

## WINDOW ON THE NETHERLANDS

# REGIONAL DIFFERENCES IN LABOUR PRODUCTIVITY IN THE NETHERLANDS

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### INTRODUCTION

One of the major goals of current Dutch economic policy is to increase labour productivity 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. However, until now there has been hardly any information about the spatial variation in labour productivity. The aim of this 'Window on the Netherlands' is to give an overview of the regional disparities in labour productivity in relation to regional differences in welfare and to explore how differences in labour productivity can be related to characteristics of the region.

Until now most studies of labour productivity are at the country level, whereas the analysis at the regional level is largely neglected. This is partly due to lack of suitable data. In an explorative study Broersma & Van Dijk (2003) show that there are substantial differences in labour productivity between Dutch regions. Furthermore, the regional differences are larger than

in other European countries. From international comparative studies it is well known that the Netherlands has one of the highest labour productivity levels in the world when productivity is measured as GDP per hour worked (McGuckin & Van Ark 2004). However, in terms of welfare, measured as GDP per capita, the position of the Netherlands drops substantially. The difference is due to the fact that Dutch employees work the lowest number of hours within the OECD. Dutch employees often work on a part-time basis and the official number of hours worked in full-time employment is quite low (Klomp & Roelandt 2004). During the 1990s the productivity growth rate slowed down considerably. This is in line with many other European countries, but in marked contrast with the United States. For the interpretation of the growth of labour productivity it is important to note that a high growth rate can be due to a large increase in GDP, but also due to a low growth rate of employment. In line with this, a moderate increase in GDP together with a high rate of employment growth may cause low growth rates of labour productivity.

During the 1990s the labour market situation in the Netherlands underwent quite dramatic changes and was dubbed the 'Dutch miracle'. Unemployment fell from eight per cent in 1994 to a mere three per cent 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 United States and much higher than in the rest of Europe.<sup>1</sup> In the United States 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 United States 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 both for countries and for regions.

Although in the 1990s all Dutch regions had growing employment and falling unemployment there remained substantial regional differences in unemployment (Atzema & Van Dijk 2005). Therefore, regional differences in labour productivity are possibly an important determinant for the explanation of regional economic disparities. For the analysis of regional differences in labour productivity in the Netherlands a rich dataset is available at the regional level for the period 1990–2001 and in even more detail for the period 1995–2001. Detailed information is also available about the amount of capital for regions, level of education, innovation and the regional economic structure.

In the remaining text we will first relate regional labour productivity, in terms of GDP per hour, to welfare, in terms of GDP per capita in 2001 at NUTS-2 levels. Next, we discuss factors that explain regional differences in labour productivity between 1990 and 2001 at NUTS-3 levels. As a final step we briefly go into the recent policy measures that aim to stimulate productivity growth.

### 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 1 shows that regional GDP per capita as a percentage of the national GDP per capita ranges from 73 per cent in the province of Flevoland to 126 per cent in Utrecht.<sup>2</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

Table 1. *Regional differences in GDP and disposable income in 2001 (Netherlands = 100; mining excluded).*

Province	GDP per hour worked (labour productivity) percentage of Netherlands	Effect of part-time work and commuting percentage point	Effect of participation and age composition percentage point	GDP per capita percentage of Netherlands	Disposable income per capita percentage of Netherlands
Groningen	101.6	-6.3	-5.4	89.9	90.9
Friesland	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-Holland	102.4	9.2	5.1	116.7	102.7
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

per employed worker, taking into account differences in participation and age composition. Column four shows the difference in percentage points with GDP for the total population. For the three northern provinces Groningen, Friesland 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 of 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 Zeeland and Drenthe provinces with 2.6 and 1.8 percentage points respectively, but even in these provinces the 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 1. 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 per cent (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 noticeable differences are found for the provinces Groningen and Zuid-Holland. The share of part-time workers is seven percentage points higher in Groningen and six percentage points lower in Zuid-Holland than the national average. Furthermore, relatively high shares of part-time workers are found in Friesland, Drenthe and Zeeland, which have relatively low GDPs per capita. Another disturbance is caused by the fact that people who live in a region can be productive in another region. Since 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 per cent 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 of Noord-Holland and Utrecht accounts for a large part the opposite effect of commuting in these provinces.

Starting with the GDP per capita in column 5 of Table 1 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 per cent to 105.7 per cent. However, with the exception of the new provinces 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 also corresponds 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 redistribution 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 Friesland at the lowest level. Table 1 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 1 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 (NUTS-3).

### REGIONAL DIFFERENCES IN LABOUR PRODUCTIVITY

Figure 1 shows the regional variation in the level of labour productivity in 2001 for COROP-regions in the Netherlands (see Figure 2 for the demarcation of the COROP-regions).<sup>3</sup> GDP per labour year ranges from €51,000 in Zuidoost-Drenthe to €78,000 in Zeeuwsch-Vlaanderen, whereas the average for the Netherlands is €64,000. Two types of regions show the highest level of productivity. 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 capital-intensive industries in basic metal and chemistry that 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>4</sup> In all regions real labour

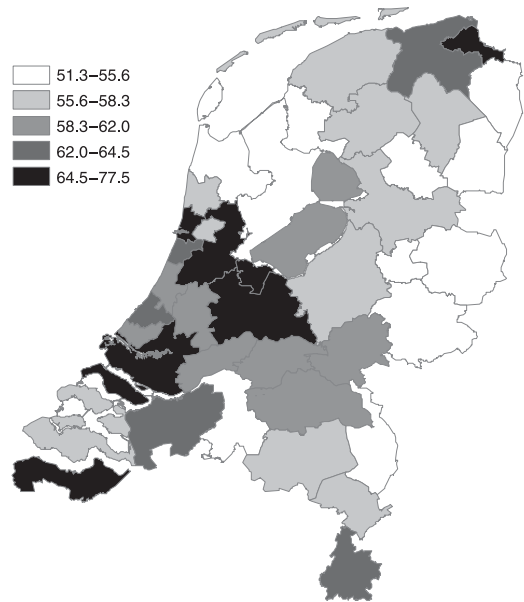


Figure 1. *Level of labour productivity as value added (in 1000 €) per labour year worked in 2001.*

productivity growth is positive, ranging from 0.2 per year in Alkmaar and environs to 1.7 per cent per year in Delft and Westland. The average annual growth is 1.1 per cent. 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 coefficient between level and growth. The regions with a strong service sector and located in the centre 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



1 Oost-Groningen	11 Zuidwest-Overijssel	21 Agglomeration Haarlem	31 Zeeuwsch-Vlaanderen
2 Delfzijl and environs	12 Twente	22 Zaanstreek	32 Overig Zeeland
3 Overig Groningen	13 Veluwe	23 Greater Amsterdam	33 West-Noord-Brabant
4 Noord-Friesland	14 Achterhoek	24 Gooi en Vechtstreek	34 Midden-Noord-Brabant
5 Zuidwest-Friesland	15 Arnhem/Nijmegen	25 Leiden agglomeration and Bollenstreek	35 Noordoost-Noord-Brabant
6 Zuidoost-Friesland	16 Zuidwest-Gelderland	26 The Hague agglomeration	36 Zuidoost-Noord-Brabant
7 Noord-Drenthe	17 Utrecht	27 Delft and Westland	37 Noord-Limburg
8 Zuidoost-Drenthe	18 Kop van Noord-Holland	28 Oost-Zuid-Holland	38 Midden-Limburg
9 Zuidwest-Drenthe	19 Alkmaar and environs	29 Greater Rijnmond	39 Zuid-Limburg
10 Noord-Overijssel	20 IJmond	30 Zuidoost-Zuid-Holland	40 Flevoland

Figure 2. Regional demarcation of the COROP-regions.

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.

As a next step we will use Figures 4–7 to shed some light on the explanation of the observed

regional differences in labour productivity. As will be clear from the descriptions of Figures 1 and 3, the sector structure plays a role. Regions with an over-representation of capital-intensive industries or specialised services do better in terms of productivity. There is also an obvious relation between 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,

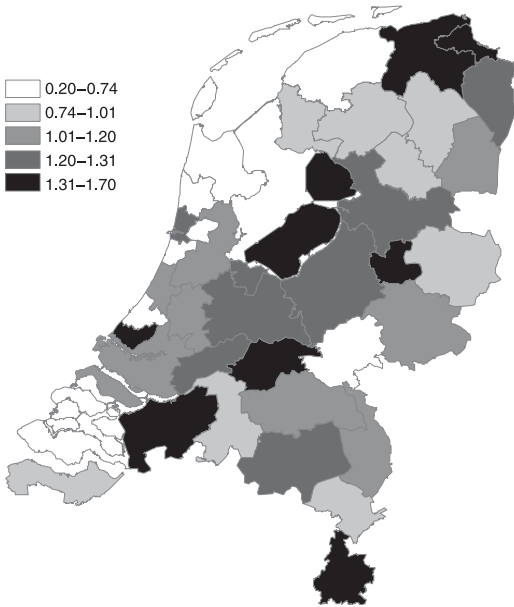


Figure 3. Real average annual growth of labour productivity (in per cent), 1991–2001.

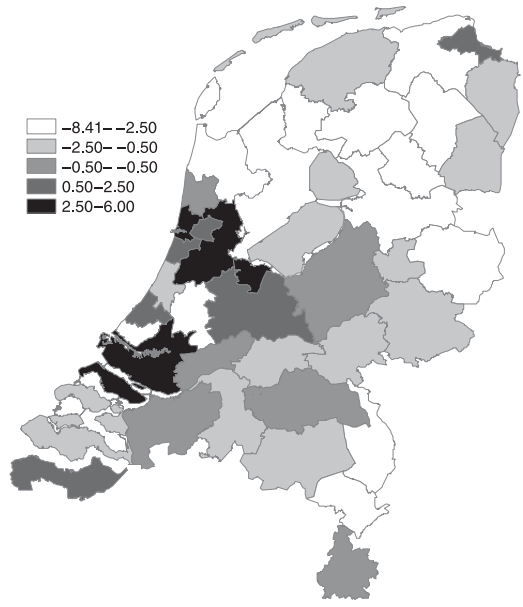


Figure 4. Industry mix or sectoral component of the level of labour productivity based on shift share analysis of 20 sectors (mining excluded), 1990–2000 (in percentage difference from national sector component).

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, Figures 5 and 6 provide maps with the share of the higher educated in the labour force and the cost of labour per labour year.<sup>5</sup> Finally, the map in Figure 7 reflects the density of the number of jobs per square kilometre, which can be seen as an indicator for the presence of agglomeration effects. Figures 4–7 are based on average values for the period 1991–2001.

In the discussion about the regional differences shown in the maps the sectoral composition in a region is several times mentioned as a possible explanatory factor. From recent studies by Broersma & Van Dijk (2003) and Broersma & Oosterhaven (2004) who analyse Dutch data for 1990–2000, it becomes clear that regional deviations from the national sectoral composition account for about 25 per cent of the regional variation in the levels of productivity. Figure 4 gives an impression of the regional variation of the effect of the sectoral composition on the level of productivity from a shift-share-analysis based on 20 sectors (mining is excluded). The map reflects that the high pro-

ductivity level in the area Amsterdam, Gooi- en Vechtstreek, Utrecht and The Hague is partly caused by an over-representation of service sectors with high levels of productivity. The regions with 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 5 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 per cent in Amsterdam to 12 per cent in Oost-Groningen, where the share of the higher educated in the national labour force is 25 per cent. The regions with a high share of higher educated outside the Randstad are mainly the regions where institutes for higher education are located. When Figure 5 is compared with Figure 1, it is clear that regions with low



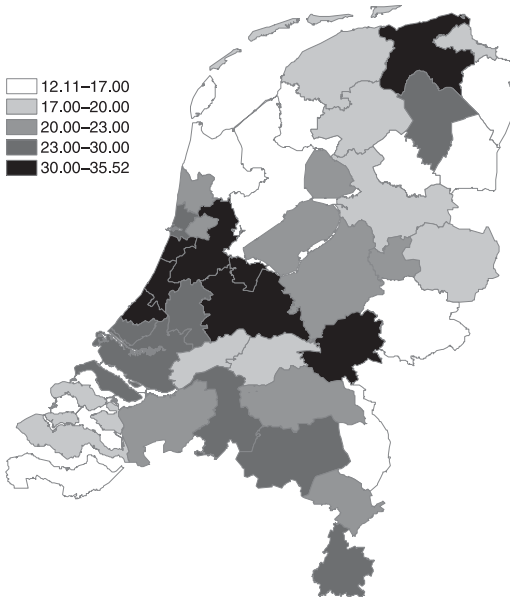


Figure 5. Average share of the higher educated (academic and higher vocational level) in the employed labour force over the period (in per cent) 1990–2001.

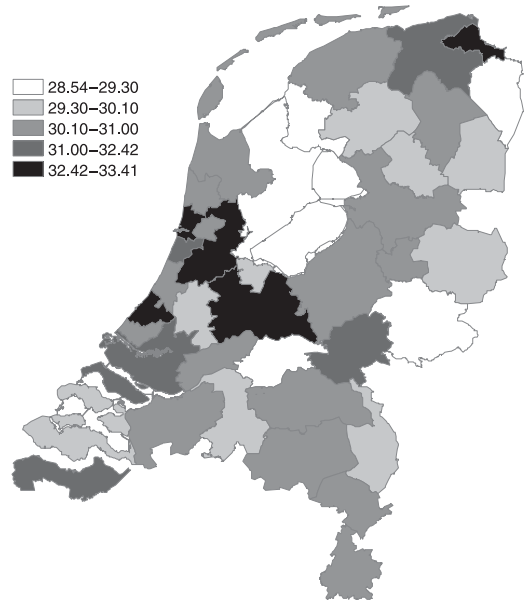


Figure 6. Average total labour cost (in €1000) per labour year, 1990–2001.

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 5 with Figure 3 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 6 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 Flevoland (€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 6 with Figure 3 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 7 the job density per square kilometre is shown. Job density can be seen as an indicator for the presence of agglomeration and cluster effects that may have a positive influence on labour productivity (Ciccone 2002). By

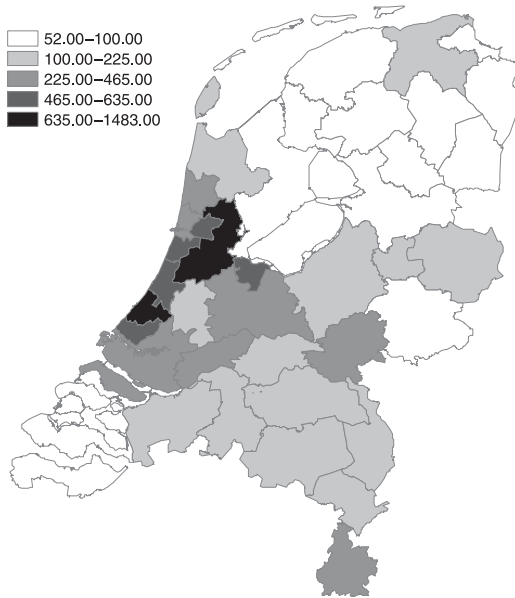


Figure 7. Average job density (in jobs per km<sup>2</sup> land surface) 1990–2001.

far the highest spatial concentration of jobs is found in the government centre at The Hague, with 1,483 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 5 ( $r = 0.70$ ) and labour cost in Figure 6 ( $r = 0.56$ ). When Figure 7 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 & 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.

## CONCLUSIONS AND POLICY IMPLICATIONS

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 (Table 1). 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 the most extreme cases, but the regional difference goes down 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 base metal and chemical industries. The regions with low levels of productivity are located in the periphery, especially in the east along the German border. 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 the higher educated, because recent empirical evidence suggests that causality may run mainly from employment growth to education and not vice versa (see Bils & Klenow 2000; Van Dijk & 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 in reducing regional differences in welfare than a policy focusing on the increase of the share of the highly educated, who might leave the region after finishing their education. Instead of a policy focusing on education, a policy aimed at creating new jobs for both low and high skilled might be a better alternative to solve the problem.

Even though the level of labour productivity in the Netherlands is very high, the rate of growth of Dutch labour productivity has decreased in the 1990s compared to its competitors in Europe (EU-15) and to the United States.<sup>6</sup> This causes the competitive advantage of the Netherlands over 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 the elderly, is precisely what the Dutch Government is aiming at by means of tax policy, increasing the statutory working week and with revisions of 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).

In the new regional policy plans of the Dutch Government focus is on regions with a national interest and the 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. The main reason for focusing on these regions is the assumption that they have agglomeration advantages due economies of scale, spillovers and are near 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 more slowing down of productivity growth. Instead, investing in less dense regions (the light areas in Figure 7) 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 on investment than investing in more peripheral regions. 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.

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#### Notes

1. Employment growth in this context measured in persons employed. In the Netherlands a high share of new entrants in the labour market work part time and, therefore, the growth in employment measured in full-time equivalents is substantially lower.

2. 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 may also occur in some other regions in a minor way, the sector mining is excluded from all analysis in this paper.
3. For the analysis by COROP-regions we use GDP per labour year as an 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 differ slightly because the definition of full time is not exactly the same for each sector due to differences in collective agreements (CAOs) 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.
4. 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 a production factor. In the period 1991–2001 prices in services increased substantially whereas the price levels in the industrial sector remained more or less constant. If we had used the nominal figures instead of the real figures, the increase in labour productivity in regions with a high share of services would have been overestimated.
5. Like the labour input in our productivity measure, this implies that all jobs are converted to full-time equivalent jobs.

6. See Groningen Growth and Development Centre, Total Economy Data Base, at <www.ggdc.net>.

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