CPB Document

Regional disparities in a small country?

An analysis of regional unemployment and participation

differentials in the Netherlands from 1975 to 2003

Wouter Vermeulen

Abstract in English

The existence of regional support programs presumes that labour markets in the Netherlands do not clear at the national, but at some local level. From a general equilibrium perspective, it is far from straightforward to identify the regional dimension of labour markets. This study argues that the size and persistence of regional unemployment and participation differentials are an appropriate indicator. We analyse regional unemployment and participation in the Netherlands from 1975 until 2003. Empirically, differences in inactivity do not seem to be a reliable indicator of the regional component of labour markets. Both from an international perspective, and in comparison to variation of labour market conditions over the business cycle, the regional dimension of labour markets appears to be small. However, it is relatively large for women, youths and the lower educated, which are the least mobile groups. It would be efficient to aim regional labour market programs at these groups, if such programs are desirable at all.

Key words: regional labour markets, (hidden) unemployment, participation

JEL code: J61, J64, R13, R23

Abstract in Dutch

Het bestaan van regionale steun veronderstelt dat arbeidsmarkten in Nederland niet op nationaal niveau ruimen, maar op een locaal niveau. Vanuit een algemeen evenwichtsperspectief is het niet gemakkelijk om de regionale component van arbeidsmarkten te identificeren. Deze studie betoogt dat de grootte en persistentie van regionale verschillen in werkloosheid en participatie geschikte indicatoren vormen. We analyseren regionale werkloosheid en participatie in Nederland van 1975 tot 2003. Uit de empirie blijkt dat verschillen in inactiviteit geen betrouwbare indicator zijn van de regionale dimensie van arbeidsmarkten. Zowel vanuit een internationaal perspectief, als in vergelijking met variatie van kansen op de arbeidsmarkt tussen hoog- en laagconjunctuur, lijkt de regionale dimensie van arbeidsmarkten klein. Deze dimensie is echter relatief groot voor vrouwen, jongeren en lager opgeleiden, die ook minder mobiel zijn. Het zou dus efficiënt zijn om regionaal arbeidsmarktbeleid te richten op deze groepen, als dit soort beleid überhaupt wenselijk is.

Steekwoorden: regionale arbeidsmarkten, (verborgen) werkloosheid, participatie

Een uitgebreide Nederlandse samenvatting is beschikbaar via www.cpb.nl.

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Summary

The existence of regional support programs presumes that labour markets in the Netherlands do not clear at the national level. However, it is far from straightforward to identify the regional dimension of labour markets. Studies that focus on commuting or migration can at best provide partial answers, because they ignore other adjustment mechanisms. From a general equilibrium perspective, trade and capital mobility matter as well. We argue that a regional dimension of labour markets is implied by the existence of wage differentials in equilibrium, which are not compensated in other markets. Because of wage rigidities due to bargaining at the national level, regional unemployment and participation differentials are probably more informative empirically than wage differentials. Therefore, this study analyses the variation and persistence of these variables.

We use labour force surveys from 1975 to 2003 to construct time series of gender-specific unemployment and labour participation at the level of provinces (NUTS2). For a smaller period (1992 - 2002), breakdowns to age (3 groups) and educational attainment (3 groups) are also available. For the aggregate regional data, the overall picture is one of striking homogeneity in developments over time, while deviations in the order of a few percentage points tend to persist. Regional variation in unemployment is relatively strong for women, youths and lower educated workers. It virtually disappears for the higher educated during business cycle peaks. Composition effects do not seem to account for variation in aggregate regional unemployment.

Variation in inactivity, which is larger than variation in unemployment for all groups, indicates a regional dimension of labour markets to the extent that it reflects hidden unemployment. However, the relationship between inactivity and observed unemployment is not robust to controlling for time-invariant regional heterogeneity. The variation in participation rates should apparently be attributed to characteristics of regions other than conditions on labour markets to a significant extent. This suggests that participation differentials do not provide convincing evidence of a regional component of labour markets.

We conclude that the regional dimension of labour markets in the Netherlands is small from an international perspective, and in comparison to variation of labour market conditions over the business cycle. However, it is relatively large for women, youths and the lower educated, which are the least mobile groups. It would be efficient to aim regional labour market programs at these groups, if such programs are desirable at all.

1 Introduction[1]

The Dutch government spends considerable resources on regional labour market policies. Almost 2 billion euros have been allocated over the period 2000 - 2006 to a program called *Kompas voor het Noorden* (compass for the North). Moreover, some large infrastructural investments have also been discussed in the light of their redistributive effects on regional labour markets.[2] But is there actually a regional dimension of labour markets in the Netherlands, or do they rather clear at the national level?

The answer to this question is far from evident, and it is not necessarily the same for different subgroups of the population. Are labour markets regional because of barriers to migration, or perhaps because people commute over limited distances only? Although some studies seem to rely on such arguments, certain trade models predict equalisation of wages even if labour and capital are fully immobile. Hence, this study addresses the issue from a *general equilibrium* perspective. In our definition, labour markets clear at the national level if uncompensated regional wage differentials for similar workers cannot exist in equilibrium. In theory, the size and persistence of uncompensated wage differentials would thus indicate the regional dimension of labour markets. In practice, regional variation in wages is probably reduced by rigidities due to bargaining at the national level. As such institutions hamper adjustment of pay levels to regional labour demand and supply, regional excess supply is likely to result in unemployment or inactivity. Therefore, our empirical analysis focuses on variation and persistence of these variables.

We have collected unemployment and participation rates at the level of provinces (European NUTS2 level) from a series of labour force surveys from 1975 until 2003. Only gender is distinguished for the entire period of observation. A breakdown to age groups and educational attainment is available from 1992 until 2002. These breakdowns are important because the regional dimension of labour markets may vary over subgroups of the population, as barriers to migration and commuting differ. The main part of our empirical analysis consists of graphical inspection of the development of these variables for four large regions, which allows us to assess variation and persistence. Also, we investigate the role of composition effects. Findings are corroborated in a more extensive analysis at the level of provinces.

[2] Investment in the *Zuiderzeelijn*, a fast train between the North and the West of the country, has recently been discussed from this perspective. See IBO (2003-2004) for a recent overview of regional policies in the Netherlands and an assessment of their effectiveness and desirability.

Persistent variation in participation rates does not necessarily imply a regional dimension of labour markets, as it may also reflect differences between regions that have nothing to do with labour market perspectives. For example, regional amenities or different attitudes towards the division of labour within a household may also affect the labour supply decision. We interpret inactivity as *hidden unemployment*, if workers are measured as inactive although they would probably hold on to a job in tight (local) labour markets. The regional component of hidden unemployment is identified on the correlation of inactivity with observed unemployment. As we have time series of these variables, we are able to control for all time-invariant regional heterogeneity.

We discuss related literature in the next section. In particular, our analysis is put into an international perspective on the basis of two OECD studies on regional disparities (OECD 2000, 2005). We develop our theoretical argument in section 3. Section 4 explores the data at the level of country parts. The more extensive analysis at the level of provinces (NUTS2) is deferred to Appendix 1, because it merely corroborates our findings in this section. Section 5 examines the relationship between unemployment and inactivity, in order to address a regional dimension of hidden unemployment. The final section concludes and discusses implications for policy. Our empirical analyses are performed on labour force survey data from 1975 to 2003, which are shortly described in Appendix 2.

2   Related literature

In a number of studies, OECD has paid attention to regional disparities in economic
performance (OECD, 2000, 2005). Within countries, variables such as income, employment
growth and unemployment appear to vary substantially, which suggests that the regional
dimension of labour markets should not be ignored. However, this conclusion does not
necessarily apply to relatively small countries, such as the Netherlands. The Figures 2.1 and 2.2,
which are reproduced from OECD (2005), put regional disparities in this country into an
international perspective. For several countries, coefficients of variation over regional
employment and unemployment rates are shown in these figures respectively.[3]

Figure 2.1   Regional variation in employment rates: an international perspective (source: OECD, 2005)
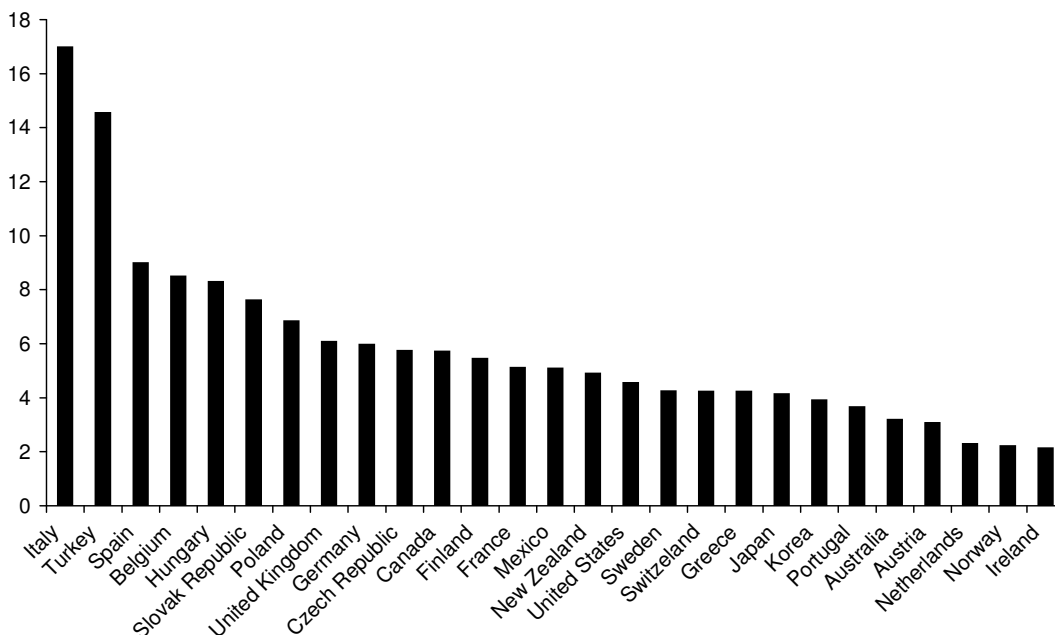
Both figures indicate that regional disparities in the Netherlands are almost the smallest in the
entire sample. In Germany, for example, the variation in employment rates is more than twice
as large, and the variation in unemployment rates is almost four times as large. Of all OECD
countries, only Norway and Ireland have less regional variation in unemployment and
employment rates. Nevertheless, the study also indicates that regional differentials are rather
persistent in the Netherlands, like in most other European countries (see also OECD, 1989,

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[3] Regional classifications vary over countries, so that these type of comparisons should always be interpreted with care. See
OECD (2005) for comments on the regional delineations used.

2000).[4] These rough indications provided by the OECD will be extended in our present analysis, which draws on a richer dataset.

Figure 2.2   **Regional variation in unemployment rates: an international perspective (source: OECD, 2005)**
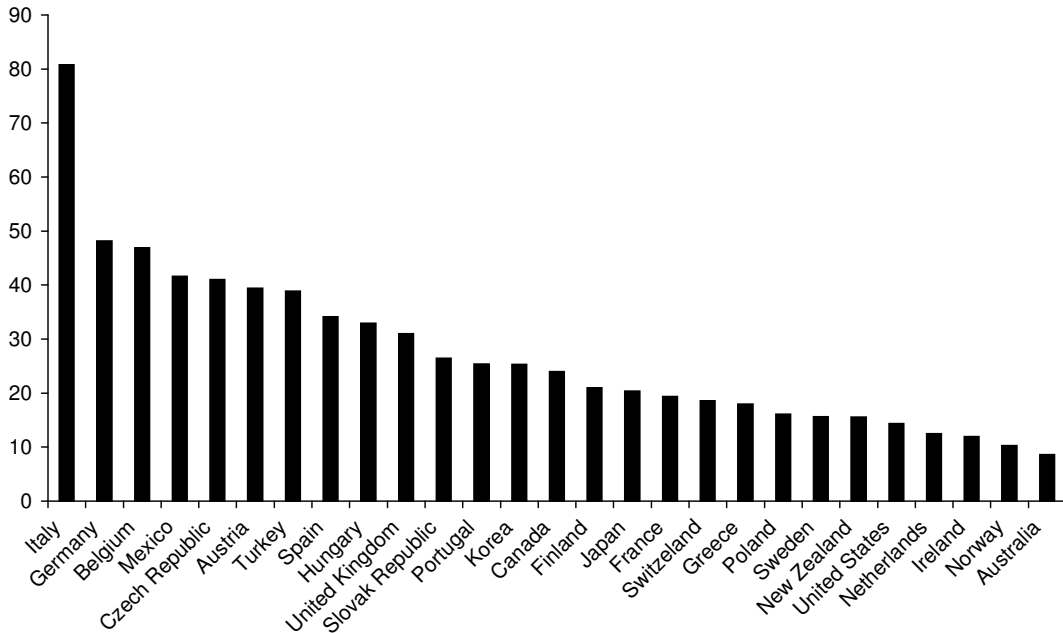
One of the few studies that explicitly poses the question whether labour markets clear at the national or at some regional level is Overman and Puga (2002), who analyse regional unemployment in Europe. They find that variation between countries accounts for only a limited part of variation between regions. Moreover, regional unemployment clusters appear to cross national borders, calling for transnational European regional labour market policies. However, these findings do not imply a regional dimension of the Dutch labour market, which accounts for only a small part of the variation in their data. Unfortunately, their methodology cannot be applied to the analysis of one single country.

A different strand of literature that is related to our research question follows the landmark paper by Blanchard and Katz (1992) on regional evolutions (cf. Decressin and Fatas, 1995, and Broersma and Van Dijk, 2002). This literature is concerned with the question how regional labour markets adjust to demand shocks. Blanchard and Katz (1992) start their analysis by evaluating the national component in US state-level employment growth, unemployment and wages. Not surprisingly, they find a strong regional component of these variables. Similarly, Broersma and Van Dijk (2002) investigate the national component of labour market disturbances in the Netherlands from 1992 to 1999. About half of the variation in employment

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[4] Regional unemployment differentials are less persistent in the US, see for example OECD (2000, 2005) and Blanchard and Katz (1992). This is probably related to the fact that labour migration is more common in this country than in most European countries.

growth in their study seems to be determined by national developments. For unemployment and participation, this share roughly equals 90 percent for most regions. A study in this vein that explicitly accounts for heterogeneity of the population is Mauro and Spilimbergo (1999), who find that lower educated workers adjust slower to demand shocks. We emphasise however that the focus of this literature is on identifying regional adjustment mechanisms rather than a regional dimension of labour markets.

We finally refer to a strand of literature that aims to identify functional labour market regions, or regional labour markets, on the basis of commuting flows (cf. Cörvers and Hensen, 2003, Van der Laan and Schalke, 2001). Such studies will generally conclude that Dutch labour markets are regional, because very few people commute from one end of the country to the other. In our view, delineation of regions which are relatively closed in terms of commuting, does not imply existence of a regional dimension of the labour market. The reason is that commuting is only one of several adjustment mechanisms, others being trade, migration and capital mobility. It may very well be that labour markets clear at a national level through these other mechanisms, even if it is impossible to commute across the entire country.

3   Theoretical framework

In this section we propose a formal definition of the existence of regional labour markets. The perspective we take is general equilibrium, so our study extends partial analyses of for instance commuting or migration. In particular, it is argued that immobility of labour does not necessarily imply that labour markets are regional. Without being exhaustive, we discuss the implications of various sets of assumptions about the economy for the regional dimension of labour markets. We then discuss how to apply this framework in an empirical analysis.

Formally, we consider labour markets to clear at the regional, rather than the national level, if *uncompensated wage differentials* between regions exist in equilibrium. So not only should wages differ between regions for similar people doing similar jobs, but workers in low-wage regions should not be compensated in other markets either. In other words, this definition requires that workers in some regions are really worse off.

Trade and the equalisation of factor rewards

What are the economic assumptions that lead to regional labour markets in this definition? A first issue to be discussed is the role of trade. The international trade literature has paid significant attention to *factor price equalisation* (cf. Krugman and Obstfeld, 1994). In so-called Heckscher-Ohlin models, wages may equalise between countries even if labour and capital are strictly immobile.[5] In these models, competition is perfect, trade is costless and countries have similar production technologies. Note that, although these assumptions are strong, they are more likely to hold within than between countries.[6] The theory illustrates how partial analyses of commuting or migration may wrongly identify regional labour markets.

Capital mobility

Capital may adjust to wage differentials in various ways. Next to firm mobility, spatially differentiated growth rates, firm start-ups and shifts within multiplant firms are other options. Institutional barriers to capital mobility that exist between countries, are mostly absent between regions. Capital will generally flow to regions where its productivity is highest. Hence, low wages tend to attract capital until factor rewards are equalised. It is therefore surprising that capital mobility is so often ignored in studies on regional labour markets.[7]

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[5] See also Hanson and Slaughter (2002). This study finds that state production in the US responds to labour supply shocks by adjusting output in the traded sector. The authors present evidence for productivity-adjusted factor price equalization between US states.

[6] Moreover, these assumptions may be more appropriate in a small and open economy, like the Netherlands.

[7] Relatively little is known about interregional mobility of capital. In a study of population-employment interaction in the Netherlands, Vermeulen and Van Ommeren (2004) find that jobs follow people in the long run. Their results indicate that this adjustment is triggered at least partly by labour supply, thus highlighting the role of capital mobility in clearing labour markets. Even less is known about spatial adjustment of capital at the micro-level. One exception is Holl (2004), who employs Portuguese firm-level data to show that local labour market conditions such as labour force qualification and labour costs are important determinants of the number of firm start-ups in a region.

Under certain conditions, trade and capital mobility are not sufficient to equalise wages between regions. The most relevant situation is probably the presence of economies of agglomeration, due to nonconvexities such as firm-level increasing returns to scale, knowledge spillovers or pooled labour markets. A variety of models with these characteristics have been developed in the *new economic geography* literature (cf. Fujita et al., 1999, or Fujita and Thisse, 2002). In these models, wages are not equalised through trade because of transport costs, and they are not equalised through capital mobility because of the nonconvexities in production. So agglomeration economies may give rise to regional labour markets if labour is immobile.

Labour mobility and compensating differentials

What happens if agglomeration economies are present, but labour is perfectly mobile? By definition, the regional dimension of labour markets disappears, because in equilibrium, workers in all regions will be equally well off. Lower wages in peripheral regions may be compensated for instance in housing markets or natural amenities.

In reality, some parts of the population are probably more mobile than others. Suppose for example that highly educated workers are perfectly mobile, but the lower educated are not. Under this assumption, labour markets clear at the national level for the higher educated, although high-skilled wages may be lower in peripheral regions. But agglomeration economies do cause a regional dimension of labour markets for the immobile lower educated. Note that wage differentials probably overstate this dimension, because lower educated workers may benefit from certain compensating differentials in peripheral regions too.

Towards an empirical evaluation

Empirical identification of the regional dimension of labour markets poses a number of difficulties. In the first place, wage differentials understate the regional dimension of labour markets due to rigidities, related to centralised wage bargaining. Secondly, in our definition only the existence of regional wage differentials *in equilibrium* implies a regional dimension, but when is an economy in equilibrium? And finally, although wages are observable, we do not readily observe *uncompensated* wage differentials.

There is an increasing awareness in the literature that bargaining institutions are an important cause of regional unemployment differentials (cf. Faini, 1999, Overman and Puga, 2002, OECD, 2005). In the Netherlands, more than 80 percent of wages of employees are bargained at

the national level.[8] As a consequence, wage adjustment to regional demand and supply is hampered. Hence, if the regional supply of labour exceeds demand, this is likely to translate into unemployment or inactivity. Therefore, we investigate the regional dimension of labour markets empirically on the basis of regional unemployment and participation differentials, rather than wages.[9]

The observation of regional differences in unemployment at some point in time does not mean that labour markets are regional. We may observe a disequilibrium situation, that will disappear quickly through the adjustment mechanisms described in this section. However, the longer these differences persist, the more likely it is that they reflect an equilibrium outcome. Therefore, our empirical analysis focuses not only on the size but also on the persistence of regional unemployment and participation differentials.

Finally, existence of compensating differentials implies that we overestimate the regional dimension of labour markets. Evidence suggests that compensating differentials in housing markets exist in the Netherlands (Vermeulen and Van Ommeren, 2006). However, problems of measurement as well as the absence of long time series make it difficult to incorporate this aspect in our empirical work.

[8] To be more precise, wages are bargained at the level of industries. Labour unions and the government coordinate these industry-specific bargaining processes to some extent. Although these institutions hamper adjustment of wages to regional labour market conditions, wages are not fully fixed at the national level as individual employers have discretion in some cases. Empirically, the small regional component of wages in the Netherlands has been recorded by Van Dijk and Folmer (1992). Furthermore, wages appear to respond to local unemployment only to a limited extent (cf. Groot et al., 1992). Estimates on housing demand survey data (WBO 1985 and 2002), not reported here, also suggest a weak relationship between regional unemployment and wages. These findings are consistent with the view that regional wage adjustment is restricted by wage bargaining at the national level.

[9] The national level of unemployment is not only related to bargaining, but also to other institutions and rigiditeis. Note that in the presence of other labour market distortions, the notion of *market clearing* is not formally appropriate, as labour demand and supply do not meet. So when we informally say that labour markets clear at the national level, we mean that unemployment is a reflection of national demand and supply, and has in that sense no regional component.

4 Exploring regional variation and persistence

The empirical content of our study consists of the analysis of regional unemployment and participation differentials over almost three decades. We use labour force surveys starting from 1975, which have been held once in the two years and yearly from 1987 onwards (see Appendix 2 for details on the data). Regional time series can thus be constructed, which distinguish gender. From 1992 to 2002, regional unemployment and participation to age and educational attainment are also available. The resulting dataset is explored in this section. We present the main stylised facts at the level of country parts (4), shedding light on the extent of regional variation and persistence. A more extensive analysis at the level of provinces is deferred to Appendix 1, as it merely corroborates our findings. We do provide a small summary of the province-level analysis at the end of this section.

Aggregate data[10]

The development of aggregate unemployment and participation over the period 1975 - 2003 is shown in Figure 4.1. The variables are scaled to consistent time series at the national level provided by Statistics Netherlands, in order to account for changes in definitions (see Appendix 2). To the extent each region is affected in the same manner by these definitional changes, our analysis is unaffected.

Figure 4.1   Aggregate unemployment (left) and participation rates (right) for four country parts
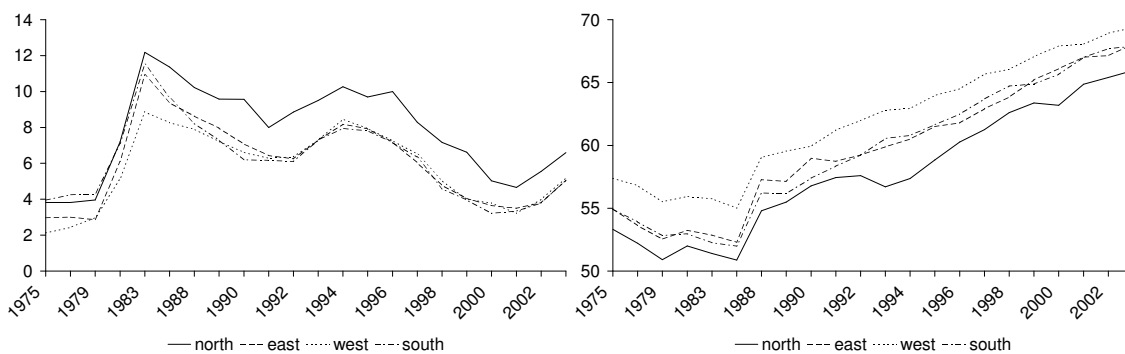
Figure 4.1 neatly summarises our data. It illustrates how little regional unemployment and participation have deviated from national developments. There is virtually no regional component of the business cycle, peaks and troughs occur at the same years in all regions. Variation over country parts, which hardly exceeds 2 percent points for unemployment and 4 percent points for participation, is small when compared to variation of national rates over time. Moreover, differences between regions are persistent at this regional scale. The only shift in

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[10] We use the term *aggregate* here to refer to data, either national or regional, which are not specific to subgroups of the population.

regional rankings occurs in the seventies and the first half of the eighties, when unemployment in the south drops from the highest to one of the lowest in the country.

Unemployment is low at the start of our period of observation, ranging from 2 to 4 percent of the labour force. It is highest in the South and lowest in the West. During the economic downturn in the beginning of the eighties, unemployment rises in all country parts at a similar pace. At the unemployment peak of 1983, the rates vary between 8 and 11 percent, and the North takes over from the South as the region with the highest unemployment rate. Changes in the regional ranking are probably related to region-specific shocks, such as closing down of the mines in the South and disappearance of traditional industries in the North. Over the eighties, unemployment in the South converges to the West and East, whereas unemployment in the North remains about 2 percent points higher. During the economic rise that characterises the nineties, the regional pattern is stable. In 2003, unemployment rates in the South, West and East were almost equal, mounting to about 5 percent, and unemployment in the North is still almost 2 percent points higher.

Participation in the Netherlands is relatively stable during the seventies and eighties, averaging about 60 percent, whereas it rises spectacularly during the nineties. In 2003, almost 70 percent of the population aged between 15 and 65 is in the labour force. The regional dimension of this development appears to be modest. It does seem however, that regional differences have become somewhat smaller, in particular during the nineties. Whereas participation in the West is more than 4 percent points higher than in the North in 1975, this difference reduces to about 3 percent points in 2003. Figure 4.1 is weakly suggestive of a relationship between participation and unemployment, as participation seems to be lowest in the region where unemployment is highest. However, the fall in unemployment in the South relative to the other regions is not reflected in its participation rate, which remains at its position somewhat below the national average.

A composition effect of educational attainment?

One may hypothesise that regional differences in unemployment are mere composition effects, unemployment may be lower in some regions because of a larger share of higher educated workers. Indeed, it is well known that unemployment and participation rates vary strongly with educational attainment. Differences are particularly marked for the lower educated. In 2002, unemployment for this group was 3 percent points higher than for the higher educated, and participation was more than 30 percent points lower.[11] Therefore, a *shift-share* analysis has been performed in order to find out whether regional variation in the educational composition of

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[11] We should note however, that younger age cohorts have higher average levels of education, so the large difference in participation can be attributed partly to an age effect.

the workforce and the population can account for unemployment or for participation differentials.

We define the *share* or composition effect as the regional unemployment (participation) rate that would result if unemployment (participation) rates in all regions were equal to the national rate for three population groups, classified with respect to the level of education. For the analysis of unemployment, we decompose the labour force to educational attainment, whereas for the analysis of participation, we decompose the *potential* labour force (population aged between 15 and 65). The *shift* or structural component is the difference between observed regional unemployment (participation) rates and the share. Shift and share of regional unemployment are shown in Table 4.1 for the four country parts. Shift and share of regional participation are shown in Table 4.2. Only for the period 1992 – 2002 do our data allow for decomposition of the population to educational attainment, so the tables show averages over this period.

Table 4.1 Unemployment and shift and share with respect to educational attainment

Region	Unemployment	Share	Shift
North	7.8	6.0	1.8
East	5.7	6.0	− 0.3
West	5.6	5.9	− 0.3
South	5.8	6.0	− 0.2
Netherlands	5.9	5.9	0.0

Evaluating the share of regional unemployment, it appears that composition of the labour force with respect to educational attainment explains virtually nothing of the regional variation in unemployment at this spatial level of aggregation. The explanation for this finding is that the share of lower educated in the labour force is relatively homogeneous over these regions at this spatial scale. The difference of about 2 percent between the North and the other regions should thus be explained by other factors.

Table 4.2 Participation and shift and share with respect to educational attainment

Region	Participation	Share	Shift
North	61.5	63.7	− 2.2
East	63.6	64.0	− 0.3
West	65.9	65.1	0.8
South	63.9	63.7	0.2
Netherlands	64.5	64.5	0.0

Evaluating the share of regional participation in Table 4.2, we observe that composition effects account for a more substantial part of regional participation differentials. In particular, they explain a third of the 4.4 percent difference between the West and the North. However, composition effects cannot account for the remaining 3 percent difference in participation. Therefore, the larger part of regional differences at this spatial level of aggregation can not be attributed to composition effects either.[12]

A closer look at some subgroups

Our dataset allows to investigate whether the regional dimension of labour markets has varied over subgroups. We explore the development of unemployment and participation, distinguishing gender, age and educational attainment. The Figures 4.2 and 4.3 show these variables over the period 1975 - 2003 for males and females respectively, where we have scaled to gender-specific consistent national time series.

Figure 4.2   **Male unemployment (left) and participation rates (right) for four country parts**
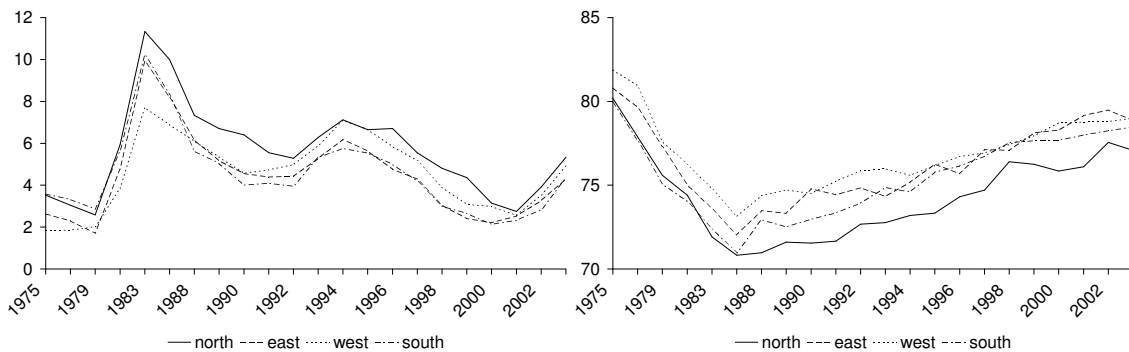
Like for the aggregate data, it appears that male regional unemployment and participation closely follow national developments. Deviations are small and there is again no evidence of a regional component of business cycles. The extent of regional variation varies somewhat over time. In the 1983 trough, unemployment in the North is almost 4 percent points higher than in the West, whereas there are virtually no differences in the final years of our sample. Compared to the national level, unemployment seems to be persistently higher in the North and lower in the West. Regional participation differentials are smaller for males than for the aggregate data. Participation seems to be low in the North in particular, after the 1983 trough. The most striking feature however, is the relationship between unemployment and participation over time. Male

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[12] Although unemployment rates may vary considerably over gender and age too, the regional composition with respect to these variables is more homogeneous. Therefore, composition effects with respect to gender and age are less important than with respect to educational attainment. In particular, we have verified that a composition effect with respect to the age composition of the regional potential labour force explains little of observed participation differentials.

participation is lowest at the 1983 employment peak and then increases as unemployment falls.[13]

Figure 4.3   Female unemployment (left) and participation rates (right) for four country parts
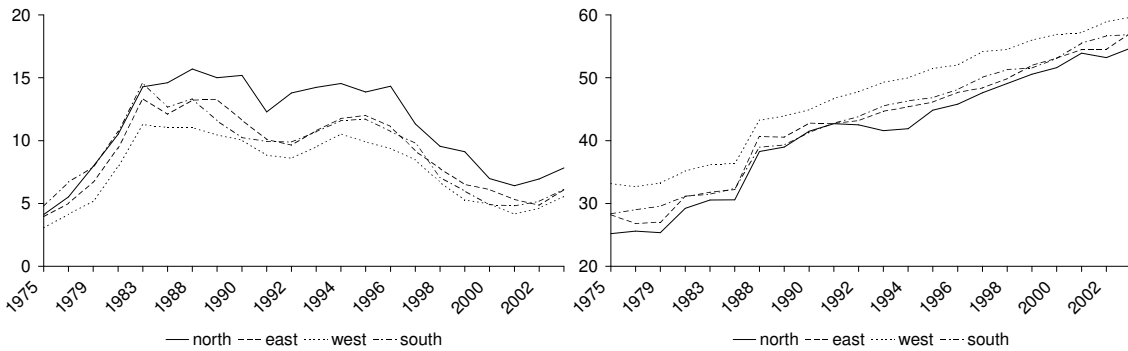

Figure 4.3 shows unemployment and participation rates for women. Obviously, female unemployment is above and female participation is below the national average, whereas for males it is precisely the opposite. Regional differences also tend to be more pronounced for women than for men, which suggests that regional variation in average unemployment and participation rates is to a significant extent shaped by women. Female unemployment in the North is substantially higher than in the other regions from 1983 onwards, whereas it is persistently lower in the West. Regional differences in participation are even more persistent. The increase in female labour participation is tremendous, having more than doubled over our period of observation. Interestingly, its behaviour over time seems hardly correlated to the evolution of unemployment. This suggests that the rise in female labour participation is not so much related to labour market developments, an issue that will be further investigated in the next section.

Figure 4.4   Unemployment in the age groups 15 - 24 (left) and 55 - 65 (right)

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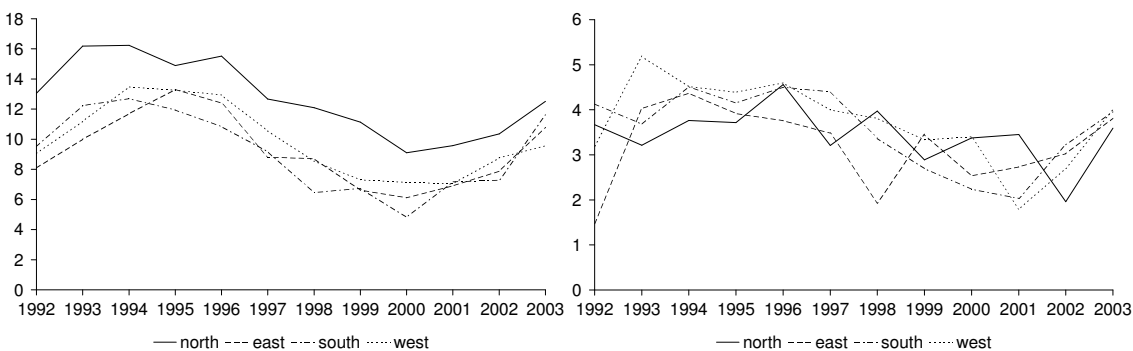
[13] Other developments, such as shifts in the demographic composition of the population, a drop in the average retirement age and changes in educational institutions, have also contributed to changes in male labour participation. .

Regional unemployment differentials over the period 1992 - 2002 are shown for young (15 - 24) and older (55 - 65) workers in Figure 4.4. Youth unemployment in the North is about 4 percent points above unemployment in the other regions for almost the entire period. This suggests that there may be a substantial regional component of the problem of youth unemployment. Only in the final years of our sample does the difference appear to decrease. For older workers, on the other hand, a significant regional component cannot be identified at all. There are no large or persistent regional differences in unemployment for this age group.

Figure 4.5   Unemployment rates for lower (left) and higher (right) educated workers
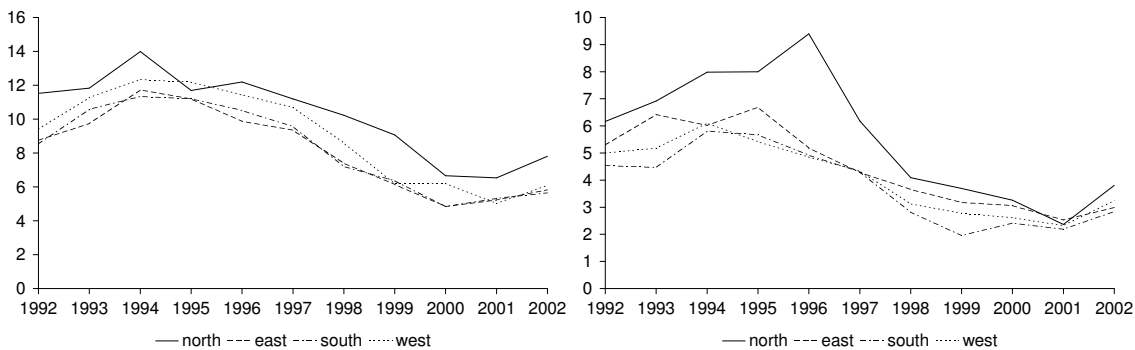
Finally, unemployment rates for the lower and higher educated are shown in Figure 4.5. The regional pattern for lower educated workers is rather stable over time. In particular, unemployment in the North for this group is about 2 percent points above the national average for the entire period. The pattern is quite different for the higher educated workers. Being quite small in 1992, regional differences increase with the following rise in aggregate unemployment. Unemployment then is particularly high for the North. Towards the end of the nineties, however, these differences decrease rapidly and they seem to disappear completely in 2001.

The peak of unemployment for higher educated workers in the North seems to be related to a relatively large student population in the northern city of Groningen.[14] During troughs, graduated students experience more difficulties in finding a job. While searching, they tend to stay in their relatively cheap (student) accommodation. However, after finding a job they often move to another part of the country. During the business cycle peak at the end of the nineties, most of the higher educated unemployed found jobs, so the regional unemployment differential disappeared. This figure therefore indicates, that for the higher educated, the regional dimension of labour markets may be quite limited. A regional component of unemployment for the lower educated is consistent with our finding that regional unemployment differentials are not due to the composition of the labour force with respect to this variable.

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[14] We have verified that most of the unemployed during this peak in the North were in the age groups 15 – 24 and 25 – 34.

Variation and persistence at the level of provinces

Appendix 1 features an analysis of unemployment and participation at the level of provinces (NUTS2), which is broadly in line with the exploration in this section. We find more regional variation in participation than in unemployment rates. Regional variation is particularly large for women and youths. In the business cycle peak at the end of the nineties, there is virtually no variation in regional unemployment rates for higher educated workers.

Consistent with Figure 4.1, regional unemployment rates appear particularly persistent in the second half of our period of observation. For males, the correlation between provincial unemployment rates in 1975 and 1989 is virtually nil, whereas it is almost perfect between 1989 and 2003. For women, regional unemployment rates are more persistent over the entire period. Also, regional differences in participation are substantially more persistent than differences in unemployment. Over the period 1992 - 2002, variation and persistence are particularly low for workers in the age group 55 - 65. Regional unemployment differentials are more persistent for the lower educated than for the higher educated, if we take account of the outlier position the province of Groningen.

In summary, changes in unemployment and participation are rather homogeneous over the country, but differences tend to persist. The regional variation in unemployment rates may be small from an international perspective, but it is relatively large for women, youths and lower educated workers. In contrast, higher educated workers seem to equilibrate regional differences in labour market opportunities during upswings of the business cycle. Variation in participation rates exceeds variation in unemployment rates, but it is not clear whether these differences point to a regional dimension of labour markets. The next section investigates whether regional participation differentials reflect local labour markets opportunities.

5   Inactivity and hidden unemployment

Less favourable perspectives on labour markets may translate into inactivity rather than unemployment, and the distinction between the two is not so clear cut. Informally, neither the unemployed nor the inactive have a job, but the latter group may be satisfied with this state while the former generally is not. In both the US and the UK, a striking rise in inactivity rates for lower educated prime-age males has been observed, apparently related to health problems (cf. Autor and Dugan, 2003). However, as there is no reason to believe that general health conditions in these countries have deteriorated, it is questionable whether these men were really too sick to work. Possibly, some would have accepted a job under more favourable labour market conditions. Shouldn't they then be counted as unemployed workers?

Some of the inactive may perhaps be best considered as *hidden unemployed*. It has been suggested that the hidden unemployment problem has a strong regional dimension. One indication for this is the widely observed positive correlation between regional unemployment and inactivity rates (cf. OECD, 2000, 2005), which is also apparent for the Netherlands in Figure 4.1. Decressin and Fatas (1995) have shown that in Europe, regional labour demand shocks are absorbed through participation to a large extent. Hence, adverse regional shocks seem to translate into inactivity as well as unemployment. Their results have been verified for the Netherlands by Broersma and Van Dijk (2002). As a final indication, we mention O'Leary et al. (2005), who report a strong regional component of ill health for the UK, concentrating around former manufacturing regions (predominantly mining and heavy industries).[15]

Obviously, inactivity does not need to be related to labour market opportunities. It may be that participation in an amenity-rich region is low because leisure time is highly valued. Alternatively, different attitudes towards the division of labour within a household may determine regional participation differentials. For a proper assessment of the regional dimension of labour markets in the Netherlands, it is therefore important to distinguish hidden unemployment from inactivity that has nothing to do with labour market opportunities. Persistent regional variation in participation implies such a dimension only to the extent that it reflects hidden unemployment. This section sets out to do so.

A definition of hidden unemployment

Before turning to the data, we want to be a bit more specific about what we mean by hidden unemployment. The distinction between unemployment and inactivity can be formalised in a search framework: *the unemployed engage in job search and the inactive do not*. Consequently, most labour force surveys count respondents as unemployed if they are available for a job immediately, and if they have been engaged in job search recently. However, people can spend

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[15] See Beaty and Fothergill (2002) for a case study of unemployment and inactivity in a peripheral UK town.

any amount of time on job search, so search effort is a continuous variable. Definitions of unemployment necessarily make this variable dichotomous and therefore a bit arbitrary (cf. Jones and Riddell, 1999, and Manning, 2003). Moreover, the observation of search effort may be biased through the benefit system. People on unemployment benefits will tend to report that they spend a lot of time on job search because the terms of the benefit system force them to engage in search. On the other hand, people on disability benefits may underreport their search effort out of a fear to lose these benefits. In line with such arguments, a significant share of newly employed workers were previously reported as inactive rather than unemployed. As some unemployed may be recorded as inactive, and vice versa, a positive relationship between the two variables may appear in the data.

The decision to invest in search depends on labour market conditions, because returns on this investment increase with the probability of finding a job. Unemployment may be expected to reduce this probability, and therefore increase the rate of inactivity. In other words, low returns on investment in loose labour markets may discourage unemployed workers from search.[16] Hence, economic behaviour may also result in a positive relationship between unemployment and inactivity.

Both problems of measurement and behavioural relationships between unemployment and inactivity imply that *some people are counted as inactive, although they could be reasonably expected to have a job in a tight (regional) labour market*. We consider these people as the hidden unemployed. So in our definition, disabled workers who would find a job if labour markets were tight are hidden unemployed. Also, married women who would like to work but have given up (active) search because there are no appropriate jobs, should thus be considered as hidden unemployed. As a final example, people who retire early because of redundancies are hidden unemployed in this definition. (Observed) inactivity of these groups is a reflection of labour market conditions, to which a regional dimension may exist.

Identification of hidden unemployment

For the assessment of a regional component of the labour market, we should distinguish hidden unemployment from inactivity that is not related to labour market opportunities. Our identifying assumption is that *inactivity reflects hidden unemployment to the extent that it correlates with observed unemployment*. Given its definition, it is unlikely that hidden unemployment is large in a region where unemployment is low, since the labour market is tight and job search is likely to be successful there. Therefore, if inactivity is large in such a region, this probably reflects circumstances other than labour market conditions. However, we should remark that by its

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[16] A discouraged worker effect has been observed in aggregate US time series of unemployment and participation (cf. Blundell and MaCurdy, 1999, Benati, 2001).

nature, identification of hidden unemployment is far from straightforward, and our evaluation on aggregate data is therefore necessarily rudimentary.

Before investigating the relationship between inactivity and unemployment in a regression model, we perform a short exploratory analysis. Figure 5.1 presents scatterplots of aggregate inactivity to unemployment in 1975 and 2003. Averaged over the period 1992 - 2002, Figure 5.2 shows the same plots for higher and lower educated workers. Finally, Table 5.1 and Table 5.2 report weighted correlation coefficients for all subgroups of the population.

Figure 5.1   **Scatterplots of regional inactivity to unemployment in 1975 (left) and 2003 (right)**
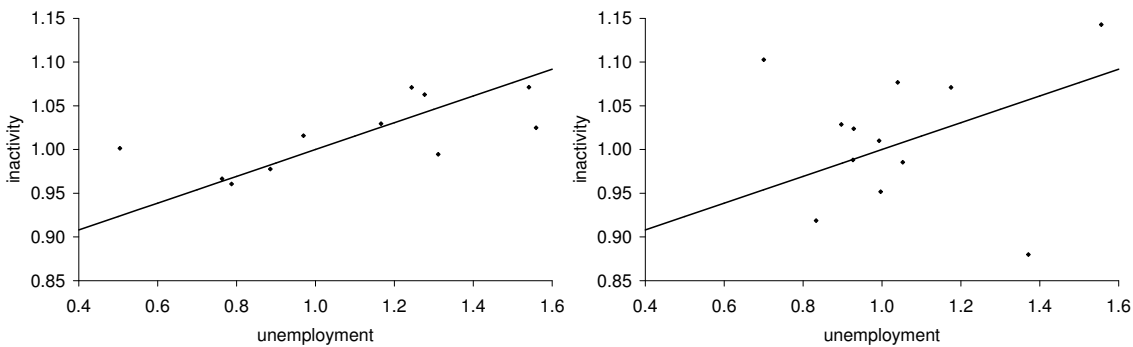

Figure 5.1 shows scatterplots of inactivity to unemployment scaled to the national rate.[17] In both years, a positive relationship seems to exist, although the correlation is moderate. Outliers in 1975 are the province of Utrecht, with a small unemployment rate but an average rate of inactivity, and the provinces of Drenthe and Limburg, with high unemployment rates and relatively low rates of inactivity. In 2003, unemployment and inactivity are both remarkably large for the province of Groningen. Outliers are the province of Flevoland, with high unemployment but a low rate of inactivity, and the province of Zeeland, with a low rate of unemployment and a high rate of inactivity. The correlation appears to be less strong in this latter period.

Table 5.1   **Weighted correlation coefficients of unemployment and inactivity**

Period	1975	1989	2003
Aggregate	0.72	0.38	0.47
Male	0.40	0.39	0.45
Female	0.59	0.46	0.58

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[17] Since the national rate of inactivity is substantially larger than the unemployment rate, the regional variation of scaled unemployment is larger than the regional variation of scaled inactivity.

This picture is confirmed in Table 5.1, which shows correlation coefficients weighted to potential labour force in the years 1975, 1989 and 2003. The correlation between aggregate unemployment and inactivity is stronger in 1975 than in later years. For males and females, correlation coefficients vary less over time. The relationship between unemployment and inactivity appears to be stronger for females.

The relationship between scaled inactivity and unemployment in Figure 5.2 seems weaker for the lower than for the higher educated. The province of Groningen has the highest rate of both unemployment and inactivity for either group. Inactivity under the lower educated is remarkably low for the province of Flevoland, where unemployment is above the national rate. Inactivity here is very low for the higher educated as well, though unemployment is below the national rate too. For the higher educated, the province of Groningen is an outlier because of the relatively large student population (see the discussion in the previous sections).

Figure 5.2   **Scatterplots of regional inactivity to unemployment for lower (left) and higher educated (right)**
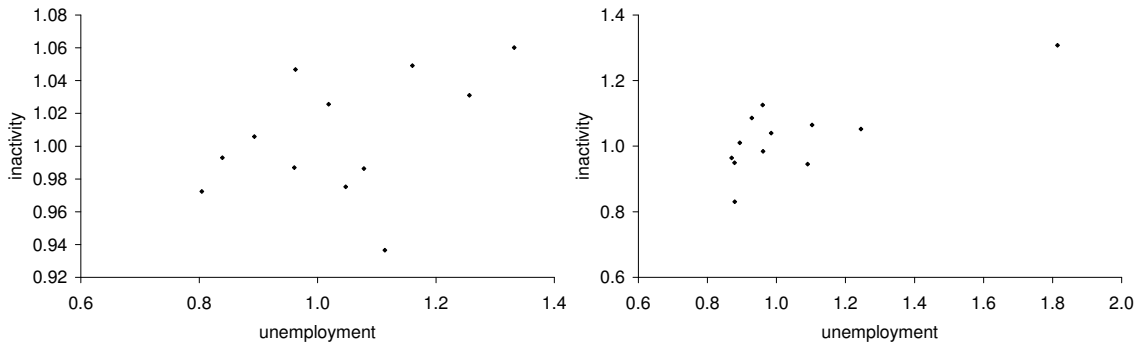
Correlations, weighted to the potential labour force in each subgroup, are reported in Table 5.2. It appears that for the period 1992 – 2002, the relationship between unemployment and inactivity is stronger for males than for females. It seems strongest for the age group 15 – 24 and almost absent for the age group 55 – 65, but leaving out the province of Groningen, the correlation for the former age group drops from 0.64 to 0.20.[18] The relationship is more robust for the age group 25 – 54, where by leaving out the same province, the correlation drops from 0.55 to 0.48. The correlation between unemployment and inactivity increases with educational attainment, but again, the correlation for the higher educated is dominated by the province of Groningen.

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[18] The student population is relatively large in the province of Groningen, see our discussion in the previous section.

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Table 5.2   **Weighted correlation coefficient of unemployment and inactivity**

Period	1992 – 2002
Aggregate	0.56
Male	0.67
Female	0.50
Age 15 – 24	0.64
Age 25 – 54	0.55
Age 55 - 65	0.09
Lower educated	0.29
Medium educated	0.51
Higher educated	0.71

Regressions of inactivity on unemployment

Regression models allow for a more formal test of the statistical significance of the relationship between inactivity and unemployment. Moreover, by including regional fixed effects we can control for time-invariant regional heterogeneity. In this way, we address the question whether the correlation between the two variables reflects a causal relationship or rather omitted variables, such as composition of the population, regional amenities, or differences in attitudes. The model is presented in equation (5.1), where $P_{r,t}$ denotes the participation rate in region r at period t, and $U_{r,t}$ the regional unemployment rate. Time invariant regional variables that affect inactivity are taken up by the fixed effects C_r.

$$\frac{1-P_{r,t}}{1-P_{NL,t}} = C_{(r)} + \alpha \frac{U_{r,t}}{U_{NL,t}} + \varepsilon_{r,t} \tag{5.1}$$

The causal relationship behind the regression model is that people invest less in search if the probability of finding a job is small, so high unemployment causes high inactivity.[19] We refer to this as a *discouraged worker effect*. However, a low rate of inactivity may cause a high rate of unemployment in turn, if wages do not adjust to excess labour supply. Underestimation of the causal relationship would result. Therefore, we apply Instrumental Variables estimators, using two year lagged unemployment as an instrument. This instrument is valid under the assumption

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[19] A more formal approach to the relationship between unemployment and inactivity would be to consider labour market transitions in a three-state Markov framework, such as in Flinn and Heckman (1983). Assume that transition probabilities depend on unobserved labour market conditions, and interpret eigenvectors of the transition matrix as equilibrium employment, unemployment and participation rates that depend on these conditions. In this framework, we may define the absence of a discouraged worker effect as independence of the transition from inactivity to activity of labour market conditions, and of the unemployment rate. It may be shown that in this case, unemployment and inactivity do not correlate over labour market conditions. Hence, an assessment of the relationship between these variables, as in Equation (5.1), may be considered as a test for the absence of a discouraged worker effect ($\alpha = 0$). Regional fixed effects are included, and variables are scaled to national rates, because any correlation between unemployment and inactivity may be due to unobserved factors that are not related to labour market conditions.

that current inactivity cannot affect lagged unemployment. Moreover, the IV estimator may reduce an attenuation bias due to measurement error.

The model (5.1) is estimated on aggregate data, and on data for males and females separately.[20] We use all odd years in the data from 1975 to 2003.[21] Leaving out the province of Flevoland, the 11 provinces are weighted to the potential labour force, averaged over time. Table 5.3 presents results for four different estimation methods. The first specification is a simple ordinary least squares (OLS) estimate, where a constant is added to the explanatory variables. We then estimate the same model with IV. The third and fourth specifications are OLS and IV estimates of regional fixed effects models (FE). Reported standard errors are robust to autocorrelation within regions and heteroskedasticity of arbitrary form.

Table 5.3	Estimates of the effect of unemployment on inactivity (robust standard errors between brackets)			
Estimation method	OLS	IV	FE	FE + IV
Aggregate	0.153 (0.025)	0.228 (0.029)	− 0.019 (0.022)	0.010 (0.040)
Male	0.222 (0.063)	0.328 (0.073)	0.067 (0.051)	0.158 (0.071)
Female	0.162 (0.040)	0.236 (0.058)	− 0.036 (0.018)	− 0.060 (0.046)

The OLS estimate for aggregate data indicates that regions with an unemployment rate of twice the national rate, on average have a rate of inactivity that is 15 percent (of the national rate) above national inactivity. Suppose that the national unemployment rate is 5 percent and the national inactivity rate is 40 percent. A region with an unemployment rate of 10 percent would thus on average have an inactivity rate of 46 percent. These numbers illustrate that the OLS estimate of the effect of unemployment on inactivity is quite strong indeed. Moreover, the coefficient is highly significant in a statistical sense.

The estimate using lagged unemployment as an instrument is higher than the OLS estimate. This is what we would expect, given that high inactivity may cause low unemployment in turn. Apparently, the simultaneity bias is stronger than the attenuation bias due to measurement error. Note however that the exclusion restriction that identifies our IV estimate is not testable, so we should regard the with some caution. At least, we may conclude from these results that the OLS estimate of the discouraged worker effect cannot be taken at face value either.

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[20] Gender specific variables are used for both inactivity and unemployment. This is appropriate only to the extent that women hold different types of jobs than males, so that they do not compete in the same labour markets.

[21] The reason is that until 1987, we only have data on odd years. Using all data from 1987 onwards would give more weight to this latter period. Since autocorrelation in the data is substantial, leaving out the even years leads to a limited loss of information.

An important finding in Table 5.3 is that both OLS and IV estimates of the unemployment effect on inactivity become statistically insignificant, when we include regional fixed effects.[22] This suggest that the correlation between the two variables is largely due to omitted variables, like amenity differentials or attitudes, and does not reflect hidden unemployment. In turn, this would imply that *regional differences in participation do not reveal a regional dimension of the labour market.*

Turning to the gender-specific results in the next two rows of Table 5.3, it appears that the effect is larger for females in terms of unscaled rates, although estimates are higher for males than for females. For both groups, IV estimates are higher than OLS estimates, and the FE estimate is statistically insignificant. It is interesting that we find a statistically significant effect for males, when the fixed effects model is estimated with IV. This suggests that the discouraged worker effect is stronger for men than for women, which is consistent with the observation in Figures 4.2 and 4.3 that the development of male participation over time correlates with unemployment. The steady increase of female labour participation does not seem to be related to developments on local labour markets, but is perhaps rather dominated by social developments. This observation is all the more important, because we have observed in section 4 that *regional variation in aggregate participation rates is largely driven by female inactivity.*

Summing up, our analysis indicates that the relationship between regional unemployment and inactivity in the Netherlands is not as strong as bivariate correlations suggest. In the first place, an estimate of the relationship between aggregate unemployment and inactivity is not robust to the inclusion of regional fixed effects. Hence, it appears to be due to omitted variables to a large extent. Secondly, we do find a statistically significant and robust relationship for males, but the aggregate regional variation in inactivity is mainly shaped by female participation. And finally, even if we trust the OLS estimates, the correlation is weak and a lot of variation in regional inactivity rates is not accounted for. This is illustrated by the continuous lines in Figure 5.1, which are projections of this model for aggregate unemployment and inactivity. This evidence does not necessarily imply that a regional component to hidden unemployment is fully absent, but it is less strong and less robust than one would believe at first sight. Hence, participation differentials do not appear to be a reliable indicator of the regional dimension of labour markets.

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[22] One may suspect that the inclusion of regional fixed effects obscures the relationship between unemployment and inactivity, because regional patterns have hardly changed over time. Lack of variation translates into large standard errors for the estimate of α. Note that standard errors associated with the fixed effects estimates are quite large indeed, so a small but positive effect of unemployment on inactivity cannot be rejected. However, the OLS and IV estimates of the first two specifications are far outside the 95% confidence interval. An indication for sufficient regional variation over time is the development of unemployment in the south. In the beginning of our period of observation, unemployment here was high, but its relative position has changed significantly over the years. This development was not mirrored by a relative rise in the participation rate, as the discouraged worker effect would predict (see Figure 4.1).

6   Conclusions and policy implications

This study aims to identify the regional dimension of labour markets for several subgroups of the population. We have argued for a general equilibrium perspective, since labour markets may clear through mobility of labour and capital as well as trade. In our definition, labour markets clear at the national level if uncompensated wage differentials between regions cannot exist for similar people in equilibrium. If, for example, productivity varies over regions due to economies of agglomeration, then a regional dimension of labour markets may exist for subgroups of the population that are not mobile. Given rigidities due to centralised wage bargaining, this dimension may be identified empirically on the size and persistence of regional unemployment and participation differentials rather than on wage differentials.

A brief summary of our data is given in Figure 4.1, which shows unemployment and participation for country parts over the period 1975 - 2003. This figure indicates persistent regional unemployment and participation differentials, alongside a striking homogeneity in the development of these variables over time. Differences in unemployment between country parts never exceed 4 percent points. From about 1990 onwards, unemployment is at the same level everywhere except in the North, where it is 2 percent points higher. Participation is about 4 percent points higher in the North than in the West over our entire sample. The most notable regional shift in Figure 4.1 occurs in the South, where unemployment is highest in 1975, but near the national rate from 1990 onwards.

These aggregate figures conceal substantial variation over subgroups of the population. Regional variation is much larger for women than for men, and the development over time is also quite different. Whereas the regional variation in male unemployment peaks shortly at the business cycle trough in the beginning of the eighties, the peak in variation for women continues until the mid-nineties. Male participation correlates negatively to unemployment over time. Female participation increases steadily, irrespective of the business cycle.

Regional variation in unemployment is particularly large for youths, and almost absent for workers in the age group 55 - 64. With respect to educational attainment, the composition of the labour force cannot account for regional unemployment and participation differentials. On the contrary, there appears to be a strong regional component of unemployment for the lower educated, which is also quite persistent. Regional variation in unemployment for the higher educated is smaller, in particular during business cycle peaks, and less persistent. One consistent outlier in these statistics is the province of Groningen, which has a relatively large student population. Some deviating outcomes in this region should probably be attributed to this composition effect rather than a regional dimension of labour markets.

To what extent do regional differences in participation reflect labour market opportunities? Cross-sectional evidence suggests a relationship between unemployment and inactivity, although it accounts for a relatively small share of the variation in inactivity. Moreover, this relationship is not robust to inclusion of regional fixed effects. Only for men do we find a statistically significant effect, but the regional variation in aggregate participation is mainly due to women. These findings suggest that regional unemployment differentials are not the main cause of regional participation differentials, so that participation differentials are not a reliable indicator of the regional dimension of labour markets.

When we focus on unemployment, therefore, it seems that (restricted) labour mobility is an important determinant of the regional dimension of labour markets. Mobility of women and youths is often tied to mobility of the breadwinner, which in the majority of households is the male. Lower educated workers are also known to have low interregional migration rates. For these groups, differences between regions are largest. Our findings thus suggests that for mobile groups, such as the higher educated, labour markets clear at the national level, but for immobile workers a regional dimension exists.

We can put the regional dimension of labour markets in the Netherlands into perspective in two ways. From Section 2 we know that regional disparities in the Netherlands are small from an international perspective (OECD, 2005). In addition, regional variation in unemployment is small, when compared to variation in national unemployment rates over time (Figure 4.1). Furthermore, evidence in Vermeulen and Van Ommeren (2006) suggests that workers in high-unemployment regions are at least partly compensated in housing markets, so unemployment differentials overestimate the true regional dimension.[23] If these regional disparities are considered to call for labour market policies nevertheless, it would seem efficient to ultimately aim such policies at groups with low mobility rates.

[23] Another qualification is that we control only rudimentary for differences in skills. Some of the regional unemployment differentials may be due to composition effects with respect to skills other than educational attainment in three categories. This would imply an overestimate of the regional dimension of labour markets. On the other hand, we cannot exclude that regional support programs in the past have played a role. Given the persistence of regional unemployment differentials, one is led to believe that regional support programs have not been very effective. Indeed, it can be concluded that regional policies in the past two decades have not been able to bring unemployment in the North down to the national rate. However, we do not know what regional unemployment differentials would have looked like in the absence of support. It may be that differences between regions would have been larger, and in that case, we have underestimated the regional dimension of labour markets.

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Appendix 1: analysis at the level of provinces (NUTS2)

In this appendix, we extend the exploratory analysis of Section 4 to the level of provinces (European NUTS2 level).[24] Standard deviations are used as a measure of the size of regional disparities, whereas persistence is evaluated on correlation over time. These statistics are compared over subgroups of the population. Similar to OECD (2000, 2005), we thus rely on exploratory techniques.

Variation at the level of provinces

The variation of unemployment and participation is measured by weighted standard deviations. We weight unemployment to the regional labour force and participation to the regional potential labour force. In this way, a regional deviation from the national rate contributes more to the standard deviation when this region is large. Table A.1 presents weighted standard deviations for the years 1975, 1989 and 2003.

Table A.1	Weighted standard deviations at province level 1975 – 2003					
Variable	Unemployment			Participation		
Period	1975	1989	2003	1975	1989	2003
Aggregate	1.08	1.25	0.79	1.68	2.27	1.68
Male	1.20	1.19	0.67	1.93	1.81	1.32
Female	0.74	1.87	1.11	2.78	3.32	2.57

There is an intuitive interpretation to these weighted standard deviations. For example, the average weighted standard deviation for aggregate unemployment of about 1 means that almost 70 percent of the labour force lives in regions, where unemployment varies by no more than 1 percent points from the national average. Only about 5 percent of the labour force lives in regions where unemployment deviates from the national rate by more than 2 percent points. Similarly, the average weighted standard deviation for aggregate participation of about 2 means that only about 5 percent of the potential labour force lives in regions, where participation deviates from the national rate by more than 4 percent points.

Regional disparities are larger in 1989 than in the other years, both in terms of unemployment and participation. Interestingly, the level of unemployment is at a higher level then as well. This suggests that regional disparities increase somewhat with the level of unemployment (see also Figure 4.1). Comparing disparities over gender, it appears that the regional variation is larger for women than for men, in particular in terms of participation. Only in 1975, the variation in regional unemployment rates is smaller for women, which is possibly related to low female participation rates in this period.

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[24] In the seventies, the Netherlands consisted of 11 provinces, and in 1986, Flevoland became the twelfth province.

Besides gender, Table A.2 distinguishes age and educational attainment for a shorter time period. In order to reduce measurement errors, we had to average unemployment and participation rates for all population subgroups over the periods 1992 – 1995 and 1999 – 2002 here.

Table A.2	Weighted standard deviations at province level 1992 – 2002			
Variable	Unemployment		Participation	
Period	1992 - 1995	1999 - 2002	1992 - 1995	1999 - 2002
Aggregate	0.80	0.66	1.96	1.54
Male	0.81	0.54	1.49	1.34
Female	2.07	1.31	3.08	2.41
Age 15 - 24	1.87	1.71	1.94	1.94
Age 25 - 54	0.71	0.58	1.67	0.97
Age 55 - 65	0.57	0.47	2.24	2.19
Lower educated	1.16	1.09	1.80	1.24
Medium educated	0.69	0.63	1.65	1.22
Higher educated	0.95	0.54	1.42	1.45

These figures are in line with the results in Table A.1 for aggregate, male and female unemployment and participation. Note in particular that regional disparities were larger in the period 1992 – 1995, when unemployment was higher than in 1999 – 2002. The table appears to be consistent with our findings in the previous section as well. Regional unemployment differentials are relatively pronounced for youths, the weighted standard deviation is almost four times as high as for older workers (aged between 55 and 65). The variation is smaller for the higher than for the lower educated, although this holds stronger in the low-unemployment period. Regional variation in unemployment is almost absent for the higher educated then.[25] The pattern of standard deviations of participation over age groups and educational attainment seems less interesting, variation over gender being the most marked outcome.
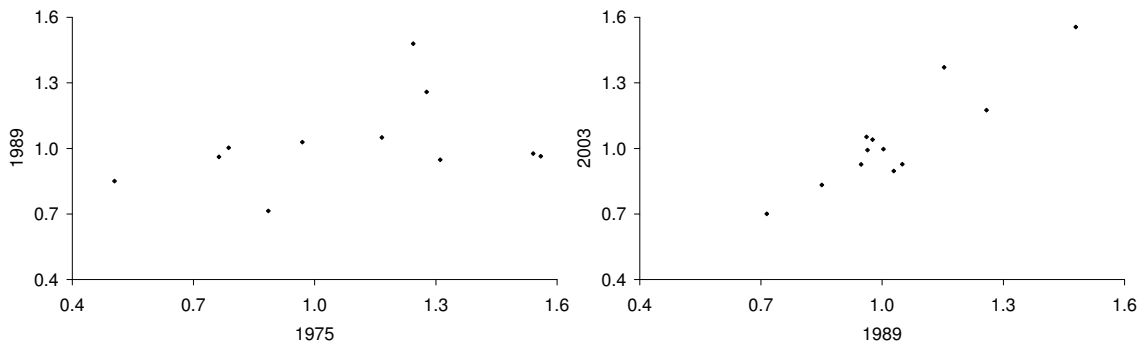
Persistence

Scatterplots, plots of unemployment and participation as a function of their lagged values for all provinces, picture the persistence of regional disparities and allow for identification of outliers at the same time. We consider unemployment and participation divided by national rates. Deviations of these variables from unity indicate regional disparities and a strong positive

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[25] One possible explanation for this finding is that in the Netherlands there is no speculative migration, so people search from their current region of residence, and move after they have found a job (see also our discussion of unemployment for the higher educated in Section 4). Since people are more likely to find jobs during upswings of the business cycle, migration as arbitrage on regional labour market differentials may be more significant during such periods. Since the higher educated are more mobile than other education groups, this effect may be more apparent for this group.

correlation indicates persistence.[26] Figure A.1 shows persistence of regional unemployment differentials over the period1975 - 1989 and over the period 1989 - 2003.[27]

Figure A.1   **Scatterplots of regional unemployment in 1989 to 1975 (left) and in 2003 to 1989 (right)**

As Figure 4.1 made clear at the level of country parts, persistence seems to have been larger in recent years than in the period 1975 - 1989, which is probably due to industrial restructuring in the seventies.[28] Unemployment was persistently high in the province of Groningen, exceeding the national rate by 25 percent in 1975, 50 percent in 1989 and almost 60 percent in 2003. In the second period, unemployment in the majority of regions was very close to the national rate over this period. Besides Groningen, the provinces Flevoland and Friesland have remained above this level and the provinces of Zeeland and Utrecht have remained below.

Figure A.2   **Scatterplots of regional participation in 1989 to 1975 (left) and in 2003 to 1989 (right)**
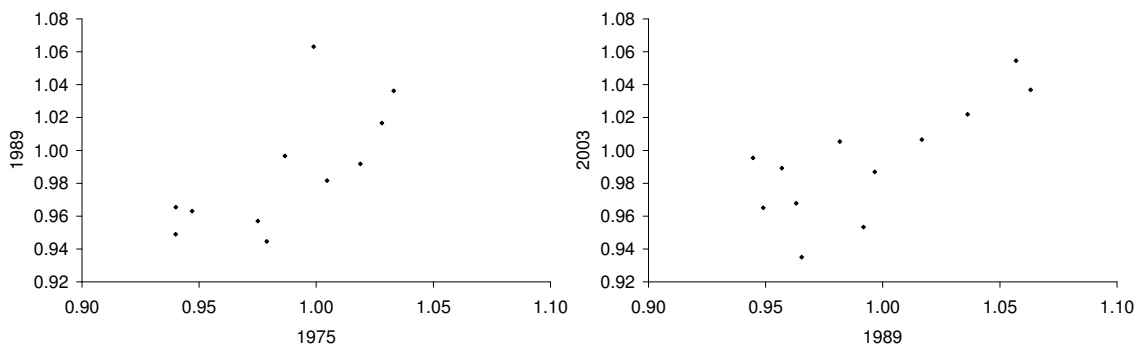
[26] We rely less on regression analyses because of a measurement error problem. Our data are derived from labour force surveys, so that regional unemployment and participation rates are only estimates (see appendix). Since subgroups of the population vary in size, these estimates vary in precision. For example, there are less higher educated than lower educated workers. A smaller estimated rate of persistence for the higher educated may thus be a consequence of the larger measurement error for this group. Note that a simple comparison of correlation coefficients already suffers from this problem. Therefore, this paper puts more emphasis on the analysis of scatterplots, which are less vulnerable to misspecification because they are nonparametric.

[27] When we consider persistence of 1975 regional differentials, the province of Flevoland is left out of our sample.

[28] Note that, scaled to the national rate, the variation in regional unemployment rate appears to be much larger in 1975, whereas unscaled, it is larger in 1989.

Figure A.2 shows scatterplots of participation rates in 1989 to 1975 and in 2003 to 1989.[29] The correlation between participation and lagged participation is quite strong in both periods. In particular in the period 1975 – 1989, persistence was much stronger than for unemployment. A remarkable outlier in this first period is the province of Utrecht, which had an average participation rate in 1975 and the highest participation rate of all regions in 1989. In the second period, the province of Drenthe moved from the lowest participation rate to an average value.

Table A.3	Weighted correlation coefficients for the period 1975 – 2003					
Variable	Unemployment			Participation		
Period	1975 - 1989	1989 - 2003	1975 - 2003	1975 - 1989	1989 - 2003	1975 - 2003
Aggregate	0.30	0.83	0.20	0.75	0.80	0.75
Male	0.07	0.89	-0.11	0.62	0.71	0.61
Female	0.48	0.73	0.52	0.87	0.85	0.84

Aggregate correlation coefficients in Table A.3, which are weighted to (potential) labour force, are consistent with our interpretation of the scatterplots. Regional disparities appear to be more persistent for women than for men. In particular, there seems to virtually no correlation between male regional unemployment in 1975 and 1989, whereas for women the coefficient is about half.

Figure A.3   **Scatterplots of regional unemployment for the age groups 15 - 24 (left) and 25 - 54 (right)**
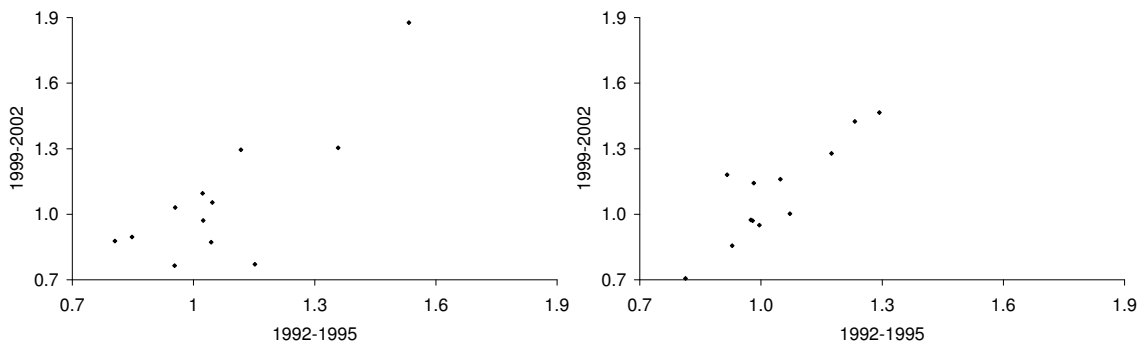

Persistence for age and education groups is analysed for the periods 1992 – 1995 and 1999 – 2002. Figure A.3 plots regional unemployment rates scaled to the national rate in 1999 – 2002 to 1992 – 1995 for the age groups 15 – 24 and 25 – 54. Persistence for young workers does not seem to be very strong except for two regions. Unemployment in the province of Groningen rose from 50 percent above the national rate to almost 90 above the national rate and unemployment in the province of Friesland remained stable at about 30 percent of the national rate. Regional unemployment rates for the age group 25 – 54 seem to have been more

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[29] Note that scaled to the national rate, variation in participation rates is much smaller than variation in unemployment rates.

persistent, with as an exception the province of Zeeland (from 10 percent below to 20 percent above the national rate).

Figure A.4   Regional unemployment lower (left) and higher (right) educated relative to national
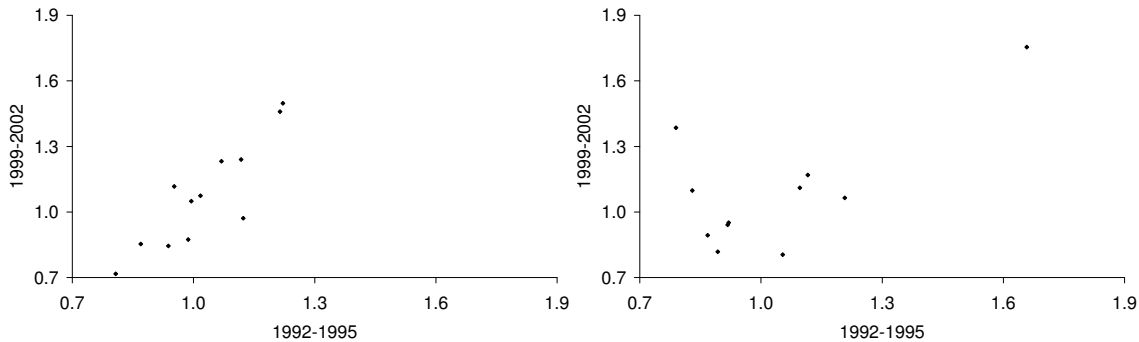
Regional unemployment rates for the lower and higher educated in 1999 – 2002 to 1992 – 1995 are shown in Figure A.4. Persistence seems to be stronger for the former than for the latter group. Again, the province of Groningen is an exception. Unemployment for the higher educated remains about 70 percent above the national rate over this period. As we have pointed out in the previous section, this may be related to the relatively high proportion of students in this region. Note also the province of Zeeland, where unemployment for the higher educated has increased from 20 percent below to 40 percent above the national average.

Table A.4   Weighted correlation coefficients for 1992 - 2002 period

Variable Period	Unemployment (1992-1995) – (1999-2002)	Participation (1992-1995) – (1999-2002)
Aggregate	0.92	0.94
Male	0.88	0.90
Female	0.89	0.97
Age 15 - 24	0.80	0.81
Age 25 - 54	0.87	0.90
Age 55 - 65	– 0.22	0.88
Lower educated	0.77	0.80
Medium educated	0.92	0.80
Higher educated	0.80	0.90

These patterns of persistence of regional unemployment differentials over age and education groups are confirmed in Table A.4, which shows weighted correlation coefficients. The correlation coefficient for the age group 15 – 24 is somewhat lower than for the age group 25 – 54. However, if we leave out the outlier Groningen, the correlation for the former age group drops from 0.80 to 0.60.[30] We have seen that there is little regional variation in unemployment

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[30] Leaving out the same region for the age group 25 – 54, the correlation drops only from 0.87 to 0.82.

rates for the age group 55 – 65, this table indicates that these differences are not persistent either. The correlation coefficient for the higher educated is higher than for the lower educated, but if we leave out again the outlier Groningen, this correlation drops from 0.80 to 0.60.[31] Persistence of regional unemployment differentials seems to be strongest for the medium educated. For participation, patterns of persistence over population groups are less pronounced than for unemployment. We remark that persistence seems to be somewhat less strong for the age group 15 – 24. For the higher educated, regional differences seem to be more persistent than for other education groups.

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[31] Leaving out Groningen for the lower educated, the correlation drops from 0.77 to 0.72.

Appendix 2: the data

The data used in this paper stem from two series of labour force surveys. From 1975 until 1985 we use the AKT (Arbeidskrachtentelling), and from 1987 until 2003 we use the EBB (Enquete Beroepsbevolking). Both surveys were produced by Statistics Netherlands (CBS). The AKT was held once every two years, and the EBB is a yearly survey. These surveys contain information about roughly 100.000 households.

Definitions of labour participation and unemployment have varied over our period of observation. The most recent definitions are that someone working for 12 hours a week or more is counted to the working labour force, and that someone who does not have a job of 12 hours or more but who is immediately available and has been actively engaged in search in the past month is counted as unemployed. The working labour force and the unemployed constitute the labour force. The unemployment rate is the number of unemployed divided by the labour force. The potential labour force consists of all people aged between 15 and 65. The ratio of the labour force to the potential labour force is the participation rate.

We have dealt with inconsistencies in definitions in two ways. Statistics Netherlands has consistent time series of unemployment and participation at the national level. Regional rates were scaled to these national rates in the graphs in sections 3 and 4. In all other analyses, we have scaled unemployment and participation to the national rate in the original (inconsistent) data. This makes our analyses robust to changing definitions to the extent that they did not affect the regional distribution of unemployment and participation.

For the years 1992 - 2002 (EBB), we have distinguished gender, age and educational attainment. A high level of education means a university degree or higher vocational training. A medium level of education means medium vocational training. People with only primary and secondary school degrees are counted as lower educated.

Because regional unemployment and participation are estimated with survey data, they are subject to measurement error. Measurement errors are larger when we distinguish population groups to gender, age and educational attainment. Therefore, we have worked as much as possible with averages over time.

All data are available upon request.