

How do Dutch regional labour markets adjust to demand shocks?

Lourens BROERSMA*
Jouke VAN DIJK**

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Abstract

This paper analyses the response of regional labour markets in The Netherlands to region specific labour demand shocks. Whereas previous studies analyse only average patterns of all regions in a country, this paper provides also a more in depth analysis of within country differences in labour market adjustment processes. Previous studies show remarkable differences in response between regions in European countries and regions in the United States. The analysis in the present paper shows that in Dutch regions the labour market adjusts to labour demand shocks primarily through changes in participation. In that sense it fits the European picture. As far as the speed of adjustment to a shock is concerned, the Dutch labour market seems more in line with American than with European levels. A spatial disaggregated analysis shows remarkable differences between regions within the Netherlands. In particular the response of the regions in the northern part of the country stands out. First, adjustment to a shock is absorbed much faster than in other Dutch regions. Second, the shock is absorbed more through changes in unemployment than changes in participation.

* University of Groningen, Faculty of Economics and Faculty of Spatial Sciences, P.O. Box 800, NL- 9700 AV Groningen, The Netherlands. E-mail: l.broersma@eco.rug.nl.

** University of Groningen, Faculty of Spatial Sciences, P.O. Box 800, NL-9700 AV Groningen, The Netherlands. E-mail: j.van.dijk@frw.rug.nl.

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1. Introduction

This paper analyses to what extent regional labour markets in The Netherlands in the past decade share similar labour market shocks and to what extent regions differ with regard to the adjustment to those shocks. In essence adjustment to a shock in regional labour demand can take place via changes in regional unemployment, changes in labour participation rates and through spatial mobility in the form of migration and commuting. One of the reasons for investigating regional rather than national labour markets is the fact that region-specific shocks may trigger different adjustment mechanisms than nation-wide shocks. Migration from one region to another within a country is one such response that can be analysed using regional data and much less with national data, since migration between countries is far less important as adjustment mechanism. This is especially true for Europe, with its cultural differences and language barriers between countries.

This paper is in the tradition of the seminal paper of Blanchard and Katz (1992) on labour demand shocks to regional labour markets in the United States and of Decressin and Fatás (1995) who analyse regional labour markets in European countries. These papers show marked differences between Europe and the United States. A labour demand shock in the US is much more likely to lead to migration of workers as adjustment mechanism than a similar shock in Europe would do. In Europe such a shock is mainly resulting in changes in the participation rates. Furthermore, the speed of adjustment in the US is much higher than in Europe. It is frequently argued that the flexibility of the US labour market, or the inflexibility of European labour markets, lies at the heart of these differences. Because of the favourable social security arrangements in Europe, a worker who becomes unemployed is less inclined to migrate to other regions to look for work than in the US. In the US the social security payments are less abundant which triggers a much higher level of (spatial) mobility of workers when they loose their job. Van Dijk *et al* (1988) show, however, that the extent to which migration really increases the re-entry probability into employment of unemployed is higher in the Netherlands than in the US. Hence, the higher spatial mobility in the US does not necessarily imply that the labour market functions more efficiently with higher levels of spatial mobility.

The economic upsurge of the second half of the 1990s caused a major increase in employment in the US, while the Europe was lagging behind. One notable exception in Europe has been The Netherlands that has witnessed 'American' employment growth figures during that period. One explanation for this 'Dutch Miracle' is the policy of wage moderation that could be sustained due to major revisions in the Dutch social security system. See also Broersma *et al.* (2000). One of the questions

addressed in this paper is to what extent the similarity in employment growth between the US and The Netherlands is also reflected in similarities in the adjustment processes and in the speed of adjustment.

Another goal of this paper is to study to what extent adjustment processes vary within a country. Whereas previous studies analyse only average patterns of all regions in a country, this paper provides a spatially disaggregated analysis of within country differences in labour market adjustment processes. As will be discussed in section 5, even within a small country as The Netherlands, labour market characteristics between regions vary considerably. The unemployment rate in the northern province of Groningen is known to be consistently higher than the national average, while the central province of Utrecht lies consistently below this level. In this paper the dynamics on the regional labour market is analysed on data for a regional subdivision of The Netherlands in 18 so-called RBA-areas. This is the regional subdivision used by the Public Employment Service (Arbeidsvoorziening) in The Netherlands. More information about this regional subdivision can be found in section 5 of this paper.

We find that the mechanism of adjustment of the Dutch regional labour markets, based on these 18 RBA-areas, to a one period labour demand shock is rather similar to what Decressin and Fatás (1995) find for European regions. A labour demand shock in a Dutch regional labour market model leads to substantial changes in participation as a means to absorb that shock. The effects of the shock on unemployment and migration/commuting are limited. However, in contrast to this the speed of adjustment to a labour demand shock in The Netherlands is of a similar level as in the US and amounts to at most five years. For Europe Decressin and Fatás (1995) show that it takes almost ten years to absorb such a shock completely. This points towards the fact that the Dutch labour market is more flexible than one usually thinks and is more in line with the US than with other European countries.

When a further subdivision of the national labour market is made into the four composite regions North, East, West and South, based on aggregating the 18 RBA-areas, we do find substantial differences between these regions in terms of adjustment patterns to a labour demand shock. In the East, West and South, the participation rate is still the major absorption channel of the shock, while in the North it is mainly the unemployment rate that takes care of absorbing the shock. In the periods after the shock we find in the three aforementioned regions that in the longer run the share of spatial mobility, as absorptive mechanism becomes more important while the importance of unemployment falls. In the North, on the other hand, we find that in the longer run participation will absorb a larger share of the remaining shock rather than migration/commuting and unemployment.

An obvious explanation for this phenomenon is the fact that the North is since long a high unemployment region, so there is a large reservoir of unemployed from which workers can be found to fill the new jobs that come with the shock. In the other regions unemployed workers are less abundant and mostly newcomers on the labour market, like (re-)entering women or school leavers, fill the new jobs. This work potential will be opened up in the North at a later stage. Initially, migration is also a relatively important absorption mechanism in the North. Hence, in case of a positive shock, workers are recruited from other regions and in case of a negative shock, workers move to other regions, at a higher rate than for the other regions.

Another difference between the North and the other three regions is the speed of adjustment in response to the shock. In the North, we find the shock is absorbed after about four years. In the other three regions it seems to take a longer period of time, ranging from five to seven years. A higher speed of adjustment points towards a more flexible labour market. In other words, there is indeed evidence that supports the view that reallocation rate of unemployed workers and of migration flows, in the northern labour market are indeed much higher than in other parts of The Netherlands.

This paper is organised as follows. In section 2 we present the data we use in this investigation. Section 3 studies whether labour market shocks are common to all Dutch regions or whether there are region-specific shocks as well. Section 4 is about the adjustment to a labour demand shock of the Dutch labour market. Section 5 expands the analysis to the difference in adjustment in four regional labour markets. Section 6 looks at evidence that can explain our empirical findings and finally section 7 concludes.

2. Data description

Employment

Employment is measured as the number of jobs (excluding self-employed and jobs in agriculture) in each of the 18 RBA-areas. The data come from a large survey among 67.000 Dutch firms and organisations and covers 82% of all jobs. This so-called survey of Employment and Wages (Enquête Werkgelegenheid en Lonen, abbreviated to EWL) is held by Statistics Netherlands¹. Regional employment data for this study have been drawn from this survey for a number of reasons. First of all, the survey is large enough for the provision of reliable data for sparsely populated regions that is required for the spatial disaggregated analysis. An alternative source for employment

¹ The data we use are of the same type as used by Blanchard and Katz (1992) who also used establishment-based (non-agricultural) employment.

data that is often used for analysis on the national level is the Labour Force Survey (Enquête Beroepsbevolking, or EBB) of Statistics Netherlands. This is a monthly survey held among some 10 thousand persons. In annual terms this is about 1% of employment and is thus a much smaller survey than the EWL. This implies that the EBB has a fairly high uncertainty threshold, of 5000 persons, below which results are not reported. Changes in (un)employment in sparsely populated regions may easily remain below this threshold. Another reason for not using the EBB is the fact that it is a survey among persons and not among firms and, therefore, registers the residence of workers instead of the working place. This implies that according to the EBB it is possible that a change in employment in region i (that is: working persons *living* in region i) is caused by an increase in the number of jobs in region j . Hence, regional employment growth according to the EBB includes commuting to other regions. However, we are interested in employment - in terms of jobs - within a particular region. The EWL employment data allow for this. Where the persons that fill these jobs come from is of secondary interest. For the moment we simply assume that these workers come from the same region. In fact when we speak of spatial adjustment in this study we mean migration *plus* commuting.

The employment data from the EWL also have some drawbacks, but these are of minor importance for the present analysis. First the EWL employment consist only of jobs of employees, and hence, self-employed are not taken into account. The number of self-employed differs between regions. Particularly agricultural regions, like Fryslân (RBA 2), have a relatively high share of self-employed (farmers). Urban areas, like Rijnmond (RBA 13) have a lower share. Overall, roughly 12% of the employed labour force is self-employed, in Fryslân it is almost 15% and in Rijnmond some 9%. Hence disturbing effects of leaving this group out are not too serious. Moreover, the *differences* in regional employment are a central issue in this paper and changes in employment will not be affected much when self-employed are neglected. A second drawback concerns the frequency of the data. Quarterly data are available only on an aggregate level. Regional data are only available with an annual frequency. In order to arrive at regional quarterly data, we have interpolated the regional data in order to be compatible with the quarterly unemployment data that are available. When these interpolated data are compared with the deseasonalised national quarterly data, both series are very similar. We end up with employment data from 1993.2-1999.3 (26 quarters) for each of the 18 RBA-areas.

Unemployment

Unemployment data are available according to different definitions. Most frequently used in studies at the national level are the registered unemployment and the unemployed labour force. Both are drawn from a survey. The unemployed labour force stems from the Labour Force Survey (EBB) which has already been discussed

before. The registered unemployment stems from a separate survey called the Registered Unemployment Survey (Statistiek Geregistereerde Werkloosheid). Both are hampered by the fact that changes in unemployment in sparsely populated regions may fall below the uncertainty threshold of these surveys, when these two measures are used. Because the number of unemployed is substantially smaller than the number of employment, for regional unemployment data these surveys are not very useful. In order to avoid these sample issues, we use an alternative unemployment measure which is not based on a survey, but on an actual count of non-working job searchers registered at the employment offices of the Public Employment Service. The unemployment definition they use is more extensive than both the registered unemployed and the unemployed labour force definitions. The only criterion here is that unemployed, between 15-64 years of age, are listed at an employment office as job searcher and that they do not already have a job for more than 12 hours a week.² This unemployment definition includes for example persons following courses to enhance their chances of getting a job or persons with a small job. The main difference with registered unemployed is that immediate availability for a job is not necessary here. The main difference with the unemployed labour force is that the 'active search' criterion is not required to count as unemployed. The level of unemployment according to not-working job searchers of the Public Employment Service is therefore higher, but the pattern and trend is in fact very similar to the other two regular definitions.³ The monthly series for 18 RBA-areas, covering 1993.03-1999.10, are adjusted to yield quarterly data for 1993.2-1999.3 and seasonally adjusted for an adequate comparison with the employment data.

Participation

Like Blanchard and Katz (1992) we define the regional labour force as the sum of regional employment from the establishment survey and unemployment from the employment offices. Decressin and Fatás (1995) conduct a similar exercise to get labour force data for Germany and the UK. In fact the labour force data constructed in this way do not differ much from the official labour force data of Statistics Netherlands. These official data are not used here for the same reason as before, *viz.* the small sample properties of the Labour Force Survey (EBB) which are likely to become problematic for less densely populated RBA-areas. Our labour force

² Registered unemployed are also listed at the employment agencies, but should be able to start a job of at least 12 hours a week within 2 weeks after a job offer has arrived. The unemployed labour force consists of persons between 15-64 who are willing, are available and do efforts in order get a job for at least 12 hours a week.

³ This is clearly shown by Atzema and Van Dijk (2000a, p. 44, figure 4). An additional drawback of the unemployment data of the Public Employment Service is that the files are somewhat contaminated in the sense that persons may not be removed when they have found a job, because they do not report the job finding.

definition is consistent with the employment and unemployment measures we use and since both measures refer to the regions in which the jobs and unemployed are registered there is no disturbing effect of commuting. All three measures concern one and the same region. To get participation rates we take the ratio of the labour force and the population of working age, *i.e.* everyone between 15 and 64 years old. Data on the population between 15-64 by region are available from Statistics Netherlands. Since these data are available only annually, they are interpolated (without imposing a seasonal pattern) to a quarterly frequency. Since the size of the population moves very gradually over time, interpolation will not cause any major disturbance.

3. Common labour market disturbances

The main purpose of this section is to determine whether labour market disturbances in The Netherlands are distributed symmetrically across regions and compare those results with the US and other European countries. In other words, how much of a typical movement in regional employment is common to all regions and how much is region-specific? In addition it also specifies region-specific variables that are used later on for evaluating regional adjustments to a labour market shock. To determine the extent to which changes in employment are common to all regions, we estimate the following equation for each RBA-area i

$$\Delta \log(N_{i,t}) = \alpha_i + \beta_i \Delta \log(N_t) + \eta_{1,i,t}, \quad (1)$$

where Δ is the difference operator, $\Delta x_t = x_t - x_{t-1}$, N_i is the employment in region i , N is the nation-wide employment and η is a disturbance term. This equation is estimated using quarterly data from 1993.2 to 1999.3. When β_i differs significantly from unity this means that a nation-wide labour demand shock will not make itself felt in region i to the same extent. Put in another way: regions may respond differently to common nation-wide shocks. The estimation results for β for each region are presented in table 1. Similar specifications can be formulated to check whether shocks in the unemployment rates and in the participation rates are common to all regions.

$$\left(\frac{U}{LF} \right)_{i,t} = \mu_i + \gamma_i \left(\frac{U}{LF} \right)_t + \eta_{2,i,t} \quad (2)$$

and

$$\log \left(\frac{LF}{B} \right)_{i,t} = \lambda_i + \delta_i \log \left(\frac{LF}{B} \right)_t + \eta_{3,i,t} \quad (3)$$

where LF is the labour force, $LF = U + N$, and U is the number of unemployed, index i refers to the region, B is the population between 15 and 64 years of age. Parameter values of γ_i and δ_i that differ from unity again imply the existence of region-specific responses to nation-wide shocks.⁴ The estimated values for β , γ and δ for each region are in table 1. In fact these estimation results refer to elasticities. Thus in terms of equation 1 it shows that when national employment changes with 1%, that in reaction regional employment changes with $\beta\%$. When $\beta = 1$ national changes and regional changes are identical in magnitude. The adjusted R^2 s in Table 1 indicate the extend to which the pattern of regional labour market indicators (employment growth and unemployment and participation rates) fits the pattern of the corresponding national indicator over the whole sample. The β 's give the 'average value' over the sample with which regional indicators follow the national ones. Therefore, a value of β close to unity can easily go together with a low R^2 .

Table 1. Common shocks in regional employment, unemployment and participation

RBA-area	<i>Employment</i>		<i>unemployment</i>		<i>participation</i>	
	β	adj. R^2	γ	adj. R^2	δ	adj. R^2
1. Groningen	0.52*	0.34	0.84*	0.93	0.63*	0.91
2. Fryslân	0.86	0.62	1.26*	0.99	0.58*	0.90
3. Drenthe	0.68	0.16	0.76*	0.96	1.24*	0.96
4. IJssel-Vecht/Twenthe	0.61	0.11	1.04	0.98	1.80*	0.97
5. IJssel/Veluwe	1.57	0.24	0.99	0.95	0.75	0.47
6. Arnhem/Nijm-Riv.land	0.97	0.79	1.11*	0.98	0.87*	0.98
7. Flevoland	0.39*	0.09	1.18*	0.89	1.56*	0.74
8. Midden-Nederland	1.04	0.86	0.90*	0.98	1.65*	0.98
9. Noord-Holland Noord	1.46	0.39	1.26*	0.98	1.29*	0.90
10. Zuidelijk Noord-Holland	1.46*	0.95	0.99	0.98	1.34*	0.99
11. Rijnstreek	0.88	0.80	1.02	0.99	0.68*	0.97
12. Haaglanden	1.47	0.52	0.71*	0.89	0.53*	0.66
13. Rijnmond	1.19	0.76	1.04	0.93	0.62*	0.88
14. Zeeland	0.68	0.11	0.51*	0.90	1.43*	0.96
15. Midden- en West-Brabant	1.50*	0.62	1.15*	0.97	0.75*	0.82
16. Noordoost-Brabant	0.99	0.10	1.12*	0.99	1.30*	0.91
17. Zuidoost-Brabant	1.24*	0.84	1.23*	0.88	1.29*	0.91
18. Limburg	0.97	0.46	0.88	0.97	0.66*	0.83

* significantly different from 1 at 5%

⁴ For more on data analysis and application of unit root tests, we refer to the Appendix.

The average adjusted R^2 for the employment equations equals 0.49. Hence only a limited part of the movement in national employment is reflected in regional employment. In fact our result is close to the value of 0.6 that Decressin and Fatás (1995) report for the US. Their value for Europe is a much smaller with only 0.2. Blanchard and Katz (1992) found an adjusted R^2 of 0.66 for the US. So the changes in regional employment that are shared by all regions is much higher in the US and The Netherlands than in Europe.

The null hypothesis of a unit elasticity of regional employment changes with respect to nation-wide employment changes is rejected for five of the 18 RBA-areas. Hence, a small number of regions do not follow the national employment growth path on a one-to-one basis. The values of β indicate that the variation in regional employment is for a large part region-specific. This is in striking contrast to the other two equations for unemployment and participation rates.⁵ A vast majority of regions is indeed ruled only in part by national shocks. However, the high frequency of the data causes a high fit and elasticities close to unity but statistically different from it.

These results imply that there are arguments for constructing region-specific variables in our subsequent analysis. These region-specific variables are constructed as the residuals from equations (1)-(3) using the estimated coefficient values of β , γ and δ in the following way.

$$n_{i,t} = \log(N_{i,t}) - \hat{\beta}_i \log(N_t) \quad (4)$$

$$e_{i,t} = \log\left(\frac{N_{i,t}}{LF_{i,t}}\right) - \hat{\gamma}_i \log\left(\frac{N_t}{LF_t}\right) \quad (5)$$

$$p_{i,t} = \log\left(\frac{LF_{i,t}}{B_{i,t}}\right) - \hat{\delta}_i \log\left(\frac{LF_t}{B_t}\right) \quad (6)$$

where n_i is the so-called β -difference and the series e_i and p_i are named accordingly.⁶ Further, $LF_{(i)}$ is the labour force and $B_{(i)}$ is the population of working age, in region i or nation-wide, respectively. Note that these transformations imply that we allow

⁵ Decressin and Fatás (1995) use the employment rate, which is in fact the mirror image of the unemployment rate since $\log(N/LF) \approx -(U/LF)$.

⁶ Since $\log(N/LF) \approx -(U/LF)$, equation (5) is equivalent to $u_i = (U_i/LF_i) - \gamma(U/LF)$, where U is unemployment.

different regions to respond differently to common shocks just like Decressin and Fatás (1995) and in contrast to Blanchard and Katz (1992) who assume that all regions respond in the same way implying that $\beta = \gamma = \delta = 1$. However, because in our analysis (see table 1) for many regions these parameter values do differ from unity, we proceed with the β , γ and δ -differences.

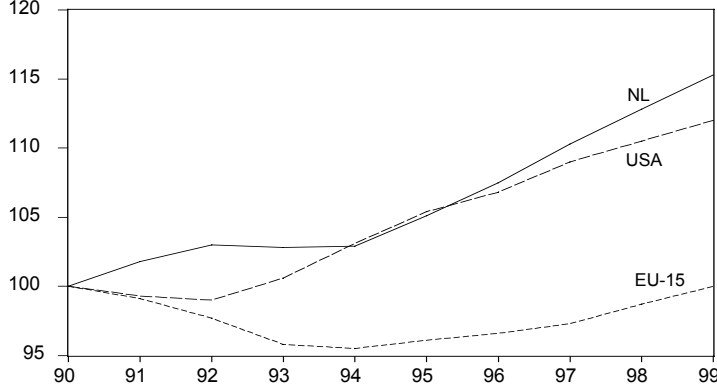
4. National adjustment to regional demand shocks

This section is about the mutual relationship of employment growth and relative (un)employment and participation rates in reaction to a labour market shock. There are a number of adjustment mechanisms that come into play in case of a (positive) regional employment shock. First, such a shock may result in a fall in regional unemployment, *i.e.* an increase in the employment rate. In this case unemployed job searchers fill the newly created jobs as a result of the shock. Second, it may result in a rise of the participation rate, *i.e.* the newly created jobs are fulfilled by persons previously not in the labour force. Third, such a shock may induce spatial redistribution of labour by means of migration or commuting.

In this section the adjustment mechanisms to an employment shock in The Netherlands are at stake. In many ways the growth rates of employment in The Netherlands of the past years have been more of an ‘American’ level than in line with the rest of Europe. Average annual employment growth in the US was some 1.3% during the period 1990-1999. For The Netherlands this was about 1.6%, while in the average employment growth in the 15 countries of the European Union was zero during that period. The similarity of the US and The Netherlands is clearly shown in figure 1.

One explanation for these exceptionally high growth rates, in relation to the European Union average, is the policy of sustained wage moderation, which is upheld in The Netherlands over the past two decades. One possible reason why such a policy could be upheld for so long has to do with the restructuring of social security provision starting in the second half of the 1980’s. See Broersma *et al.* (2000). Is this phenomenon also present when models of regional labour markets are at stake? In other words, do regional labour market models reflect this asserted flexibility of the Dutch labour market in terms of speed and mechanism of adjustment?

Figure 1. Employment growth in The Netherlands, US and the EU-15 (1990=100)



Source: CPB (2000, pp. 218-219)

To answer this question, we estimate the joint behaviour of relative employment growth, the relative employment rate and the relative participation rate for all 18 RBA areas. To the extent that a regional labour demand shock is not reflected in unemployment or participation rates it must be absorbed by interregional migration (among these 18 areas) or migration from abroad. The following system is specified:

$$\Delta n_{i,t} = \phi_{i,1,0} + \phi_{k,1,1}(L)\Delta n_{i,t-1} + \phi_{k,1,2}(L)e_{i,t-1} + \phi_{k,1,3}(L)p_{i,t-1} + \varepsilon_{i,\rho,t} \quad (7)$$

$$e_{i,t} = \phi_{i,2,0} + \xi_1 \Delta n_{i,t} + \phi_{k,2,1}(L)\Delta n_{i,t-1} + \phi_{k,2,2}(L)e_{i,t-1} + \phi_{k,2,3}(L)p_{i,t-1} + \varepsilon_{i,\sigma,t} \quad (8)$$

$$p_{i,t} = \phi_{i,3,0} + \xi_2 \Delta n_{i,t} + \phi_{k,3,1}(L)\Delta n_{i,t-1} + \phi_{k,3,2}(L)e_{i,t-1} + \phi_{k,3,3}(L)p_{i,t-1} + \varepsilon_{i,\tau,t} \quad (9)$$

where n , e and p are defined in equations (4)-(6), the lag polynomial $\phi_{k,i,j} = \sum_{k=0}^1 \phi_{k,i,j} L^k$ and L is the usual lag operator. Note that Δn in system (7)-(9) has an instantaneous effect on both e and p . Hence, current changes in relative employment are assumed to affect unemployment and participation rates but not *vice versa*. We allow for region-specific fixed effect, reflected by the N 's. This system is simultaneously estimated with OLS on pooled data on all 18 RBA-areas over the period 1993.2-1999.3. Next, the resulting model⁷ is used to conduct an impulse

⁷ The detailed estimation results of the model are available from the authors upon request.

response analysis.⁸ The data analysis, including the application of a unit root test, on which specification of (7)-(9) is based, is presented in the Appendix. We follow Blanchard and Katz (1992) in determining the labour demand shocks from which the adjustment paths are studied. We associate unexpected changes in regional relative employment with changes in labour demand. Therefore, it suffices to determine the effect of a shock in relative employment, *i.e.* the ε -term of equation (7), in order to understand the dynamic effects of an innovation in labour demand on relative employment, employment rates and participation rates.⁹

Figure 2 shows the impulse responses of employment, employment rates (the mirror image of the unemployment rate) and labour force participation rates to a 1-percentage-point regional specific shock in relative employment for The Netherlands.¹⁰ This figure shows that the initial shock is almost completely absorbed by an increase in the relative regional participation rate. The effect of the shock on the employment rate is very small. Hence, a positive labour demand shock in The Netherlands in the 1990's leads to an increase in participation rather than a fall in unemployment. Inter-regional migration becomes an important adjustment channel only after a few years when a large part of the initial shock has already been absorbed.¹¹ Notice that some 25 periods (quarters) or six years after the shock the impulse is completely absorbed. The initial shock has invoked a reallocation process, with obsolete jobs being destroyed and new jobs being created which eventually has resulted in a new relative employment equilibrium which lies 0.6%-point above the original level.

⁸ Note that OLS yields consistent estimates. The first equation contains lagged variables e and p , so these variables can be labelled weakly exogenous. On the other hand, the latter two equations contain contemporaneous variable Δn . This might lead to biases when applying OLS. Seemingly unrelated regression estimation (SURE) to (7)-(9) accounts for the fact that the error terms of the three equations might be correlated. These correlations might be the result of the presence of such contemporaneous variables. However, application of SURE gives almost similar coefficient values, and, hence, responses of (7)-(9). Therefore, estimation with OLS indeed suffices. Applications of two (or three) stage least squares (2SLS or 3SLS) to system (7)-(9) are probably the most appropriate methods to account for this simultaneity bias. These estimation methods both require adequate instrumental variables for Δn , e and p , which are, however, currently not available.

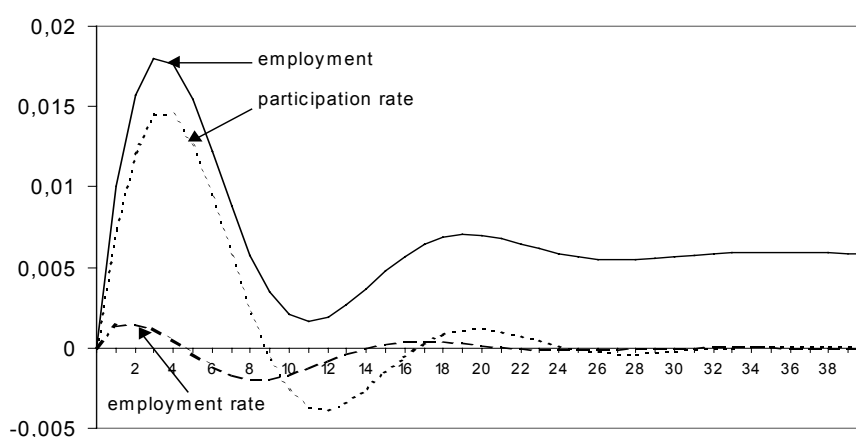
⁹ This means that a 1-percentage-point shock in equation (7) affects $\Delta n_{i,t}$ of equation (7), but also equations (8) and (9) through the inclusion of $\Delta n_{i,t}$.

¹⁰ This means a 1-percentage-point regional shock in the Δn -equation (7) for 1 period in all regions.

¹¹ International labour migration is only a minor adjustment mechanism in The Netherlands as Sprangers (1995) and Nicolaas and Sprangers (2000) report.

The response of the relative participation rate, p_i , closely mimics the pattern of the impulse in n_i for the first eight periods (two years) and diverges afterwards. Hence, participation remains to play a prominent role in the absorption of the shock. In addition, unemployment falls only modestly over the whole period. The difference between the employment response on the one hand and the participation and unemployment responses on the other hand, refers to absorption through spatial adjustment, *i.e.* migration and commuting, and possible other mechanisms. Figure 2 indicates that the role for spatial adjustment as adjustment mechanism is small. Table 2 reviews the responses of an employment shock at the national level. When these results are compared to those of Blanchard and Katz (1992) for the US and Decressin and Fatás (1995) we find that the speed of adjustment of six years is close to the US figure of six years and shorter than the European figure of some nine years. Hence, in terms of flexibility of the labour market, the Dutch situation more resembles the US than Europe.¹² However, as far as the three adjustment channels are concerned, we find that The Netherlands mimics the situation of the European countries, where a labour demand shock is mainly absorbed through adjustments in labour participation.

Figure 2. Impulse responses to a regional labour demand shock in The Netherlands, based on 18 RBA-areas



¹² We do acknowledge that our study is based on a more recent sample than the other two studies. Blanchard and Katz' study refers to the 1950-1990 era, while Decressin and Fatás' is based on roughly the 1970's and 1980's. As far as the European situation is concerned, we do not expect any major changes in terms of labour market institutions. The fact that the European employment performance in the 1990's was virtually flat, as shown in figure 1, corroborates this premise.

Table 2. Comparison of the main results of a 1-percentage-point shock in relative employment, both for the nation as a whole and for groups of regions in four parts of the country.

	Netherlands	Regions in the :			
		North	East	West	South
Absorption time (quarters)*	26	17	27	35	28
Final employment effect	0.58%	0.63%	0.83%	1.50%	0.64%
Adjustment in 1 st quarter by					
- participation	74%	35%	65%	56%	75%
- unemployment	14%	38%	26%	31%	6%
- spatial adjustment	12%	27%	10%	14%	19%
Cumulative adjustment after 30 th quarter by					
- participation	72%	49%	59%	58%	77%
- unemployment	14%	33%	15%	13%	7%
- spatial adjustment	14%	18%	26%	29%	16%

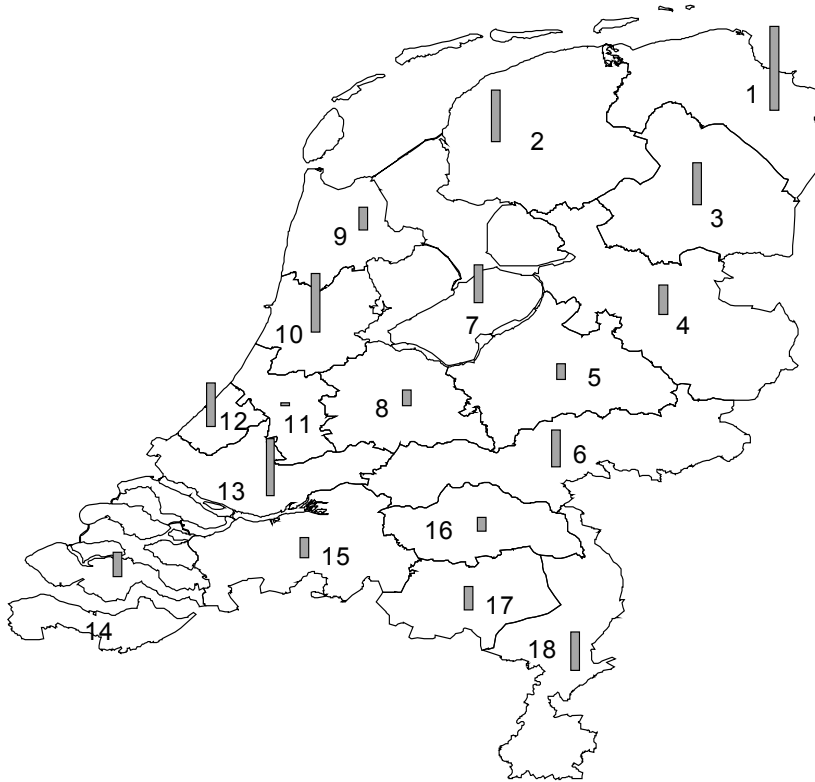
* absorption completed when less than 1% of the initial shock is left

5. Regional adjustment to region specific demand shocks

In this section we attempt to fully exploit the regional character of our data. The central question here is: are similar adjustment patterns, as shown in figure 2, observed for labour demand shocks in all regions within The Netherlands? This implies that we next shift focus from a nation-wide to a regional analysis. Unfortunately, the number of observations does not allow estimation of system (7)-(9) for each of the 18 RBA-areas. We need at least four RBA-areas in order to yield stable system. Therefore, we divided The Netherlands in four parts and allocated the 18 RBA-areas in The Netherlands to these parts. Each part consists of 4 or 5 preferably adjacent RBA-areas with more or less similar regional labour market characteristics. Figure 3 shows the regional demarcation and also the unemployment rate in the third quarter of 1999, at the end of the period we studied.¹³

¹³ Notice that the geographical North is The Netherlands is usually made up of Groningen (RBA 1), Fryslân (RBA 2) and Drenthe (RBA 3). However, based solely on these areas we could not obtain a stable system (7)-(9). Therefore, we have augmented the North with Noord-Holland Noord (RBA 9), which is not only geographically located in the vicinity of the other three areas, but also has similar characteristics, like a relatively high unemployment, the rural character and focus on agriculture and manufacturing. In that sense it fits to the other areas. The subsequent analysis was also conducted with RBA-4 (IJssel-Vecht/Twenthe) attached to these three northern areas instead of RBA-9. The resulting impulse responses were rather similar than the results presented in table 2.

Figure 3. The 18 RBA-areas in The Netherlands; the bars give the unemployment rate for each region at 1999:3; the national unemployment rate is than equal to 7,9%.



Legend

<i>North</i>	<i>East</i>	<i>West</i>	<i>South</i>
1. Groningen	4. IJssel-Vecht/Twente	8. Midden-Nederland	14. Zeeland
2. Fryslân	5. IJssel/Veluwe	10. Zuidelijk Noord-Holland	15. Midden en West-Brabant
3. Drenthe	6. Arnhem-O.Gld/ Nijmegen- Rivierenland	11. Rijnstreek	16. Noordoost Brabant
9. Noord-Holland Noord	7. Flevoland	12. Haaglanden	17. Zuidoost Brabant
		13. Rijnmond	18. Limburg

The high unemployment regions are clearly the ones in the North (RBA 1, 2 and 3) and the regions with the important urban centres in The Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht) where unemployment is also relatively high, *i.e.* in RBA 8, 10, 12 and 13. In these parts of the country unemployment is the highest, *viz.* 9.5% in the North and 8.3% in the West. Despite the relatively high unemployment in the West, this is the economic heart of the Netherlands with the highest participation rate of 68.2%, while the lowest participation is found in the North (64.6%). The other two parts of the country take intermediate positions. Unemployment in the East amounts to 7.0% and in the South it is 6.6%, while participation is 66.1% in the East and 65.3% in the South. During the period 1993-1999 that we used data from the average national unemployment rate went down from 11.7% till 7.9% with a peak of 13.5% in 1995. The same pattern occurs more or less in all regions, but especially in the regions with high unemployment, the peak in unemployed was somewhat later. During the whole period under study the highest unemployment rates are found in the regions in the North and in the big cities in the western part of the country. In terms of reduction of unemployment the RBA-areas 15-17 in the province of Brabant show the largest decrease followed to a lesser extent the RBA-regions 4-6 in middle-eastern part of the country. A detailed overview of the regional differences in labour market performance in the Netherlands during the last decade of the previous century can be found in Atzema and Van Dijk (2000a and 2000b). We may conclude that even in a small country as The Netherlands substantially differences occur between regions and this justifies a spatially disaggregated analysis.

We run the system (7)-(9) for each of the four parts of the country (North, East, West and South), where the data for each of the composing RBA-areas are pooled allowing for fixed region-specific effects. In order to be consistent with the methodology used in the previous section, the variables, n , e and p , have to be computed using β , γ and δ -differences that are now all taken relative to the averages of the specific part of the country in which the RBA-area is located and not relative to the nation-wide situation. Therefore, for each of the four parts of the country we again determine the region-specific variables, constructed as the residuals of equations (1)-(3) but now relative to the part they located in. For convenience sake and due to the similarity in the procedure with the national analysis in the previous section we do not report all the elasticity values needed to for these β -differences and the estimation results of the system.¹⁴ We proceed with a discussion of the results from the analysis in terms of the speed of adjustment, the final employment effect and the share of each of the three mechanisms of adjustment to a unit labour demand shock for each of the four parts of the country that are summarised in table 2.

¹⁴ The detailed estimation results of the model are available from the authors upon request.

North

Table 2 shows that there are two eye-catching differences when comparing the adjustment paths, *i.e.* the impact and shares of the absorption channels, for the northern part of The Netherlands with the nation-wide situation of the first column of table 2. First the speed of adjustment in the North is higher than national. In the North, a regional labour demand shock is completely absorbed after just over four years, when a new employment equilibrium level is reached of 0.6 %-point above the initial level just like in the nation-wide model. The adjustment speed nation-wide was six-and-a-half years. This points towards the fact that the northern labour market is better suited to adjust to shocks and in that sense be more flexible than the national labour market. Second, the impact of the absorption channels differs with the national picture. Table 2 shows that the initial impact of the shock in terms of adjustment channel is almost evenly spread among participation, unemployment and spatial adjustment. In fact the main adjustment is through changing unemployment rates. Initially, some 38% of the shock is absorbed by a fall in unemployment, 35% is absorbed by increasing participation and 27% through spatial adjustment. In due course the share of participation increases to almost 50% where the unemployment share is reduced slightly till exactly one third and the importance of spatial adjustment goes down till just below 20%. An obvious explanation for the higher speed of adjustment and the large share of unemployed that take a job is the relatively high quality of the unemployed in the North. Due to the historically high unemployment in the North there is a large reservoir of unemployed immediately suitable for a job. In other regions the pool of unemployed consists for a much larger part of unemployed who are not immediately suitable for a job, but need first additional occupational or social training.

East

The impulse responses of the eastern regions in table 2 show longer adjustment paths than those of the North. The shock has died out completely after about 27 periods, or seven years. The new equilibrium level is fairly high with some 0.8 %-point above the original level. It is obvious from table 2 that participation is the major adjustment channel to the shock in the East both immediately after the shock as well as during the rest of the time. It also becomes clear that in due course the role of spatial adjustment as means to absorb the remnants of the shock becomes more and more important. In about four years after the shock spatial adjustment is almost twice as important as unemployment as absorptive channel. Hence the impact of spatial adjustment grows as time moves on. In the first period, some 10% of the adjustment process is through spatial adjustment. The cumulative effect of commuting and migration after 30 periods is 26%. The role of unemployed in the absorption process

goes down over time. Nevertheless, changing participation rates are still the primary way in which the labour demand shock is absorbed.

West

This part of the Netherlands can be characterised as the economic heart of the Netherlands where about 40% of total Dutch employment is located. Furthermore, most headquarters and the offices of the central government are located in this part of the country. The adjustment speed of the western part of the country to a labour demand shock, which can be obtained from table 2, is relatively slow compared to the North and East. Here it takes some 35 periods (almost nine years) before the effects of the shock have completely died out. Another striking outcome of the impulse responses for the West is the relatively high new employment equilibrium level of 1.5 %-point above the original level. Notice that a labour demand shock will always lead to some level of reallocation of jobs: new jobs are being created, (some) obsolete jobs are destroyed. This reallocation process has for the other parts of the country resulted in a new equilibrium employment level below the initial value of the shock of a 1-% change in employment. In the West this reallocation process initiated by the labour demand shock in the West, has generated an even larger amount of additional jobs (1,5%) than implied by the initial shock of 1%. This means that jobs created in the West generate additional jobs as well, rather than destroying obsolete jobs as part this reallocation process. It becomes clear that also in the West a change in participation is the main adjustment channel through which the shock is absorbed. Initially, there is also a substantial share of unemployment as means of adjustment, but in due course we find that the share of spatial adjustment becomes more and more important, at the expense of unemployment. The share of participation remains almost constant at roughly 55%.

South

Finally, table 2 reports the adjustment paths and patterns for the southern RBA-areas. The effects of the shock have died out after about seven years (28 periods). After that time a new employment equilibrium is reached which lies some 0.6 %-points above the original level. This outcome is in line with the nation-wide analysis and the results for the North. Also for the South the main adjustment channel to a labour demand shock is through changing participation rates. Table 2 shows that there is virtually no change in the absorption channel as time moves on. In the South spatial adjustment acts from the beginning as the second important adjustment mechanism, both immediately after the shock as in the longer run. Most striking is the very low share of unemployment as adjustment mechanism in the South. A possible explanation is that all the unemployed with relatively favourable labour market characteristics have found a job and that the remaining unemployed have a rather large distance to the

labour market. They need substantial occupational and/or social training before they are suitable to take up a job if this is possible anyway.

Summarising, this impulse response analysis shows:

1. Adjustment of the Dutch labour market to employment shocks is quicker than the European average and more in line with the speed of adjustment in the US. Within The Netherlands we find the northern labour market to adjust more rapidly than other parts of the country. This may point to a more flexibly operating labour market in the North than in the rest of The Netherlands.
2. A labour demand shock yields a new positive equilibrium value for the relative employment, *i.e.* this shock has a permanent (positive) effect on the regional employment level. This new equilibrium is by far the highest in the West and lowest in the North and South.
3. In the East, West and South, a positive labour demand shock is for about two-third absorbed through a rise in participation rates. Unemployment and spatial adjustment are of secondary interest. Of these secondary effects, in the East and West unemployment stands out, while in the South this is spatial adjustment. Over time the share of unemployment goes down considerable in the East and West and this is taken over by a higher share of spatial adjustment. In the South there are hardly any changes over time.
4. Besides the high speed of adjustment, the North also shows another picture with regard to the shares of the various mechanisms in the adjustment process. In the North absorption runs initially through all three channels in an almost equal share. In due course the impact of spatial adjustment and unemployment slightly diminishes favouring the role of participation. An obvious explanation for the higher speed of adjustment and the large share of unemployed that take a job is the relatively high quality of the unemployed in the North. In other regions unemployment is relatively low and, hence, the pool of unemployed consists for a much larger part of unemployed who are not immediately suitable for a job, but need first additional occupational or social training.

6. Corroboration of the results

Using a relatively simple labour market model to study the effects of regional labour demand shocks for The Netherlands, we have found a relatively high speed of adjustment to these shocks. In fact this adjustment speed is more of ‘American’ levels than of ‘European’. This implies that the Dutch labour market operates in a more flexible way than the European average. Until about a decade ago The Netherlands were still characterised by its slow adjustment and inflexibility (the

Dutch Disease'). One explanation for this increase in flexibility compared to the European perspective stresses the importance of the structural reforms in welfare state provisions in The Netherlands since the second half of the 1980s. See for more information Broersma *et al.* (2000). Furthermore, impulses in labour demand are largely met by workers moving in and out of the labour force as a reaction to that shock. It is a well-known phenomenon that in the 1980's and early 1990s redundant workers moved out of the labour force rather than becoming unemployed. In addition, the recent increase in Dutch employment was not accompanied by an equal fall in unemployment implying that a substantial part of the new jobs are filled by former non-participants entering the labour force.¹⁵

There are a number of reasons for these phenomena. First, the early retirement and disability schemes enabled employers to get rid of redundant personnel. This personnel was willing to move into these arrangements, because benefits of these arrangements were higher and lasted longer than unemployment benefits (see for example Hassink *et al.*, 1997). Second, a large part of these non-participants moving into employment consist of school-leavers who are of much more interest to employers than unemployed, because they are (considered to be) more motivated, have a higher productivity and are cheaper. The same can be said for another group of non-participants that have become of growing importance for the employment growth in The Netherlands: women that start participating for the first time or after a period of interruption because they took care of their children.

When we consider the results of the four geographical parts in which we subdivided The Netherlands based on the 18 RBA-areas, the adjustment paths of the North catch the eye. Therefore, we will focus on the plausibility of the results for the North in some more detail. Labour market adjustment to a region specific labour demand shock runs in the North initially through unemployment, participation and spatial adjustment in an almost equal way. In due course, the role of participation becomes more important. In the other three parts of the country, adjustment runs mainly through changes in participation, both initially and in the longer run. For these three parts of the country the role of spatial adjustment as absorptive channel to the shock becomes more important as time moves on. In a flexible labour market persons lose their job earlier than in case of inflexible labour markets, but they also find a new job sooner. We found that persons losing their job in the North become unemployed more frequently than elsewhere, or move to other regions more frequently to get a job. Following the same reasoning, once jobs are created in the North there is

¹⁵ Only the employment increase of the last couple of years goes with a dramatic fall in unemployment figures. Unfortunately, our data do not allow for a similar analysis on a shorter sample period than the one in this analysis.

substantial inflow of unemployed workers to those jobs, but also an inflow of workers from other regions. Therefore, in this section we will consider the flows of persons moving into and out of unemployment and the flows of persons moving into and out of the northern district (as migrants) to answer the question: is the reallocation rate of these groups relatively high in the North compared to the rest of the country?

Figure 3 shows the average reallocation of persons moving into and out of unemployment as percentage of the labour force for each of the 18 RBA-areas relative to the nation-wide reallocation rate between 1993 and 1999. Indeed two of the northern RBA-areas, *viz.* Groningen and Fryslân, have by far the highest reallocation rate of 1.5 percentage points above the national level. Figure 4 shows the reallocation of persons moving into and out each of the 12 Dutch provinces as percentage of the labour force relative to the nation-wide percentage between 1993-1998.¹⁶ Apart from the province of Flevoland, which is known for its high in-migration rates because it consists of newly reclaimed land from the sea, the reallocation rate of migration flows in the three northern provinces is clearly above the nation-wide average.¹⁷ These two figures corroborate the fact that both unemployment and migration are important as means of adjustment to shocks in the North. There is substantially more unemployment reallocation and migration in- and outflow in at least two of the four RBA areas in the northern part of the country than anywhere else.

¹⁶ Unfortunately, we have no migration figures for the 18 RBA-areas, but provinces do give a rough indication for the size of migration reallocation in the four parts of the country we distinguish. The three northern provinces Fryslân, Groningen and Drenthe are identical to the three RBA-areas in the North.

¹⁷ Obviously not all migration is linked to job opportunities, but this is true for all provinces so the rank order of the size of the migrant reallocation will remain the same. The very high rate for the province of Groningen is partly caused by the in- and outflow of students to the university that is located close to the border of this small province.

Figure 3. Regional unemployment turbulence (sum of unemployment inflow plus outflow as % of labour force) in 18 Dutch RBA-areas minus the national reallocation rate, averages 1993-1999

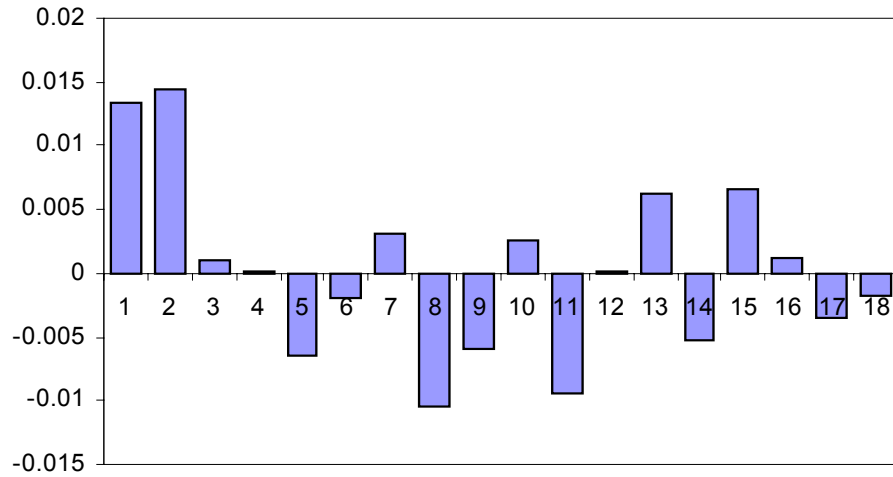
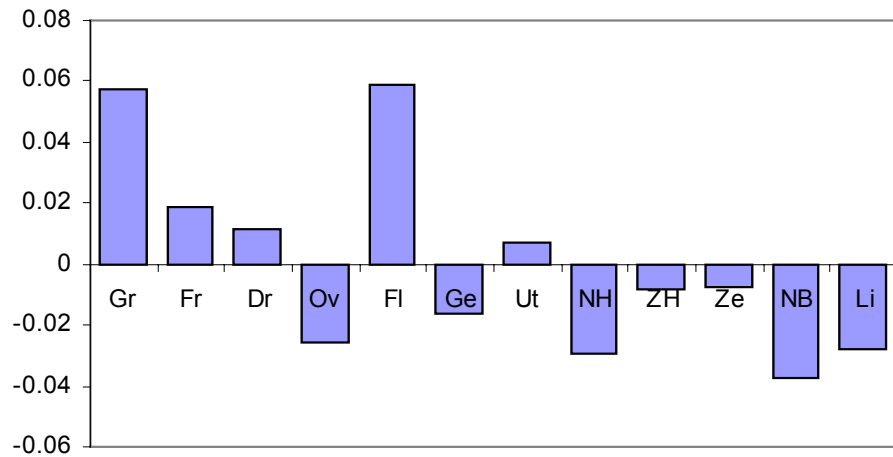


Figure 4. Regional migration reallocation rate (sum of migration inflow and outflow as % of labour force) in 12 Dutch provinces minus the national reallocation rate, 1993-1999



7. Concluding remarks

This paper has studied regional labour market dynamics in The Netherlands over the past decade. We find that the speed of adjustment to a labour demand shock in The Netherlands is high compared to other European countries and more in line with the situation at the US labour market. On the other hand, a shock in regional labour demand in The Netherlands is primarily absorbed by changing participation rates like in most other European countries whereas in the US migration is the most important adjustment mechanism. The effect on unemployment or spatial adjustment as ways to absorb a shock is only of minor importance. This corroborates the general situation on European labour markets. In other words, the Dutch labour market shows ‘American’ levels of flexibility, but ‘European’ ways of adjustment. This flexibility may explain the employment upsurge in The Netherlands, reaching ‘American’ growth rates of employment in the last decade of the previous century.

A spatial disaggregated analysis shows remarkable differences between regions within the Netherlands. In particular the response of the regions in the northern part of the country stands out. First, adjustment to a shock is absorbed much faster than in other Dutch regions. Second, the shock is absorbed more through changes in unemployment than through changes in participation. Spatial mobility plays in the North especially a prominent role in the initial phase of the adjustment process compared to other parts of the country, whereas in the latter the importance of spatial adjustment increases over time, it decreases for the North. The different effects in the North can be explained by the characteristics of the labour market and the unemployed in this part of the country. The North is known for its adverse labour market performance in terms of high unemployment and low participation rates. Obviously the availability of these relatively large reservoirs of (potential) job searchers means that in this part of the country a labour demand shock is absorbed relatively easily through unemployment. The fact that spatial adjustment also plays a relatively large role means that workers are not unwilling to move to the North to fill a job, or move from the North to other regions when opportunities are better over there or that commuting flows are relative important here as well.

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Appendix: Data characteristics

This appendix discusses the suitability of the data used in this paper for the particular type of analysis of regional labour market dynamics applied in this paper. The data are seasonally adjusted quarterly time series from 1993.2 through 1999.3 on employment, unemployment and population of 15 and 64 years of age for 18 so-called RBA-areas in The Netherlands.

First, the time span is relatively short, in essence the second part of the 1990's, compared to similar studies of Blanchard and Katz (1992) and Decressin and Fatás (1995). These studies are based on annual data sets which cover a period of twelve years (1978-1990 and 1975-1987, respectively) on some 50 different regions. Our analysis is based on 29 observations over time for 18 different regions. The data of Blanchard and Katz and of Decressin and Fatás includes an economic upswing following the 1975 recession (1977-1979), a period of deep recession (1981-1982) and the subsequent "mild" boom (1984-1986). So, there is a full cycle. Essentially our data set covers only half a cycle from the recession of 1993-1994, to the strong boom of 1997-1999. In other words, it covers only an economic upswing period. So our analysis shows the effects of an employment shock in a booming period. The studies of Blanchard and Katz and Decressin and Fatás basically average the possible different responses in recession and boom. This may hide some of the effects that occur because Pekkala and Kangasharu (2000) show that the response of the labour market may be quite different in a period of economic growth compared to a recession period. Therefore, the fact that our analysis only refers to an upswing period is an advantage because our results will also uncover effects that are opposite in booming and recession periods and will be faded out when data of booming and recession periods are combined. Of course, it would be interesting to compare our results with results for a recession period, but this data are currently not available for The Netherlands.

Second, we deseasonalised our quarterly data with a simple multiplicative moving average adjustment method. We are well aware of the fact that this may lead to spurious results since elimination of the seasonal pattern may induce the emergence of new spurious patterns. See *e.g.* Ghysels (1994) and Franses and Vogelsang (1998). There are a number of reasons for using seasonally adjusted data. First, since we have no reason to assume some seasonal model specification, we would assume a deterministic seasonal pattern resulting in the inclusion of a series of seasonal dummies. This would expand the number of model variables and reduce the degrees of freedom and does not necessary result in a better model and/or other results. Second, some variables are interpolated annual data and imposing a seasonal pattern

in the time series is not a good idea since this indeed means incorporating spurious patterns. Hence, application of deaseasonalised data is the best option.

Finally, a simple unit root test is conducted in order to assess whether or not the variables in our system of equations (7)-(9) are indeed stationary. The results of the unit root test of Dickey and Fuller (1979), using 4 lagged dependent variables to eliminate possible residual auto-correlation, are presented in table A. This test boils down to estimating

Table A. Augmented Dickey-Fuller (ADF) unit root test, including coefficient values, for variables of system (7)-(9).

RBA-area	$n_i = \Delta \log N_i - \beta_i \Delta \log N$		$e_i = (U_i/LF_i) - \gamma(U/LF)$		$p_i = (LF_i/B_i) - \delta(LF/B)$	
	coefficient	<i>t</i> -value (DF)	coefficient	<i>t</i> -value (DF)	coefficient	<i>t</i> -value (DF)
1	-0.12	-1.98	-0.22	-1.34	-0.07	-0.41
2	-0.03	-0.33	-1.19	-3.91**	-0.65	-2.97*
3	-0.07	-2.06	-1.39	-4.51**	-0.38	-2.62*
4	-0.02	-1.19	-0.34	-2.12	-0.17	-2.60
5	-0.04	-1.76	-0.19	-2.20	-0.13	-2.51
6	-0.23	-3.02**	-0.20	-1.70	-0.30	-1.84
7	-0.00	-0.21	-0.09	-1.39	-0.12	-1.52
8	-0.01	-0.69	-0.19	-1.41	-0.26	-1.68
9	-0.16	-2.77*	-0.42	-2.62*	-0.17	-2.03
10	0.01	0.72	-0.35	-3.01**	-0.46	-2.54
11	-0.10	-2.25	-0.45	-2.27	-0.27	-1.54
12	-0.02	-1.20	-0.51	-2.91*	-0.10	-1.17
13	-0.02	-1.54	-0.11	-1.28	-0.20	-1.31
14	-0.05	-1.72	-0.40	-2.23	-0.21	-2.92*
15	-0.02	-1.13	-0.11	-1.56	-0.13	-1.99
16	-0.12	-1.99	-0.41	-2.07	-0.30	-3.07**
17	-0.10	-2.46	-0.11	-2.00	-0.09	-1.85
18	-0.06	-2.36	-0.36	-2.11	-0.17	-1.35

*** unit root rejected at 1% significance
 ** unit root rejected at 5% significance
 * unit root rejected at 10% significance

$$\Delta y_t = \theta_0 + \theta_1 y_{t-1} + \sum_{j=1}^4 \Delta y_{t-j} \quad (\text{A-1})$$

These results include both the coefficient θ_1 and its *t*-value. In fact this *t*-value is the augmented Dickey-Fuller (ADF) unit root test, which follows a non-standard

distribution in case of a unit root for which critical values are available from Monte Carlo simulations. The coefficient value is presented because its size provides additional information on the deviation from unity of the series y_t . This can easily be seen when (A-1) is rewritten as

$$y_t - (1 + \theta_1)y_{t-1} = \theta_0 + \sum_{j=1}^4 \Delta y_{t-j} \quad (\text{A-2})$$

The more negative θ_1 is, the more likely that y_t does not contain a unit root. Notice that this information is not based on the significance of the associated t -value of θ_1 (*i.e.* on the ADF-test), but merely on the size of the coefficient and the fact that unit roots are known to have low size and power properties in case of near-unit roots and small samples (see *e.g.* Schwert, 1989 and Cochrane, 1991). Hence, this value of coefficient merely provides additional information on the stationarity of the time series. See also Blanchard and Katz and Decressin and Fatás, who (without explanation) do the same thing.

When a significance level of 10% is considered, we find for the regional (β -) difference of employment growth that a unit root is rejected only twice. For the regional (γ - and δ -) differences of the (un-)employment rate and the participation rate equations, a unit root is rejected in five and four regions respectively. However, do note that the coefficient values of the latter two equations are much larger in absolute value than the coefficient values of the regional employment growth equation. The average coefficient value for this equation is some -0.06 , against -0.4 and -0.2 for the regional (un-)employment rate and participation rate equations. Hence, the coefficient values for the latter two series imply that the presence of a unit root is rejected and thus these series are considered to be stationary, while the coefficient values for the regional employment growth equation indicate that the presence of a unit root is not rejected. On the basis of the foregoing we may conclude that the characteristics of our data allow the type of analysis we do.