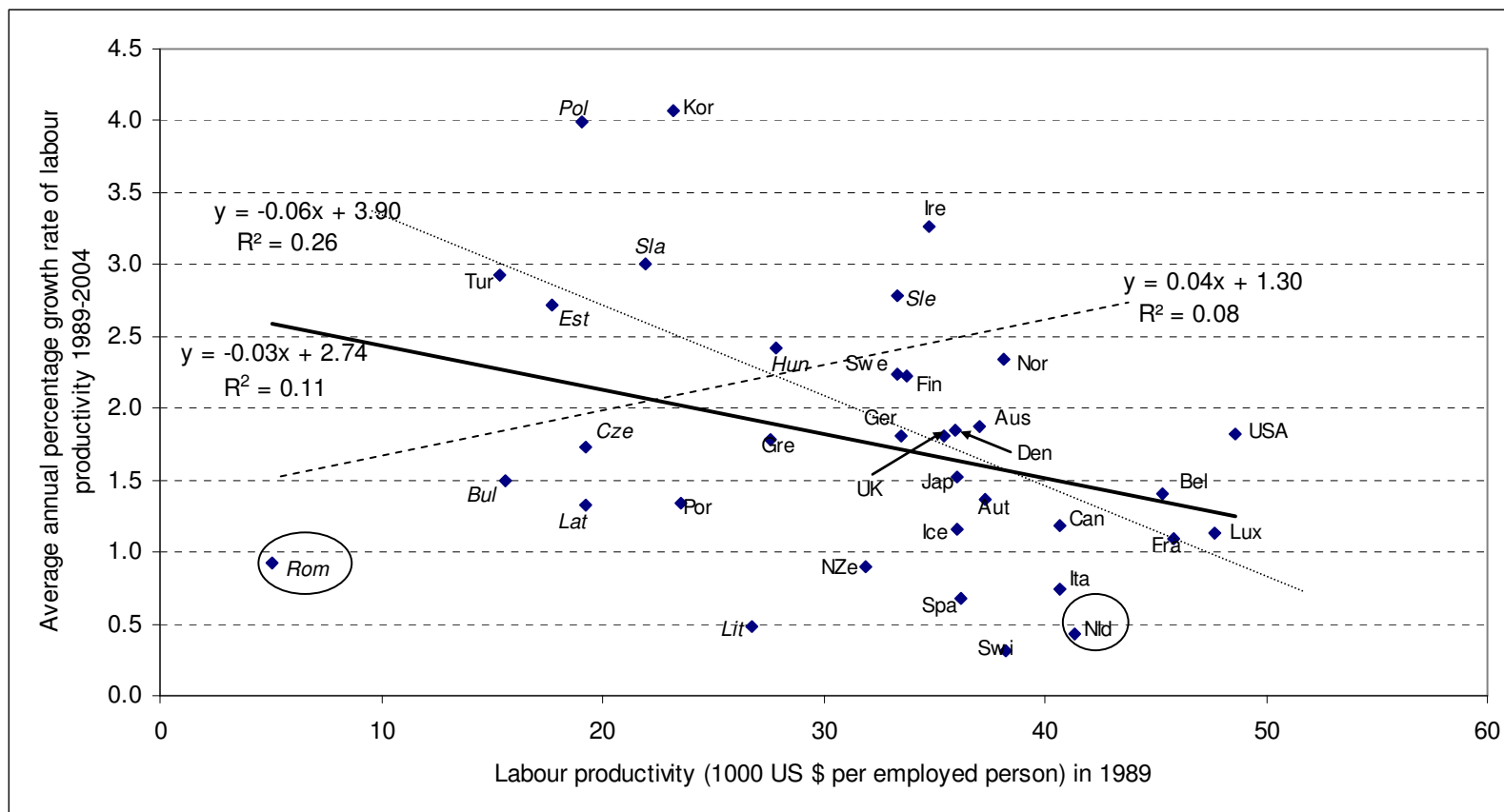
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tight regional labour market'. Chapter 5 in Eike Schamp and Vivian Lo (eds.) Knowledge, Learning and Regional Development. Münster/Hamburg/London: Lit Verlag, p.83-105.

Figure 1: The relation between the level of labour productivity in 1989 and the growth of labour productivity over the period 1989 – 2004.

(source: Groningen Growth and Development Centre, Total Economy Data Base (at [www.ggdc.net](http://www.ggdc.net)))



Western countries: normal font acronym; Central and Eastern European countries: acronym in italics;

Fat trend line: all countries; Faint trend line: Western economies; Dotted trend line: Central and Eastern European economies;

Figure 2: Level of labour productivity as value added (in 1000 €) per labour year worked in 2001.

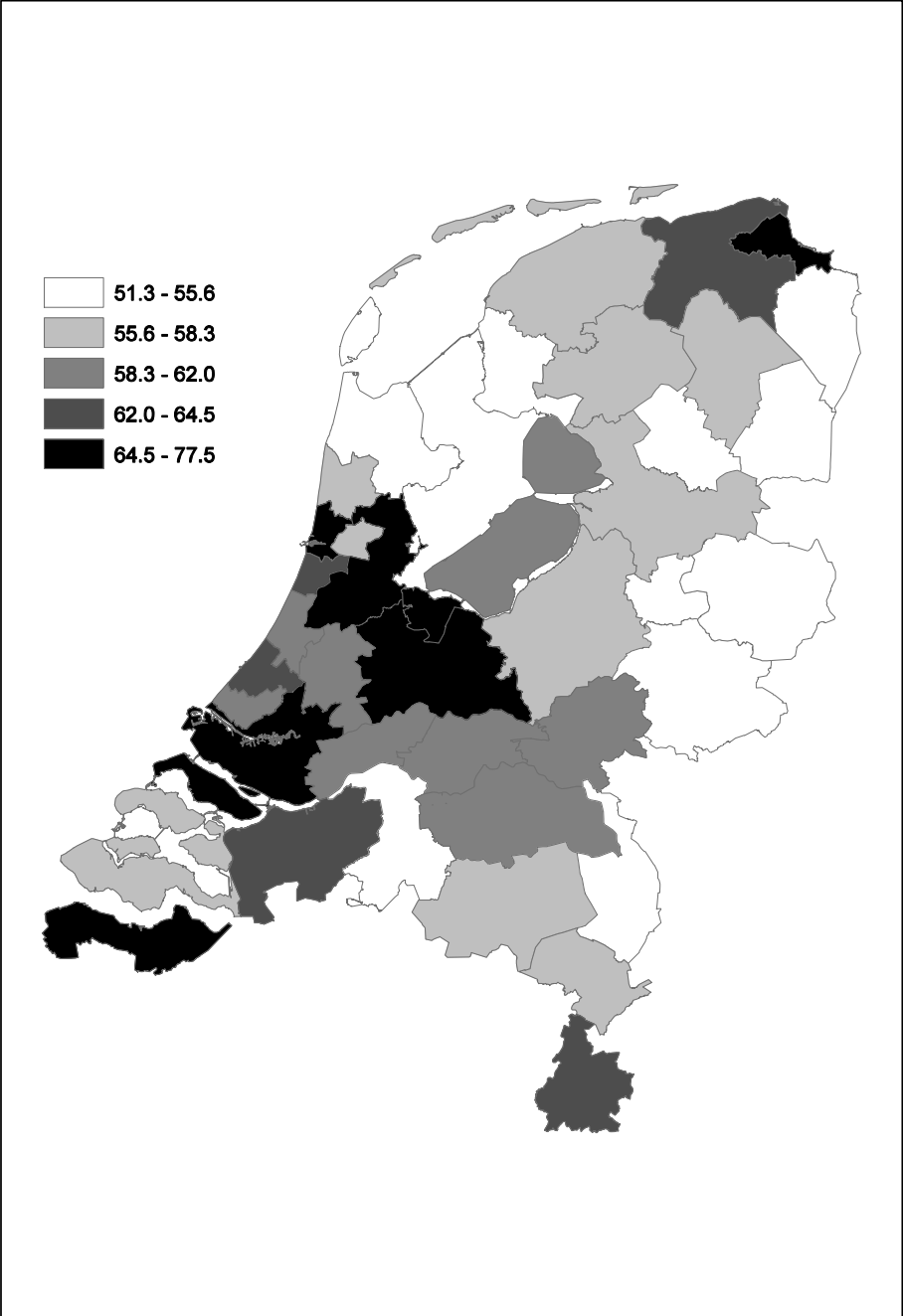


Figure 3: Real average annual growth of labour productivity (in %), 1991-2001.

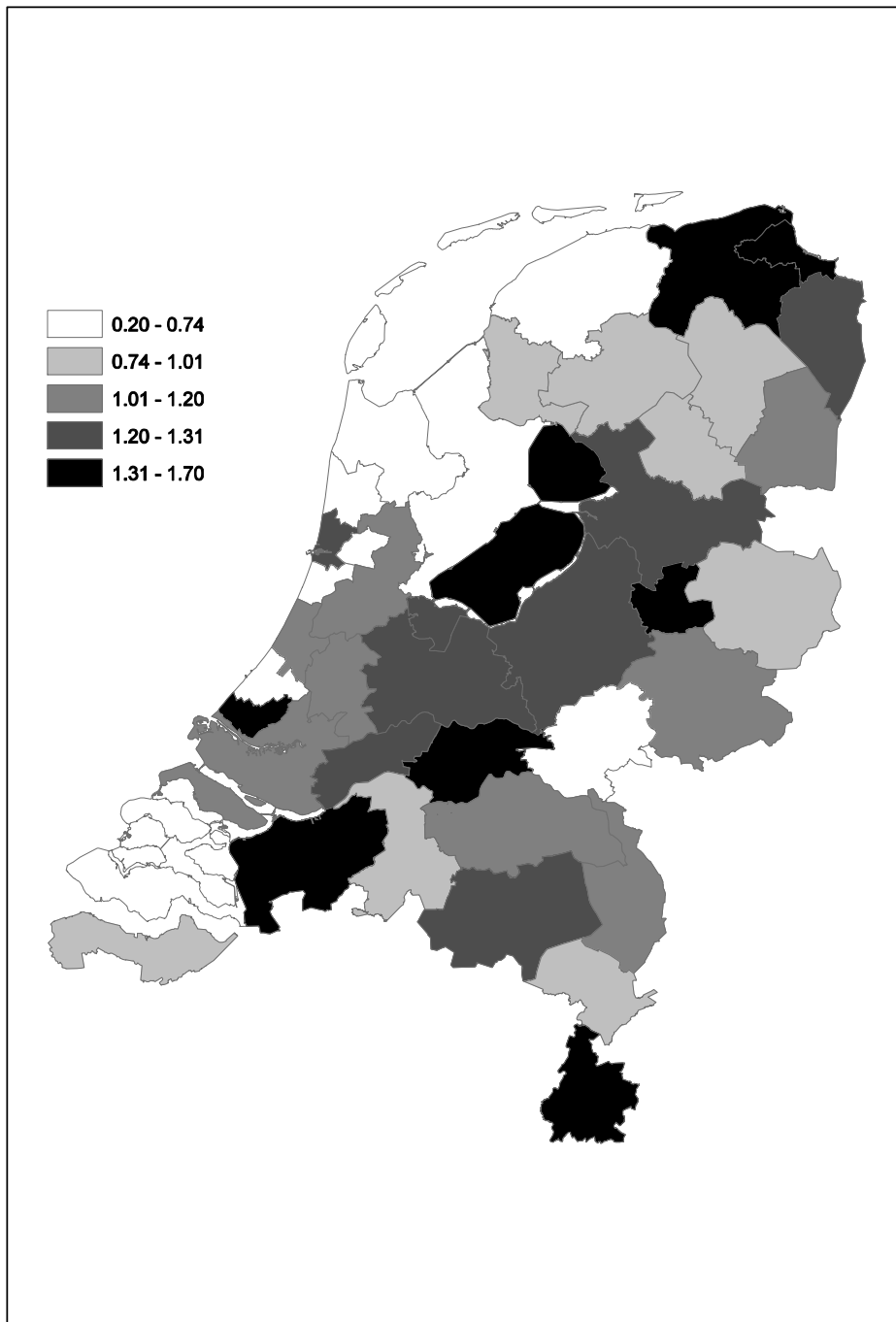




Figure 4: Average share of higher educated (academic and higher vocational level) in the employed labour force over the period (in %) 1990-2001.

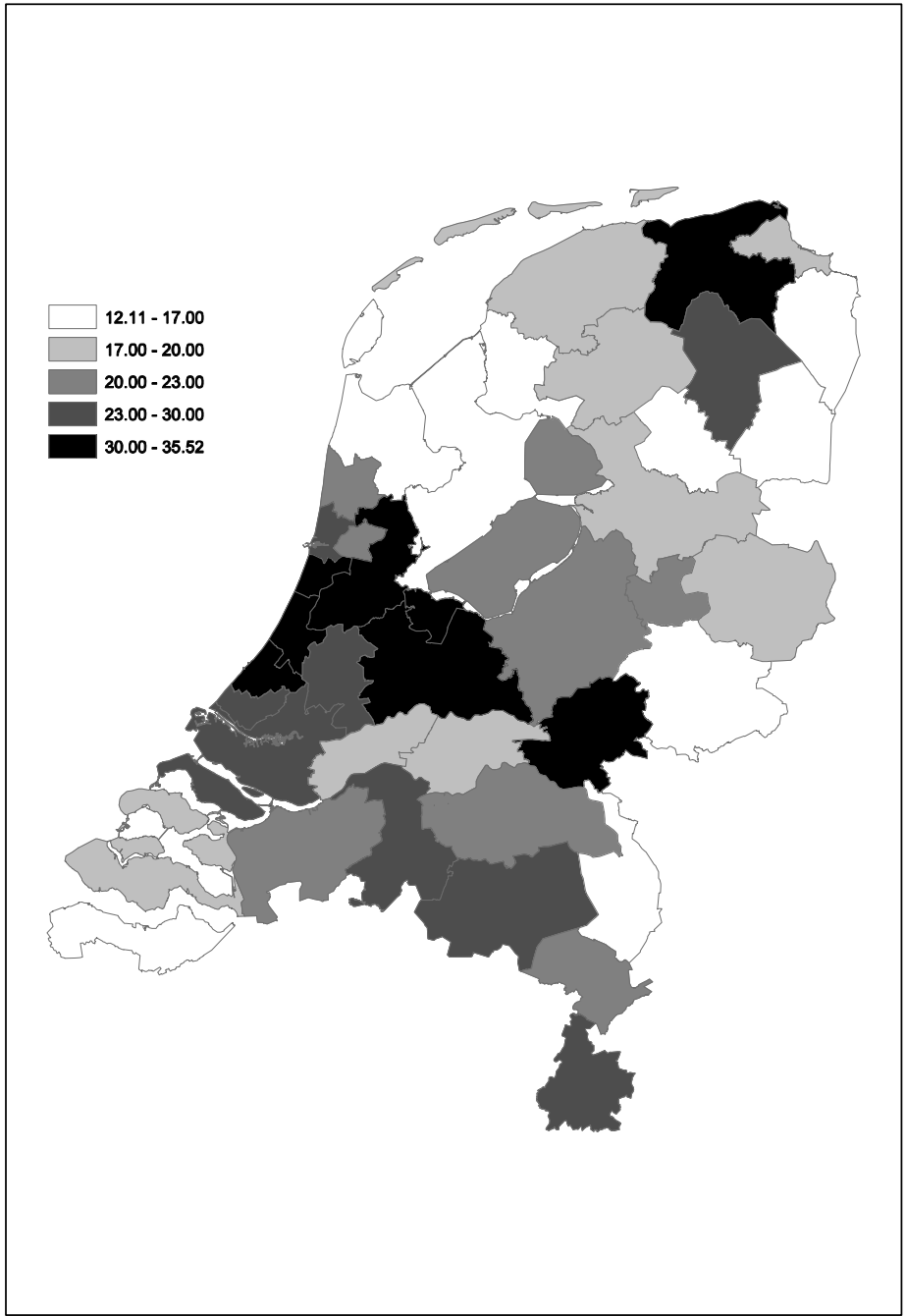


Figure 5: Average total labour cost (in € 1000) per labour year, 1990-2001.

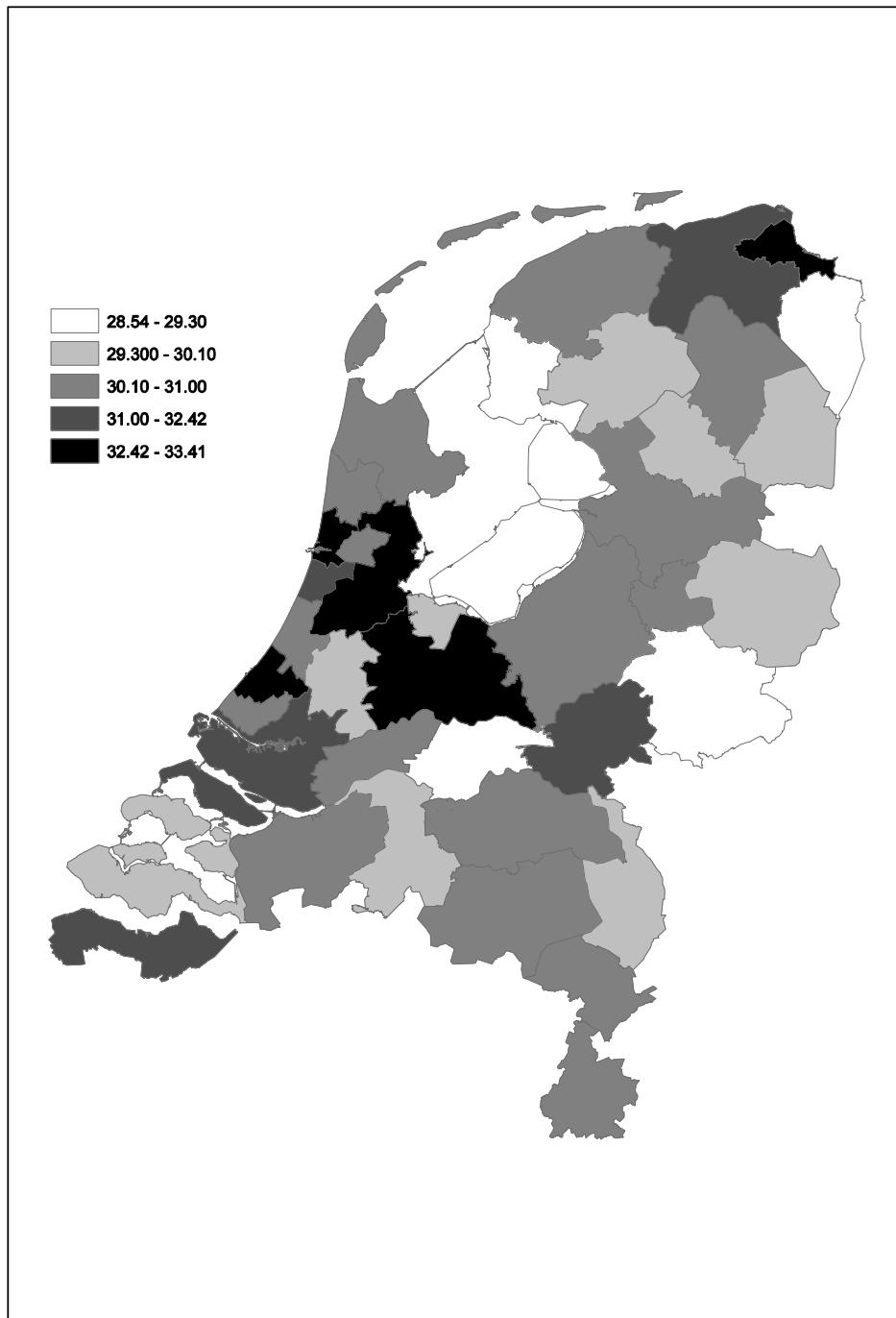
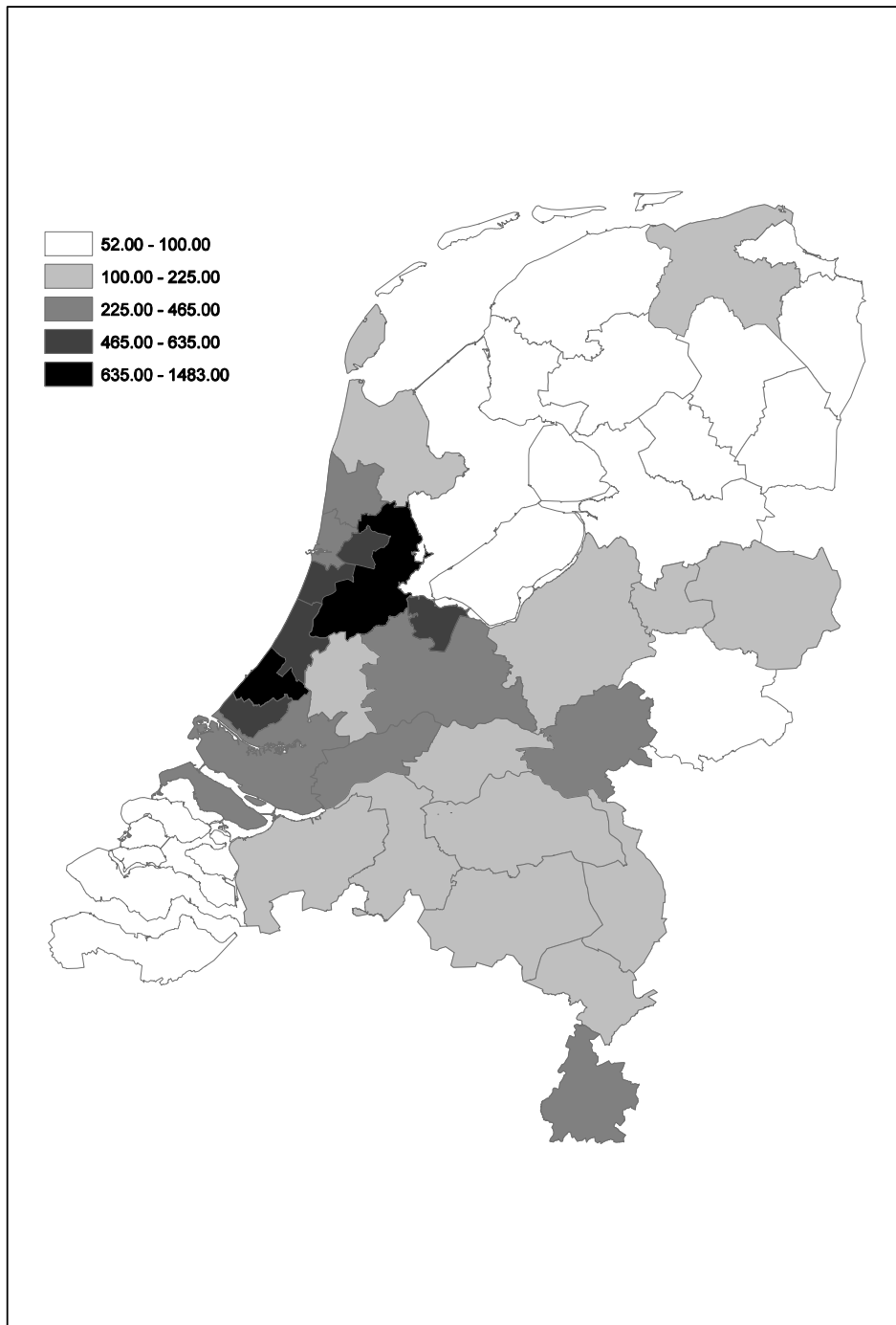
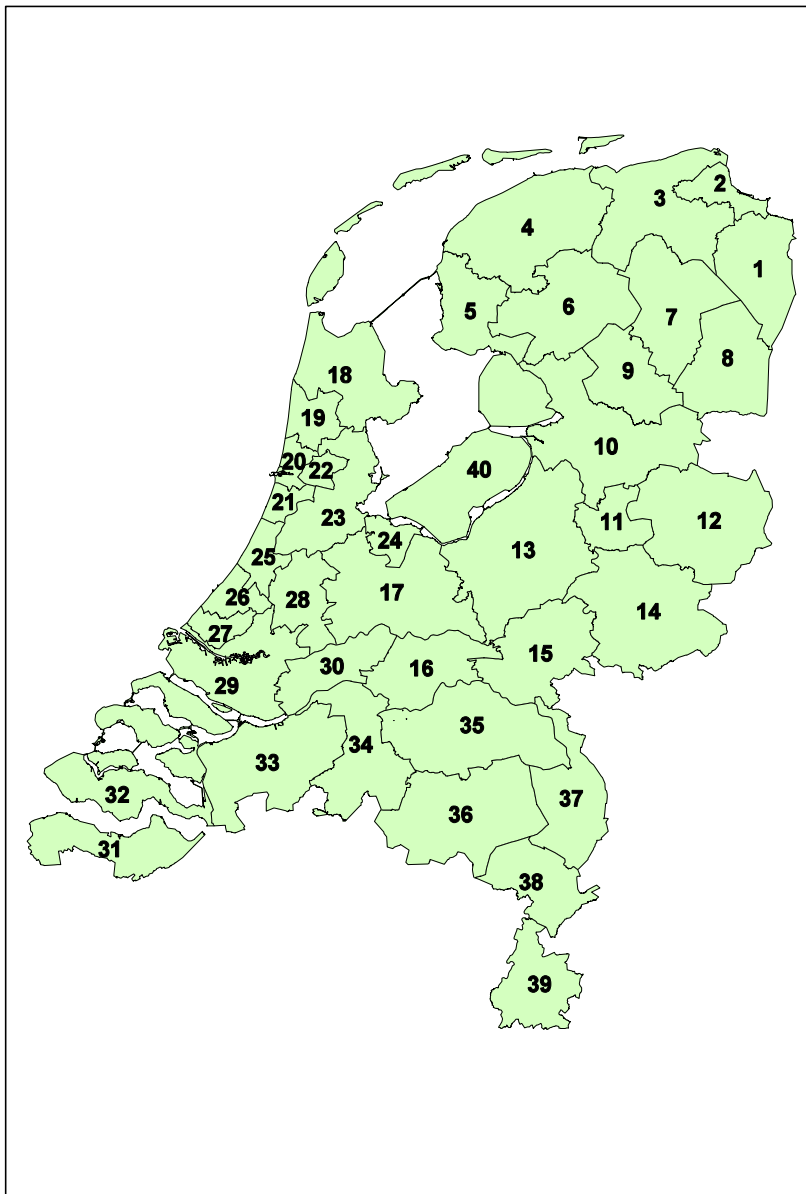


Figure 6: Average job density (in jobs per km<sup>2</sup> land surface) 1990-2001.



## Appendix A. Regional demarcation of the COROP-regions



Nr. Corop	Nr. Corop	Nr. Corop
1 Oost-Groningen	11 Zuidwest-Overijssel	21 Agglomeratie Haarlem
2 Delfzijl en omgeving	12 Twente	22 Zaanstreek
3 Overig Groningen	13 Veluwe	23 Groot-Amsterdam
4 Noord-Friesland	14 Achterhoek	24 Het Gooi en Vechtstreek
5 Zuidwest-Friesland	15 Arnhem/Nijmegen	25 Agglomeratie Leiden en Bollenstreek
6 Zuidoost-Friesland	16 Zuidwest-Gelderland	26 Agglomeratie 's-Gravenhage
7 Noord-Drenthe	17 Utrecht	27 Delft en Westland
8 Zuidoost-Drenthe	18 Kop van Noord-Holland	28 Oost-Zuid-Holland
9 Zuidwest-Drenthe	19 Alkmaar en omgeving	29 Groot-Rijnmond
10 Noord-Overijssel	20 IJmond	30 Zuidoost-Zuid-Holland