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Matching Unemployment and Vacancies in Regional Labour Markets; an Empirical Analysis for the Netherlands

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MATCHING UNEMPLOYMENT AND VACANCIES IN REGIONAL LABOUR MARKETS; AN EMPIRICAL ANALYSIS FOR THE NETHERLANDS

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ABSTRACT

In this paper we analyze regional developments in unemployment and vacancies in the Netherlands during the eighties. Our purpose is to establish to what extent the differences in unemployment and vacancy rates are due to differences in regional labour market performance. We do not use traditional UV-analysis in our empirical investigation since a necessary condition to apply this approach is not fulfilled: there is no constant flow of filled vacancies. Therefore, we perform the analysis by looking at the dynamics of the labour market using the concept of the matching function.

We find a constant returns to scale matching function with coefficients of 0.25 on unemployment and 0.75 on vacancies. Efficiency rises significantly during the recession at the beginning of the eighties. Regional differences in efficiency appear to be modest, suggesting that the reduction of regional unemployment can only be achieved by stimulating regional labour demand.

1. INTRODUCTION

Unemployment in the Netherlands has increased sharply in the beginning of the eighties to decline again after 1984. The number of vacancies shows an opposite movement: a decrease in the beginning and an increase since 1984. These developments in unemployment and vacancies by and large occurred in all regions of the Netherlands. Yet, there are substantial differences between regions with respect to the level of unemployment and vacancies. While for example in Groningen in 1988 the average unemployment rate was 22 %, it was 11 % in Zeeland and 12 % in Utrecht.

There is a debate to what extent a worsening of the functioning of the labour market contributed to the high unemployment in the Netherlands. Empirical studies based on the relationship between unemployment (U) and vacancies (V) claim that unemployment due to market imperfections has increased in the past decades. A general conclusion of Dutch UV-studies is that the UV-curve has shifted gradually in the seventies and eighties. The explanations of this phenomenon differ: increasing heterogeneity due to structural changes in labour supply or labour demand, decreasing search intensity of job seekers, increasing employers' selectivity and so on.

Recent studies emphasize the importance of labour market flows in understanding the functioning of the labour markets (Blanchard and Diamond (1989), Jackman, Layard and Pissarides (1989), for a public-relation piece see Blanchard and Diamond (1992)). In stead of a traditional UV-curve (also called the Beveridge-curve) these studies use a matching function to describe labour market performance. A matching function specifies the relationship between the flow of filled job vacancies and the stocks of job seekers and job vacancies. Only at a given flow of job vacancies the matching function is equivalent to a UV-curve.

A study by Van Ours (1991) specifies and estimates a matching function of the Dutch labour market. This study claims that in the course of the seventies and eighties the efficiency of the Dutch labour market remained quite

stable. Van Ours concludes that with a higher level of unemployment and lower level of job vacancies the Dutch labour market of today is apparently as efficient in generating a flow of filled vacancies as it was in the seventies.

In this paper we analyze developments in unemployment and vacancies for different regions in the Netherlands during the eighties. It is important to pay attention to the spatial aspects of the matching process, because the geographical range of a relevant labour market for the economic actor is limited by - among others - the type of job wanted, educational level, income, cost of moving, time preference and travel costs. Hence, geographical space acts as a fraction or barrier in the labour market, so that spatial adjustment processes (such as migration or commuting) are insufficient to ensure an efficient nation-wide matching. This element is expected to have clear implications for the equilibrium and adjustment processes on the labour market. Therefore, the analysis of the labour market functioning should preferably be carried out on a spatially disaggregated level (see also Gorter, 1991).

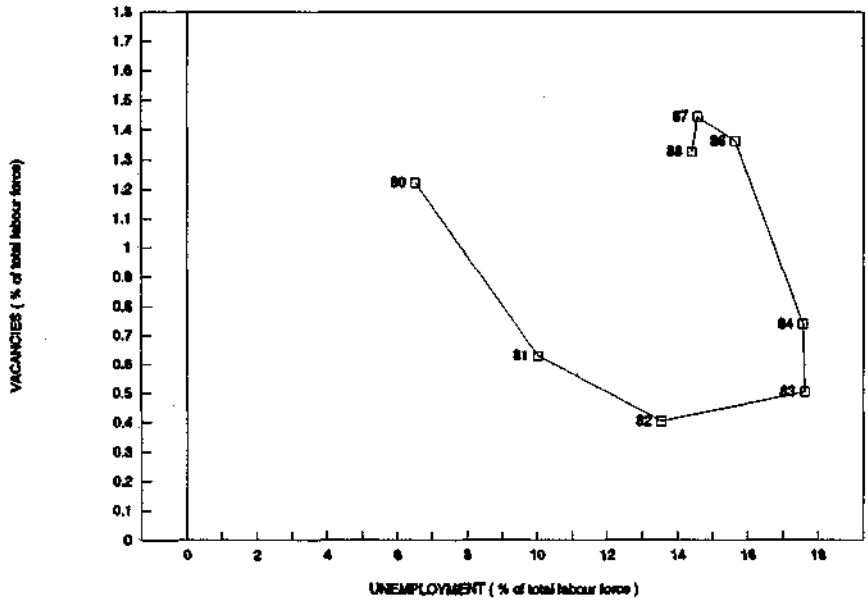
The purpose of this study is to establish to what extent the differences in unemployment and vacancy rates are due to differences in regional labour market performance. We start our empirical investigation with considering traditional UV-analysis. Then we extent the analysis by looking at the dynamics of labour market functioning using the concept of the matching function. For this analysis we pool cross-section data for eleven regions (provinces) with time series information of the period 1980-1988. (See for a similar analysis based on German data: Borsch-Supan (1991)). By using this panel data, we add cross-sectional variation in the explanatory variables (such as unemployment and vacancies) and also considerably enlarge the number of degrees of freedom in the analysis. Of course, we realize that the labour market areas used in the analysis (provinces) are discerned on administrative grounds and hence not equal to "closed" labour markets. On the other hand, most unemployed individuals in the Netherlands search for jobs locally in the area where they live an this is usually inside the province.

This paper is set up as follows. In section 2 we discuss developments on the Dutch labour market during the eighties with specific attention to regional developments. In sections 3 we discuss the use of the matching function in analyzing differences in labour market performance. Section 4 presents the estimation results of the matching function. Section 5 concludes.

2. THE DUTCH LABOUR MARKET IN REGIONAL PERSPECTIVE

Unemployed workers in the Netherlands have to register at the public employment office to be entitled to unemployment benefits. Monthly data on unemployment are available from this registration. The data on vacancies are from the vacancy surveys of the Central Bureau of Statistics (CBS). In these vacancy surveys some 20.000 firms were questioned on whether they have vacancies and if so, some questions were asked about the characteristics of the vacancies. The CBS vacancy surveys were held in October 1980, 1981, 1982, 1983, September 1984, January 1986, 1987 1988. The availability of the vacancy data restricts our analysis to these dates in the eighties. We merged unemployment and vacancy data of these dates for figure 1, which shows the development of the unemployment and vacancy rates in the eighties. As is obvious from this figure the unemployment rate in the Netherlands has gone up substantially in the eighties. In 1980 it was about 7%, in 1984 it was about 18%. Since 1984 unemployment decreased somewhat. The vacancy rate decreased from 1.2% in 1980 to 0.5% in 1983 and increased again in later years.

Figure 1 Unemployment and vacancy rates in the Netherlands: 1980-1988



In this paper, the focus is on the functioning of regional labour markets in the Netherlands. Now, the demarcation of regional labour markets is far from easy, because regional interaction between supply and demand on the labour market may vary among groups as well as over time. In addition, regional labour markets can be defined from the viewpoint of job seekers and employers. The regional labour market for a job seeker is usually defined (see, for example, Fischer and Nijkamp, 1987) as a region within which the employment opportunities open to a worker can be fulfilled without changing his or her place of residence (e.g., by daily travel from home to work). The geographical range of a regional labour market is affected by (among others) income, transport access and commuter time. Seen from an employer's perspective, the regional labour market may be defined as the regional area which contains the potential pool of applicants a firm can - theoretically considered - attract (see also Fischer and Nijkamp, 1987). Another important criterion in the delineation of labour markets - besides journey to work and the

market's employment opportunities - is the accessibility to market information about job openings, actual and potential future wage, etc.

The demarcation of spatial labour markets that can be implemented in empirical analysis is also strongly influenced by the availability of data. In this paper, we do not only need regional data on the stock of unemployment and vacancies, but also on the number of matches (i.e., the flow of filled vacancies). Especially the lack of spatially disaggregated data on the flow of filled vacancies enforces us to define regional labour markets on the basis of administrative entities (provinces).

Table 1 presents some characteristics of the Dutch regions (provinces)[1]. First of all the table shows that regions differ in the contribution to gross national product. The three provinces Utrecht, Noord-Holland and Zuid-Holland were responsible for almost half of the Dutch gross national product in 1984. Population density between the regions also differs quite a lot. The number of inhabitants per km^2 in Zuid-Holland for example is 4-5 times as high as in Friesland, Drenthe and Zeeland. With the exception of Zeeland the share of long term unemployment in 1988 does differ that much between regions, while there are substantial differences in regional unemployment and vacancy rates. The problem of unemployment appears to be most severe in the northern (peripheral) regions of the country. Moreover, it can be seen that the northern regions have low vacancy rates (0.7%), while the provinces Utrecht and Noord-Holland have high vacancy rates (1.7%).

[1] See Map A for the geographical position of the provinces in the Netherlands.

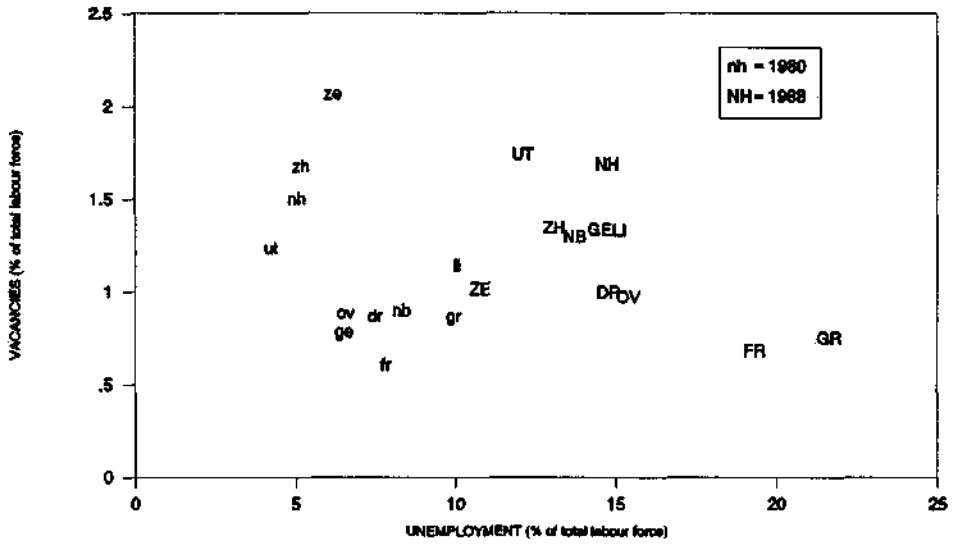
Table 1 Regional characteristics

	GRP 1984	inh. km^2 1988	% U long 1988	% U 1988	% V 1988	EMPL 1988
Groningen (gr)	8	237	55	21.6	0.7	136
Friesland (fr)	3	178	48	19.3	0.7	142
Drenthe (dr)	3	164	47	14.0	1.0	111
Overijssel (ov)	6	302	49	15.4	1.0	314
Gelderland (ge)	10	356	52	14.5	1.3	481
Utrecht (ut)	6	725	48	12.1	1.7	283
Noord-Holland (nh)	18	882	52	14.7	1.7	699
Zuid-Holland (zh)	24	1104	52	13.1	1.3	977
Zeeland (ze)	3	199	38	10.7	1.0	97
Noord-Brabant (nb)	13	436	48	13.7	1.3	613
Limburg (li)	6	505	52	15.1	1.3	313
Nederland	100	434	51	14.4	1.3	4168

GRP = Gross regional product, inh. = inhabitants,
U = unemployment, V = vacancies, EMPL = regional employment (x 1000)
% = percentage of labour force, long = more than 12 months unemployed
Source: Central Bureau of Statistics

The data on regional unemployment and vacancy rates are also presented in figure 2. This figure shows the differences between regions for 1980 and 1988. In 1980 the spread in vacancy rates was larger than the spread in unemployment rates, in 1988 this was the other way around.

Figure 2 Regional unemployment and vacancy rates; 1980 and 1988



Furthermore, we present the development of regional unemployment for the period 1980-1988 in the figures 3,4 and 5. The picture that emerges is a rapidly rising unemployment rate for all provinces during the period 1980-83. In the following years we see an almost constant unemployment rate for the northern and western provinces while the southern provinces show a gradual reduction during the period 1984-87. Hence, we observe similar movements over time for all regions (provinces) in the Netherlands during the eighties.

Figure 3 Regional unemployment rates in the North-East: 1980-88

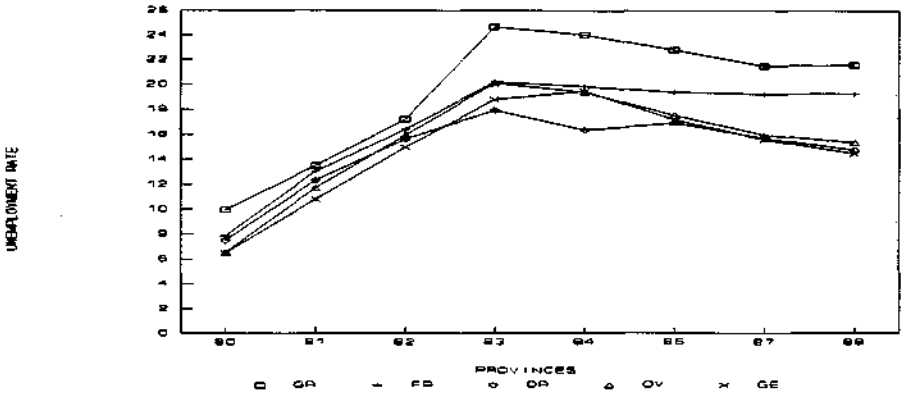


Figure 4 Regional unemployment rates in the West: 1980-88

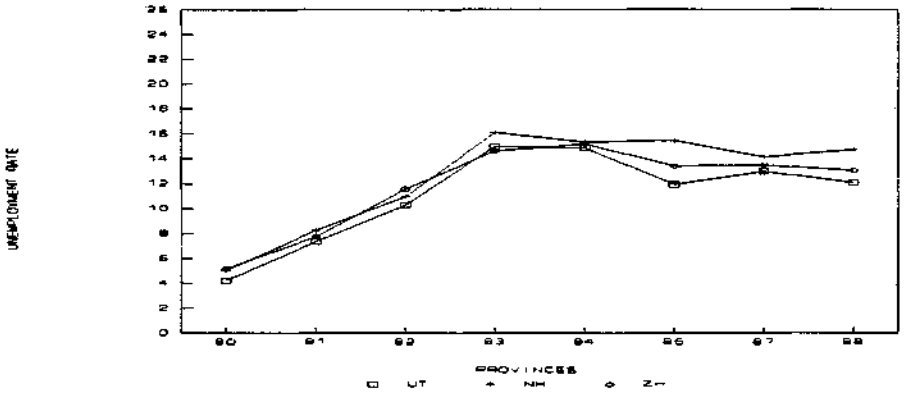
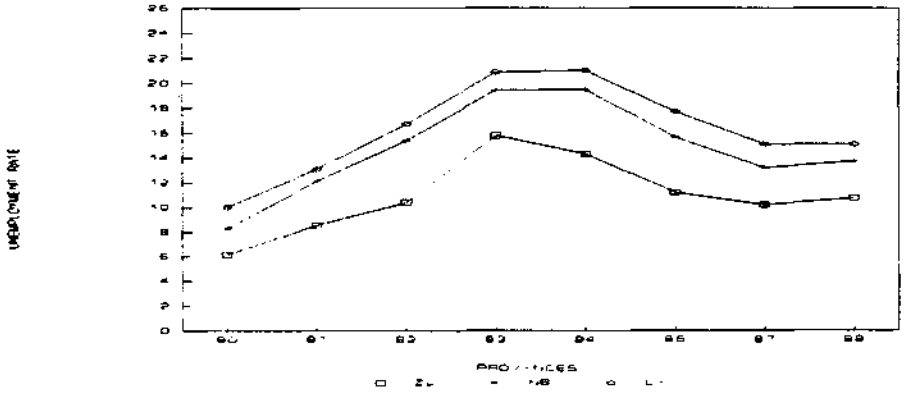
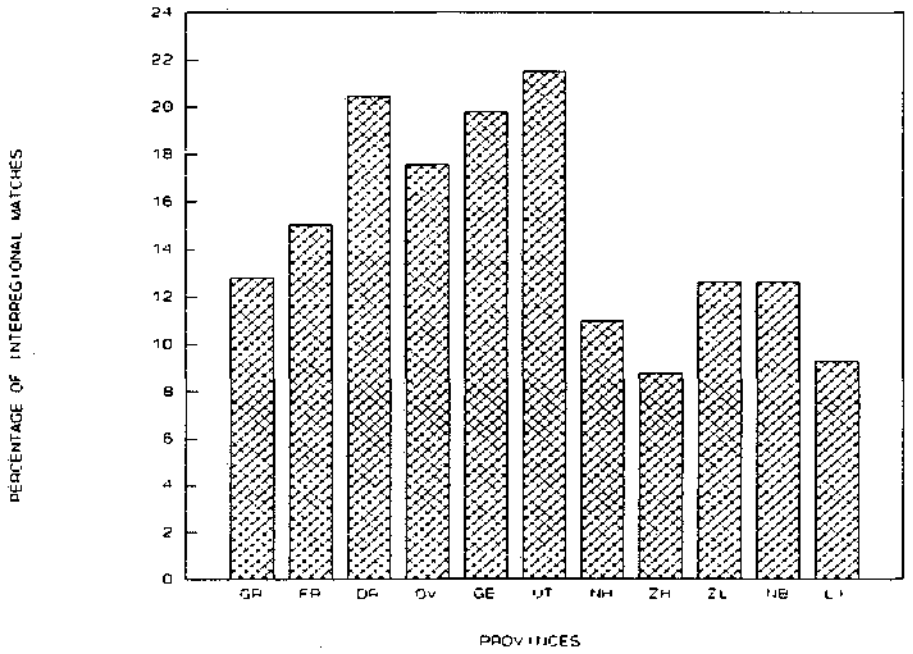


Figure 5 Regional unemployment rates in the South: 1980-88



In the case of using provinces as regional labour markets, it can - of course -be expected that employees living in province A will fill vacant jobs in other provinces (for example by commuting). In order to find out to which extent these interprovincial matches occur in the Netherlands we show the number of individuals who find a(nother) job outside the province where they live relative to the total number of individuals who find a job during a period of one year.

Figure 6 The percentage of interprovincial matching in the Netherlands: 1981



The graph demonstrates that the percentage of interregional matches is in the range of 10-20% which is - to our opinion - rather low.

Moreover, we consider the level of interregional commuting of the employed by calculating - for the years 1981, 1983 and 1985 - (a) the percentage of jobs in province X, occupied by workers living in other provinces (see figure 7), and (b) the percentage of workers living in province X, who occupy job in other provinces (see figure 8).

Figure 7 The percentage of provincial in-commuting in the Netherlands

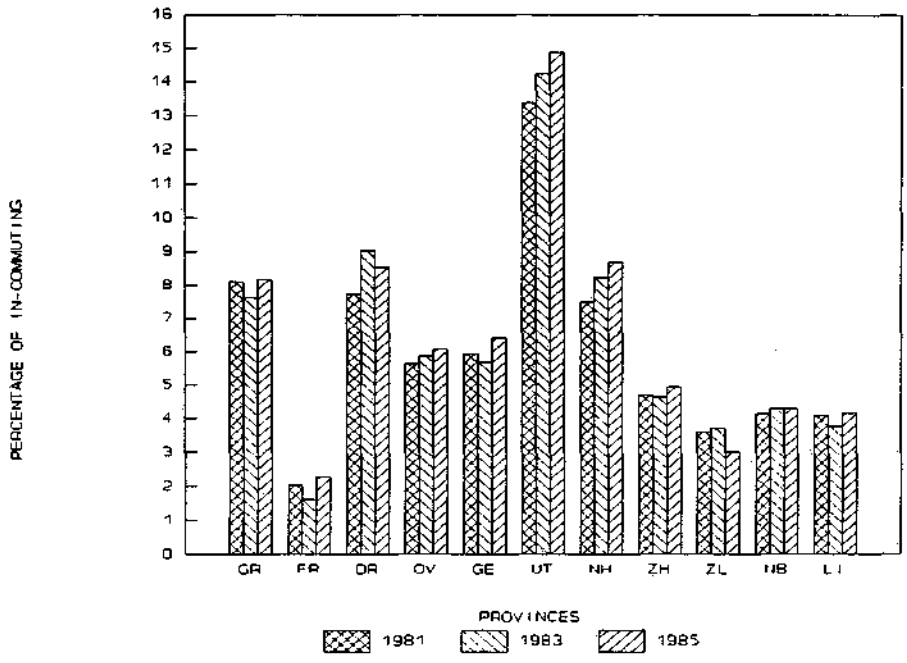
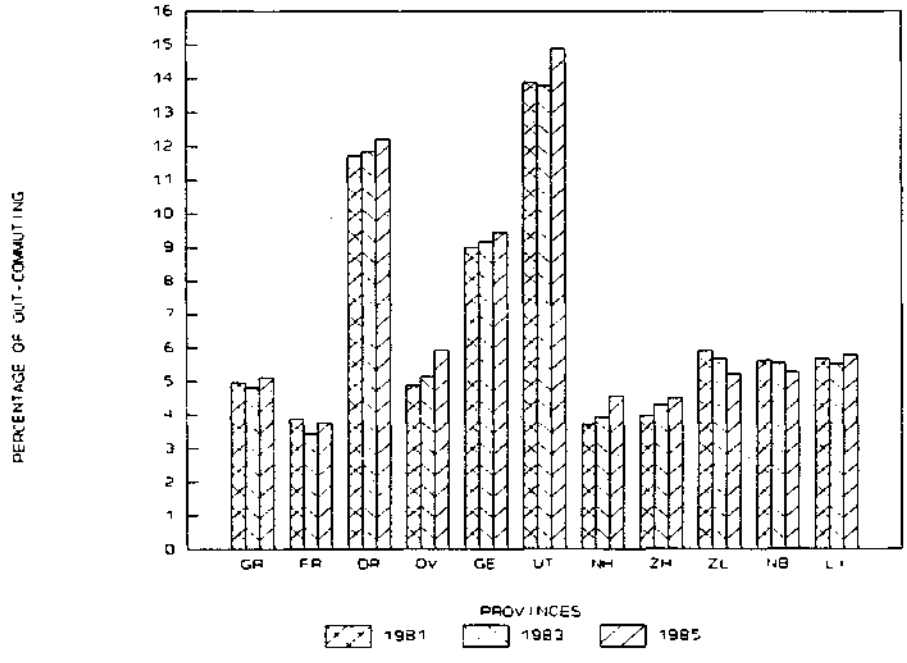


Figure 8 The percentage of provincial out-commuting in the Netherlands



We realize that the outcomes presented in the figures 7 and 8 are based on stock data (i.e., regional employment) and not on flow data (i.e., matches between job seekers and vacant jobs). In particular, the information on in-commuting (a) is probably an underestimation of the degree of interregional matching, because the finding of a job in another province may lead to the decision of the worker to move to this province. Nevertheless, data on provincial in- and out-commuting can be used to consider the "closeness" of provincial labour markets. The results show that interprovincial commuting is relatively low for all provinces (about 5-10%) with the exception of the centrally located province of Utrecht (about 13%).

In conclusion, interprovincial matching takes place to some extent in the Netherlands. On the other hand, it seems reasonable to assume that - in general - people will find jobs in the province where they live.

3. THE MATCHING FUNCTION

Employers search for new employees by creating job vacancies. In the labour market employers with vacancies and job seekers are searching for each other. This search process eventually leads to vacancies that are filled: employers hire a new employee and unemployed find a job or employed job seekers find a new job. The flow of filled job vacancies (F_v) is equal to the sum of the flow of unemployed finding jobs (F_u) and the flow of employed job seekers finding a new job (F_e). We assume that the search process on the labour market is equivalent to a matching process. The number of contacts C generated between job seekers and employers in a period of time depends on the number of job seekers and the number of vacancies:

$$C = \frac{(U + S)^{\alpha}.V^{\beta}}{T_m} \qquad [1]$$

in which: U = number of unemployed
S = number of employed job seekers
V = number of job vacancies
T_m = average time between contacts
α,β = scale parameters

$1/T_m$ is the rate at which potential contacts materialize or the 'clock-speed' of the labour market, i.e. the rate at which job seekers and employers meet. The flow of filled job vacancies F_v is equal to:

$$F_v = [(U + S)^{\alpha}.V^{\beta}/T_m].P_c \qquad [2]$$

in which: P_c = probability a contact results in a job

We define:

$$k = P_c/T_m \qquad [3]$$

where k is an indicator of efficiency of the labour market.

The efficiency of the labour market increases if the average time between contacts decreases and if the probability a contact results in a job increases. The latter probability is the product of two other probabilities: the probability an employer - conditional on the contact - offers a job to the job seeker and the probability that - conditional on this job offer - a job seeker accepts this offer. A change in labour market efficiency may therefore also occur if employers change their job offer behaviour or job seekers change their job acceptance behaviour. For example labour market efficiency will increase if job seekers turn down less job offers and are more likely to accept these offers. However, since we have no information to disentangle the different parts of the labour market efficiency parameter we write [4] as:

$$F_v = k.(U + S)^{\alpha}.V^{\beta} \qquad [4]$$

Equation [4] is a Cobb Douglas type matching function for the labour market (and if $\alpha+\beta=1$ we have constant returns to scale), a production function which describes the relation between the flow of filled vacancies and the stocks of job seekers and vacancies. Ignoring the stock of employed job seekers we have a relation between the flow of filled vacancies and the stocks of unemployed and job vacancies[2]:

$$F_v = k.U^{\alpha}.V^{\beta} \qquad [5]$$

From this we derive that a traditional UV-curve is in fact a matching function with constant flow of job vacancies:

$$\begin{aligned} U &= (F_v/k)^{1/\alpha}\, V^{\beta/\alpha} \\ &= k^{*}\, V^{\beta/\alpha} \end{aligned} \qquad [6]$$

To investigate the matching process of unemployment and vacancies on regional labour markets, we use [5]. In this way, it can be analyzed whether or not the efficiency parameter k differs between regions. We could also estimate [6] to see whether the parameter k^{*} differs between regions if the UV-curve can be interpreted as a "iso-vacancy flow" matching function (i.e., if the flow of job vacancies is constant over time). However, if cyclical shocks change the locus of the UV-curve, it is not meaningful to use traditional UV-analysis as an instrument for the quantification of (differences in) labour market efficiency.

Therefore, we first considered whether the condition of a constant flow of job vacancies is fulfilled during the estimation period (1980-88). Data on the flows entering and leaving the stock of vacancies is not available for the Netherlands, however. From the Dutch Central Bureau of Statistics vacancy survey, we have information about the number of vacancies cross-classified by

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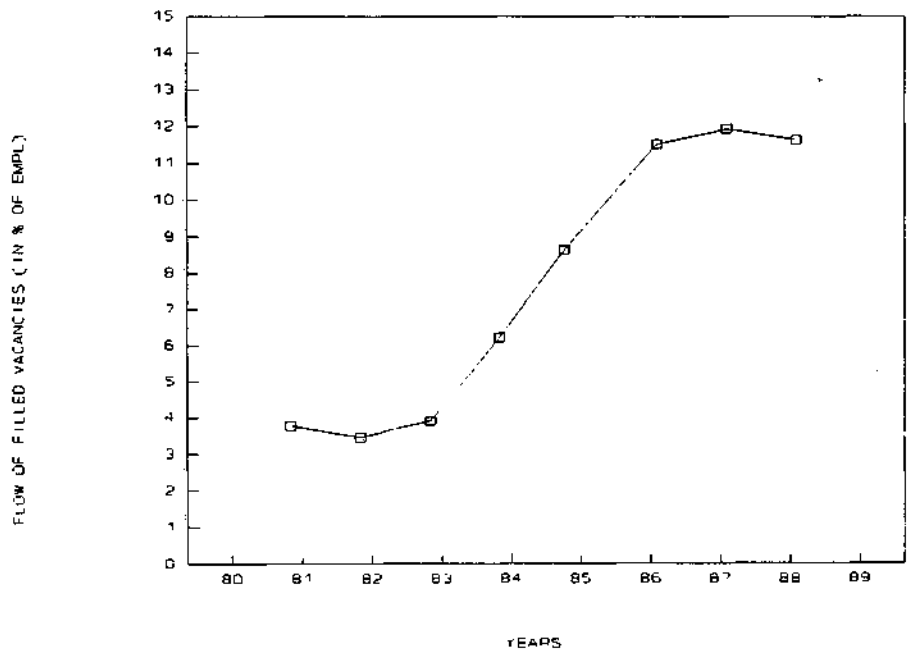
[2] We cannot estimate equation [4] since we have no data on S. In stead of simply ignoring S we can also assume that the ratio (U/S) is stable.

region (province) and elapsed duration groups over the period 1980-88. Applying a non-parametric estimation method, we obtained completed vacancy durations for each region over this period (see for more details, Appendix A). Now, if we assume a steady state labour market, the estimates for the annual vacancy in- and outflows can be easily derived from the steady state identity, i.e., the stock of vacancies is equal to the product of vacancy flow and the average completed duration.

As can be seen from figure 3, the annual flow of filled vacancies - in percentage of employment - almost tripled during the period 1980-1988. When we consider this relation on the regional level similar S-shaped curves appear. This implies that the UV-curve estimated for regional labour markets can not be interpreted as an "iso-vacancy flow" matching function during the period 1980-88.

Figure 3 The annual flow of filled vacancies (in percentage of employment)



The estimation results of the UV-relation (see Appendix B) indeed show that the curve is instable (i.e., shifted outwards) during the eighties. This conclusion remains unchanged when structural variables characterizing the unemployed pool are taken into account.

In sum, we can not use the findings of the static UV-approach and proceed our investigation by applying the dynamic matching function approach.

4. ESTIMATION RESULTS OF THE MATCHING FUNCTION

We estimated the loglineair form of equation [5]. For this model we used unemployment and vacancy rates and allowed the efficiency parameter k to vary over time and between regions. The estimation results are shown in table 2.

Starting from the first estimate in table 2, we restricted the matching function to have constant returns to scale. Next, we searched for a statistically equivalent model with a minimum number of time dummy variables. Finally, we further reduced the model by restricting the regional dummy variables to be all equal. As can be seen from the F-statistics at the bottom of the table, we arrive at a final specification of the matching function with constant returns to scale, no regional dummy variables included and time dummy variables for the years 1980 and 1981.

Table 2 Estimation results of the matching function (1980-88)

	(1)	(2)	(3)	(4)
Constant	-2.29 (1.6)	-1.69 (3.1)	-1.33 (4.3)	-1.21 (5.4)
α	-0.14 (0.3)	0.04 (0.2)	0.23 (2.7)	0.28 (4.0)
ß	0.91 (3.5)	0.96 (-)	0.77 (-)	0.72 (-)
regions				
Groningen	0.29 (1.2)	0.26 (1.1)	0.19 (0.9)	-
Friesland	0.76 (3.3)	0.77 (3.4)	0.70 (3.3)	-
Drenthe	0.54 (2.4)	0.58 (2.8)	0.55 (2.7)	-
Overijssel	0.25 (1.2)	0.27 (1.3)	0.26 (1.2)	-
Gelderland	0.15 (0.7)	0.18 (0.9)	0.18 (0.9)	-
Utrecht	0.05 (0.1)	0.12 (0.4)	0.25 (1.2)	-
Noord-Holland	0.08 (0.3)	0.12 (0.5)	0.24 (1.1)	-
Zuid-Holland	-0.04 (0.1)	0.02 (0.1)	0.12 (0.6)	-
Zeeland	0.22 (0.7)	0.30 (1.3)	0.38 (1.8)	-
Noord-Brabant	0.34 (1.6)	0.36 (1.8)	0.38 (1.9)	-
Limburg	-	-	-	-
years				
1980	-	-	-0.76 (4.7)	-0.70 (4.4)
1981	0.60 (1.7)	0.54 (1.7)	-0.41 (3.1)	-0.42 (3.0)
1982	1.06 (2.0)	0.96 (2.0)	-	-
1983	1.27 (2.3)	1.13 (2.6)	-	-
1984	1.33 (2.6)	1.18 (3.3)	-	-
1986	1.03 (2.4)	0.88 (4.0)	-	-
1987	1.00 (2.5)	0.86 (4.2)	-	-
1988	0.82 (2.1)	0.68 (3.2)	-	-
R^2	0.59	0.59	0.58	0.55
ssr	11.54	11.57	12.61	15.63
n	88	88	88	88

t-values between parentheses; R^2 is corrected for degrees of freedom,
ssr = sum of squared residuals; n = number of observations

specification tests:

	F-statistic		critical value (at 5%)
(2) versus (1)	0.17	<	3.99
(3) versus (2)	1.24	<	2.36
(4) versus (3)	1.77	<	1.98

The results of the final model show that the matching relation is not constant over time during the period 1980-82. According to this finding the functioning of the Dutch labour market has improved in this period and remained constant afterwards. In other words, the product of the rate at which unemployed job seekers and employers meet and the probability that a contact results in a match must have increased during the beginning of the eighties. At first sight this seems surprising in the light of the huge rise of unemployment that occurred in this period. However, the rise in labour market efficiency might in fact have been caused by the rapidly increasing number of unemployed job seekers. This may have induced unemployed workers to increase search intensity or change their job acceptance behaviour. By being less choosy - and, for example, accepting the first job offer - labour market efficiency may have been improved.

The coefficient on vacancies in the matching function turns out to be 0.72. This outcome is nicely in line with the estimate of 0.65 for the Dutch labour market as a whole, based on the period 1971-87 (see Van Ours, 1991).

With respect to the regional differences in labour market performance, table 2 shows that Limburg (the reference category) and Zuid-Holland have the lowest level of labour market efficiency[3]. It is surprising to observe that Friesland (a peripheral region with unfavourable labour market conditions) has the highest efficiency level, while the efficiency level of Zuid-Holland (a core region with labour market conditions comparable to the national average) is significantly lower than the level of Friesland. On the whole however, regional differences in labour market efficiency appear to be not very important. This suggests that the regional differences in unemployment are correlated with regional differences in labour demand. A similar conclusion is made by Gorter (1991) who has examined the determinants of the dynamic components (duration and inflow) of regional unemployment in the Netherlands.

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[3] Similar effects are found in previous studies of regional differences in labour market efficiency (see Van Ours, 1990 and Gorter, 1991), based on different empirical models and other data sources (i.e., regional unemployment and vacancy duration).

The next phase in our analysis is an investigation of the impact of relevant regional characteristics on the outcomes of the matching model. In this way, we attempt to shed light on the underlying regional phenomena responsible for the small differences in labour market efficiency. Moreover, it enables us to study to which extent the estimation results are robust against different specifications of the model.

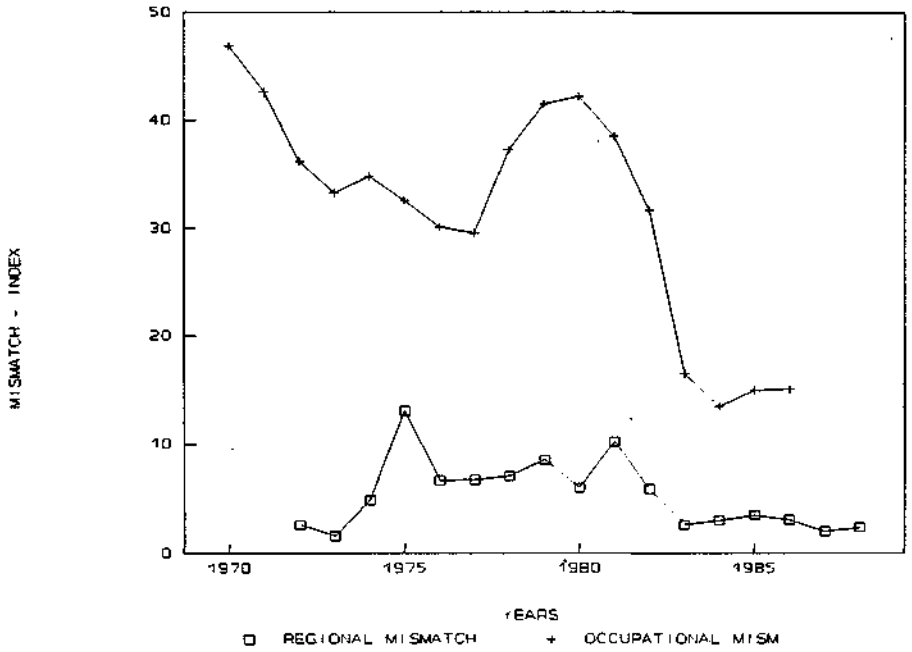
The different composition of the unemployed pool and the stock of vacancies with respect to industry or occupational group may be an important determinant of the efficiency. Clearly, the composition of unemployment and vacancies may differ among regions and over time. A natural measure for this mismatch of unemployment and vacancies is "the proportion to which unemployment is higher than it could be at given vacancies" (see Layard, Nickell and Jackman, p.236, 1991). In that case, mismatch (MM_i) is evaluated by

$$MM_i = 2 \left[1 - \Sigma_i \, (U_i/U)^{1-\alpha} \, (V_i/V)^{\alpha} \right]$$

where summation takes place over different homogeneous groups i.

For our analysis, we compute mismatch by using data on the occupational composition of unemployment and vacancies for each region and make the usual choice of α equal to 1/2 (see also, for example, Blanchard and Diamond, 1989). Similarly, we calculate regional (provincial) mismatch for the Netherlands. The pattern of occupational and regional mismatch for the Netherlands over time are shown in figure 10.

Figure 10. Occupational and regional mismatch on the Dutch labour market[4]



It appears that regional mismatch is hardly present in the Dutch labour market during the eighties. This implies that spatial adjustment mechanism (commuting and migration) can not accomplish major improvements of the national labour market's functioning[5]. This finding could be expected because we have excess supply in all regions.

The figure also shows that occupational mismatch decreased enormously during the period 1970-1986[6]. During the eighties, mismatch reduced substantially in the first years, while it remained constant in later years. Apparently, there is a negative correlation between occupational mismatch and

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[4] In this figure, mismatch is presented in percentage of the maximum value of mismatch (equal to 2).

[5] Remember that it is assumed in our regional matching model that there is no interregional matching between unemployed job seekers and vacant jobs.

[6] Unfortunately, we have no information on the occupational composition of unemployment and vacancies for the years 1987-88.

labour market efficiency during the eighties. In order to find out whether there is a causal relation between mismatch and labour market efficiency of matching unemployment and vacancies (at the regional level), we estimate equation [5] with the mismatch index incorporated. The estimation results of the matching function including the effect of the region-specific occupational mismatch (MM_o) are presented in table 3.

First, we re-estimated the matching model for the period 1980-86 without including the mismatch indicator. Again, we were allowed to impose the restriction of constant returns to scale and equality of the time dummy variables for the period 1982-86 (see the F-statistics at the bottom of the table). By doing so we arrive at the third estimate of table 3. It is clear that the parameters are nicely corresponding to the estimated coefficients for the period 1980-88. Hence, again we find that the functioning of the Dutch labour market has improved in the beginning of the eighties and remained stable in the subsequent years.

Finally, we extended the model by incorporating the effect of labour market mismatch measured by using regional data on the occupational composition of unemployment and vacancies (see equation 7). The final estimate in table 3 shows a negative (but insignificant) effect of occupational mismatch, while the other parameters are roughly the same as in the other specifications. In short, we conclude that our results for the matching function are hardly changed when a structural variable such as the degree of labour market mismatch is taken into account.

Table 3 Estimation results of the matching function (1980-86)

	(1)	(2)	(3)	(4)
Constant	-3.79 (2.3)	-2.31 (3.9)	-1.24 (3.1)	-0.97 (2.1)
α	-0.30 (0.5)	0.28 (1.1)	0.18 (1.7)	0.19 (1.8)
ß	0.67 (2.6)	0.72 (-)	0.82 (-)	0.81 (-)
regions				
Groningen	0.52 (2.2)	0.45 (2.0)	0.47 (2.2)	0.56 (2.4)
Friesland	0.83 (3.6)	0.88 (3.9)	0.90 (4.1)	0.96 (4.3)
Drenthe	0.55 (2.2)	0.67 (3.1)	0.68 (3.1)	0.76 (3.3)
Overijssel	0.39 (1.7)	0.47 (2.2)	0.47 (2.2)	0.51 (2.3)
Gelderland	0.07 (0.3)	0.19 (0.9)	0.19 (0.9)	0.20 (0.9)
Utrecht	0.08 (0.2)	0.37 (1.2)	0.29 (1.2)	0.31 (1.3)
Noord-Holland	0.11 (0.3)	0.33 (1.1)	0.26 (1.1)	0.26 (1.1)
Zuid-Holland	-0.07 (0.2)	0.20 (0.7)	0.14 (0.6)	0.22 (0.9)
Zeeland	0.30 (0.8)	0.58 (2.3)	0.53 (2.4)	0.65 (2.7)
Noord-Brabant	0.47 (2.0)	0.54 (2.5)	0.53 (2.4)	0.54 (2.5)
Limburg	-	-	-	-
years				
1980	-	-	-0.86 (4.5)	-0.74 (3.5)
1981	0.53 (1.3)	0.29 (0.9)	-0.46 (3.6)	-0.39 (2.8)
1982	0.94 (1.5)	0.54 (1.1)	-	-
1983	1.24 (1.8)	0.73 (1.6)	-	-
1984	1.39 (2.2)	0.88 (2.4)	-	-
1986	1.21 (2.3)	0.75 (3.5)	-	-
MM_o	-	-	-	-0.16 (1.2)
R^2	0.62	0.62	0.62	0.62
ssr	6.73	6.86	7.39	7.19
n	66	66	66	66

t-values between parentheses; R^2 is corrected for degrees of freedom,
ssr = sum of squared residuals; n = number of observations

specification tests:

	F-statistic		critical value (at 5%)
(2) versus (1)	0.90	<	4.07
(3) versus (2)	0.76	<	2.43
(3) versus (4)	1.42	<	4.06

5. CONCLUSIONS

In this paper we focused on the functioning of regional labour markets in the Netherlands during the eighties by examining differences in labour market efficiency. To this end, we started with exploring the possibility to apply a traditional UV-approach. It is argued that this method can only provide valid conclusions considering labour market efficiency when the flow of filled vacancies is constant over the estimation period. This condition is violated for the Netherlands during the eighties. Consequently, we based our conclusions on the results of the dynamic matching approach which regards unemployment and vacancies to be determinants of the number of matches.

The estimation results show that the matching process can be described by a "search production" function with constant returns to scale (parameter on vacancies is about 0.75). We also find that efficiency increased significantly in the economic recession that took place at the beginning of the eighties. A possible explanation for this phenomenon might be that the scarcely available vacancies induced unemployed workers to increase their search intensity and to accept job offers more frequently than before. We could not identify important regional differences in labour market efficiency, indicating that unfavourable regional labour market condition are mainly caused by a lack of regional demand. This implies that regional labour market policies should attempt to stimulate labour demand to reduce unemployment. How to accomplish this increase in demand is a different matter.

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APPENDIX A: Job vacancies: stocks and durations

In this appendix, we first present a non-parametric method for the estimation of completed vacancy duration from stock data classified by duration groups. The duration intervals are less than one month, between one and three months, between three and six months, and more than six months. It can be shown that the expected vacancy duration V_d can be written as (see for example, Gorter (1991):

$$V_d = S(1) + S(3)\ .2 + \frac{S(6)}{1-\frac{S(6)}{S(3)}}\ .\ 3 \qquad \text{(A.1)}$$

where S(t) - the so-called survivor function (evaluated at t=1,3,6 months) - is estimated by

$$S^*(t) = \frac{N(t)}{N(0)} \qquad \text{(A.2)}$$

with

N(0) = the total number of vacant jobs in the stock

N(t) = the number of jobs that are vacant for more than t months, t=1,3,6

Second, the estimation results of completed vacancy duration for the Dutch provinces over the period 1980-88 are shown in the Figures A1, A2, A3 and A4.

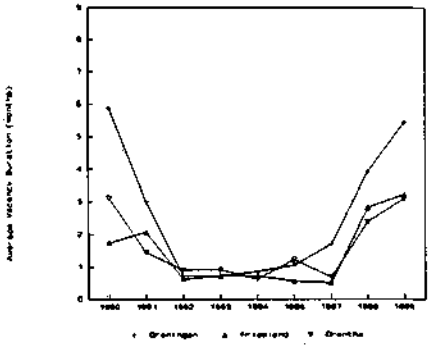

Figure A1 North

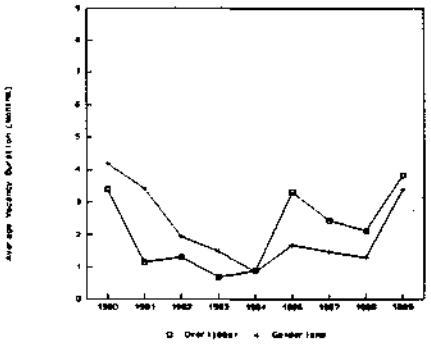

Figure A2 East

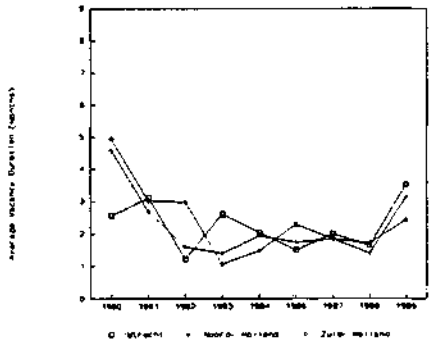

Figure A3 West

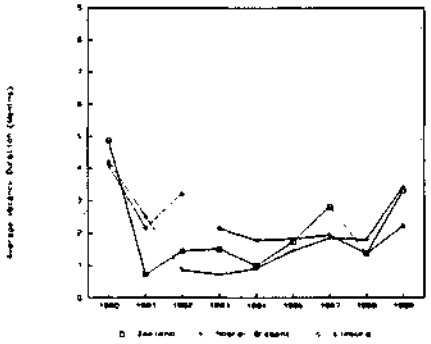

Figure A4 South

APPENDIX B : Estimation results of the UV-curve

	(1)	(2)	(3)	(4)
Constant	-2.18 (7.4)	-1.43 (5.5)	-1.95 (7.2)	-2.12 (7.2)
β/α	0.06 (0.9)	-0.02 (0.4)	0.10 (1.6)	0.09 (1.5)
regions				
Groningen	0.22 (4.1)	0.23 (5.4)	0.14 (2.7)	0.11 (2.0)
Friesland	0.06 (1.0)	0.20 (3.9)	-0.02 (0.4)	-0.04 (0.8)
Drenthe	-0.11 (2.0)	0.02 (0.4)	-0.14 (2.6)	-0.17 (3.0)
Overijssel	-0.08 (1.5)	0.04 (0.8)	-0.12 (2.3)	-0.13 (2.5)
Gelderland	-0.13 (2.5)	-0.08 (1.9)	-0.16 (3.1)	-0.17 (3.3)
Utrecht	-0.50 (9.1)	-0.27 (4.8)	-0.60 (11.1)	-0.60 (11.3)
Noord-Holland	-0.36 (6.4)	-0.20 (4.0)	-0.47 (8.5)	-0.47 (8.5)
Zuid-Holland	-0.41 (7.8)	-0.31 (7.0)	-0.50 (9.5)	-0.52 (9.7)
Zeeland	-0.46 (9.0)	-0.25 (4.7)	-0.48 (9.4)	-0.52 (9.2)
Noord-Brabant	-0.12 (2.4)	-0.07 (1.7)	-0.12 (2.3)	-0.12 (2.4)
Limburg	-	-	-	-
years				
1980	-	-	-	-
1981	0.52 (8.7)	0.32 (5.8)	0.54 (10.2)	0.55 (10.4)
1982	0.86 (10.7)	0.38 (3.9)	0.90 (12.3)	0.91 (12.6)
1983	1.17 (17.9)	0.44 (3.6)	1.20 (20.4)	1.22 (20.3)
1984	1.12 (22.5)	0.34 (2.7)	1.13 (26.0)	1.18 (22.2)
1986	0.95 (20.3)	0.26 (2.3)	0.94 (23.1)	0.97 (21.1)
1987	0.87 (18.4)	0.18 (1.6)	-	-
1988	0.86 (19.0)	0.18 (1.6)	-	-
LONG	-	0.73 (6.4)	-	-
MM_o	not included	not included	-	0.05 (1.5)
R^2	0.94	0.96	0.96	0.96
ssr	0.73	0.45	0.39	0.37
n	88	88	66	66

t-values between parentheses; R^2 is corrected for degrees of freedom,
ssr = sum of squared residuals; n = number of observations

for each region and time period we define:
LONG = the relative number of long-term unemployed;
MM_o = occupational mismatch as defined in equation [7];

MAP A The provinces in the Netherlands

Legend:

Gr = Groningen
Fr = Friesland
Dr = Drenthe
Ov = Overijssel
Fl = Flevoland
NH = Noord-Holland
ZH = Zuid-Holland
Ge = Gelderland
Ut = Utrecht
Zl = Zeeland
NB = Noord-Brabant
Li = Limburg

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