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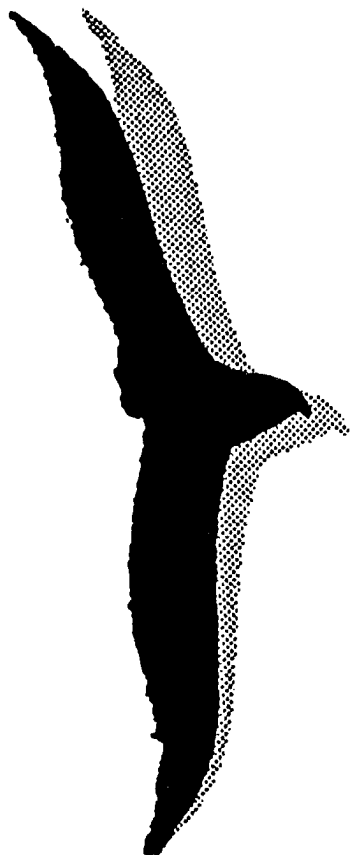
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The flow approach in the Netherlands;
an empirical analysis using regional information

Cees Gorter
Jan C. van Ours

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The flow approach in the Netherlands; an empirical analysis using regional information

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Cees Gorter

Free University Amsterdam and Tinbergen Institute, Departmen t of Regional Economics, De Boelelaan 1105, 108 1 H V Amsterdam, The Netherlands

Jan C. van Ours

Tinbergen Ins titute and Erasmus Universit y, Oos tmaaslaan 950-952, 3063 DM Rotterdam, The Netherlands

Summary

In this paper we apply the flow approach to the Dutch labour market using two sets of regional data. From the first set we estimate matching functions for unemployed using data on the period 1980-1993. Using the second dataset we compare matching functions for unemployed and employed job seekers using data on the period 1981-1985. We conclude that the efficiency of the Dutch labour market has not worsened during the 1980s and that there are no differences in labour market efficiency between regions. Furthermore, we conclude that unemployed and employed job seekers have a different matching technology, while there are no regional differences in the matching technology. Finally, we conclude that the matching function has constant returns to scale.

1. Introduction

In recent years the flow approach to the labour market has become important in both theoretical and empirical research (Blanchard and Diamond 1989, Jackman, Layard and Pissarides 1989). This approach seems to undergo a major revival: the interaction between flows and stocks in the labour market was already stressed by Holt and David, 1966.

A frequently used instrument to analyze interactions between flows and stocks in the labour market is the matching or "search production" function'. This function specifies the relationship between the flow of matches (M_t) in a short time period and the stocks of unemployed and employed job seekers (U, and S_t) and vacancies (V_t) at the beginning of that period. An important role is played by the constant term in this relationship since it reflects the efficiency of the labour market.

In this paper we deal with several issues related to the matching function for the Dutch labour market. We use two different sets of regional labour market data of which the characteristics allow us to analyze different issues. In particular, we aim to investigate whether there are differences in matching technology (reflected via the flow elasticities) across regions or between different groups of job seekers. Unfortunately, we have to treat these issues separately using different (regional) data sources since none of our datasets is "rich enough" to consider the two issues simultaneously.

The first issue (i.e., the regional variation) is tackled by using the first dataset which allows us to examine regional differences in matching technology. With the first dataset we also investigate whether or not there are changes in labour market efficiency over time. With the second dataset we deal with the second issue, i.e., we look at differences in the matching process for employed and unemployed job seekers. In a lot of empirical studies employed job seekers are ignored, usually because of a

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[1] For recent applications of this approach to migration flows see for example, Plane and Rogerson (1986) and Jackman and Savourin (1992).

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lack of suitable data.

This paper is set up as follows. Section 2 describes the two models we use to analyze the Dutch labour market. In Section 3 we discuss some empirical characteristics of the Dutch regional labour markets. Section 4 presents the results of an analysis based on annual regional data for the period 1980-1993. This analysis focuses on regional differences in matching technology and changes in labour market efficiency over time. Section 5 presents the analysis of matching functions for employed and unemployed job seekers based on regional data for the years 1981, 1983 and 1985. Section 6 concludes.

2. The models

Our analysis starts with a general relationship in which the total flow of filled vacancies (F) depends on the numbers of unemployed job seekers, employed job seekers (S), vacancies for unemployed (V_u) and vacancies for employed job seekers (V_s)[2]:

$$F_{it} = \lambda_{1it} \ U_{it}^{\alpha i} \ V_{uit}^{1-\alpha i} + \lambda_{2it} \ S_{it}^{\beta i} \ V_{sit}^{1-\beta i} \tag{1}$$

i relates to region i, t to time-period t,
λ is an indicator of regional labour market efficiency, and
α and β are the flow elasticities.

In equation (1) unemployed and employed job seekers may experience a difference in regional labour market efficiency when λ_{1i} is not equal to λ_{2i}. Furthermore, the matching technology may differ (i) between employed and unemployed job seekers when α_i is not equal to β_i and (ii) between regions when α_i is not equal to α_j (or ß$_i$ not equal to ß$_j$). Finally, vacancies for unemployed job seekers may differ from those open to employed job seekers when V_{ui} is not equal to V_{si}.

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[2] We start our analysis with a matching function that exhibits constant returns to scale. In our empirical applications, we test whether this assumption holds.

As indicated in the introduction we use datasets which separately do not contain sufficient information to estimate equation (1). Therefore, we perform separate estimates on restricted versions of equation (1). By combining the results of the separate estimates we intend to get information on all the parameters involved.

We estimate two different models, investigating different characteristics of the matching process. The first model is estimated on annual regional data over the period 1980-93. For this period we have information on the numbers of unemployed and vacancies and the number of filled vacancies. The second model is estimated on regional data for the years 1981, 1983 and 1985. For these years we have information on the numbers of employed and unemployed job seekers, the number of vacancies and the flows of vacancies filled by employed and by unemployed job seekers. So, we have less detailed information over a longer period of time and more detailed information over a shorter period of time.

In the first model we make the following assumptions:
- employed and unemployed workers face the same matching technology: $\alpha_i = \beta_i$;
- in each region the ratio of employed and unemployed job seekers is constant over time, while this ratio may be different across regions: $S_{it}/U_{it} = c_{1i}$;
- both the number of vacancies available for employed and unemployed job seekers are a constant fraction of the total number of regional vacancies: $V_{uit} = c_{2i} \cdot V_{it}$ and $V_{sit} = c_{3i} \cdot V_{it}$.
- there is a constant difference over time between the regional labour market efficiency of employed and unemployed job seekers: $\lambda_{2it}/\lambda_{1it} = c_{4i}$;
Using these assumptions we can rewrite equation (1) as:

$$F_{it} = \lambda_{1it} \, U_{it}^{\alpha i} \, V_{it}^{1-\alpha i} \, [c_{2i}^{1-\alpha i} + c_{4i} \cdot c_{1i}^{\alpha i} (c_{3i}/c_{2i})^{1-\alpha i}] \tag{3}$$

which we can rewrite as:

$$F_{it} = \lambda^{*}_{it} \, U_{it}^{\alpha i} \, V_{it}^{1-\alpha i} \tag{4}$$

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where $\lambda^{\bullet}_{it}$ now incorporates time dependent regional differences in labour market efficiency, but also regional differences in the ratio of unemployed to employed job seekers (c_1), regional differences in the ratio of vacancies open to unemployed and vacancies open to employed job seekers $(c_,, c_,)$ and regional differences in the ratio of regional labour market efficiency of employed and unemployed job seekers $(c_,)$.

With this first model we can test whether labour market efficiency changes over time (while the model allows for regional or "fixed" effects). Furthermore, we can test whether there are regional differences in matching technology: $a_i = a$?

In the second model we make the following assumptions:
- the labour market efficiency does not change over time: $\lambda_{1it} = \lambda_{1i}$, $\lambda_{2it} = \lambda_{2i}$;
- there are no regional differences in matching technology: $a_i = a$, $\beta_i = \beta$;
With this second model we can test whether there are regional differences in the efficiency of the labour market: $\lambda_{1i} = A_,, \lambda_{2i} = \lambda_2$? Furthermore, we can test whether there are differences in matching technology between employed and unemployed job seekers: $a = \beta$? Finally, we can test whether vacancies available to employed job seekers are the same as vacancies available to unemployed job seekers: $V_u = V_,$?

The second model looks then as follows:

$$F_{u,it} = \lambda_{1i} U_{it}^{a} V_{uit}^{1-a} \qquad (5a)$$

$$F_{s,it} = \lambda_{2i} S_{it}^{\beta} V_{sit}^{1-\beta} \qquad (5b)$$

For both types of models (and their corresponding datasets), we investigate whether the matching function has constant (sum of flow elasticities = 1), decreasing (sum of flow elasticities < 1), or increasing (sum of flow elasticities > 1) returns to scale[3].

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[3] Pissarides (1990) argues that the matching function must have constant returns to scale to arrive at an unique equilibrium in the labour market.

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2. The Dutch labour market (1980-93)

In this section we show that the Dutch labour market is characterized by enormous discrepancies between supply and demand since the beginning of the 1980's. To elucidate this phenomenon, we present the pattern of unemployment, vacancies and matches (flow of filled vacancies) during 1980-93 in Figure 1.

We observe a huge rise of unemployment during the major recession at the beginning of 1980's. Afterwards, the level of unemployment remains high with only a gradual decline during the recovery period during the mid 1980's. It should be noted that the sharp decrease in 1989 is mainly due to a change in definition of unemployment (which causes a drop of about 45%).

The number of vacancies decreased sharply at the beginning of the 1980's (there are hardly any vacancies left in the economy). During the period of economy recovery (with high employment growth) in the mid-1980's we also observe a growing number of vacancies. A high peak of the number of vacancies occurs at the end of the 1980's (1989-1990), but there appears to be a rapid decline afterwards (to the level of 1981).

The flow of filled vacancies is increasing considerably during the 1980's and reaches its maximum level in 1987-1988, then it rapidly declines in 1989-1990 and reaches a second peak in 1991. At the end of our observation period (1991-93), it falls back, however, to the low level of the beginning of the 1 980's[4].

When we look at the pattern of regional unemployment and vacancies, it is interesting that similar movements over time for all regions can be observed. The level of unemployment and vacancies is, however noticeably different across regions. In particular, the northern (peripheral) regions suffer from high unemployment rates and low vacancy-rates (see, for more details, Gorter et al., 1994).

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[4] It is noteworthy that traditional UV-analysis cannot be used to determine labour market efficiency since the flow of filled vacancies is not stable over time.

Fiqure 1   **Unemployment, vacancies and matches (1980-93) in the Dutch labour market**
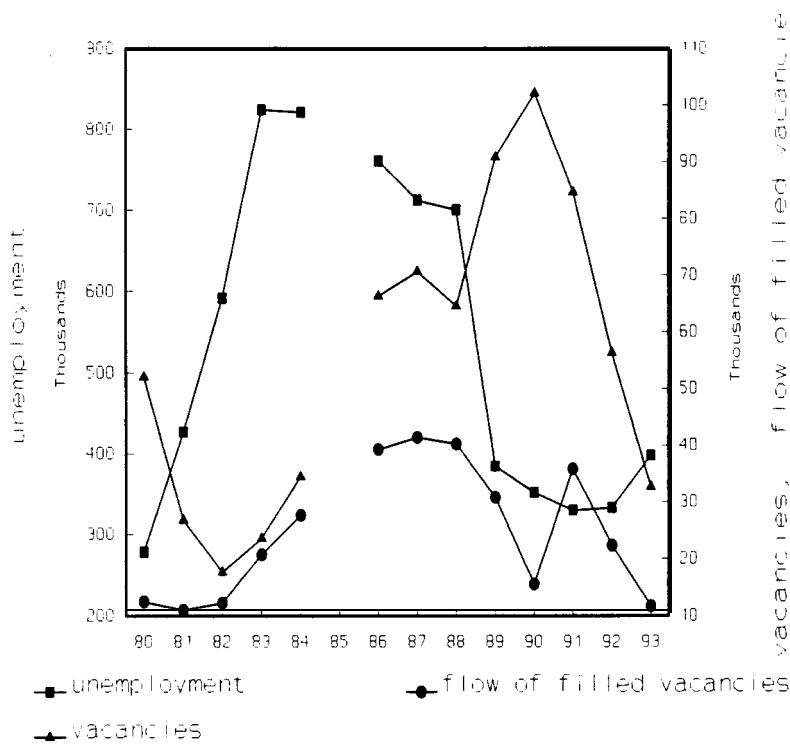
3. Regional flow elasticities and labour market efficiency 1980-1993

The analysis in this section build on a recent study for Dutch regional labour markets by Gorter and Van Ours (1994) who use the matching approach to identify to what extent the differences in unemployment and vacancy rates are due to differences in regional labour market performance. They find that regional differences in efficiency appear to be small for most regions (during 1980-88), suggesting that a reduction in regional unemployment should be achieved by stimulating regional labour demand.

In this section we use pooled cross-section time series data on vacancy duration, vacancy and unemployment stock for the period 1980-93. After dividing both sides of equation (4) by V we get:

$$Tv_{it} \; = \; (1/\lambda_{it})U_{it}{}^{-\sigma i}V_{it}{}^{1-\sigma i} \tag{6}$$

with Tv defined as mean vacancy duration (and equal to V/F when we assume a steady state labour market).

We put equation (6) in a linear form which can be easily estimated:

$$\ln Tv_{it} = \ln(1/\lambda_{it}) - \alpha_i(\ln V_{it} - \ln U_{it})$$ (7)

To estimate our model, we need regional data on the stock of unemployment, the stock of vacancies and vacancy durations. The first two are directly available from the Dutch Central Bureau of Statistics[5]; the third, however, has to be derived from information on the stock of vacancies, cross-classified by region (province) and elapsed duration groups over the period 1980-93. This information is from a vacancy survey which is held periodically except in 1985. We computed completed vacancy durations for each region by applying a non-parametric method (namely, the Kaplan-Meier estimator) for the estimation of mean vacancy duration from data on the duration-composition of the stock (see, for more details, Gorter and Van Ours, 1994).

We allow A, and α to vary among regions by using dummy-variables. Because of a change in the definition of unemployment we introduce a "definition-dummy (DD)". We also include trend-variables (i.e., a third-order polynomial of time t), with an interruption for the missing year 1985.

Estimation of equation (7) leads to the following outcomes. We only present variables that appear to be significant in the final specification of the model (standard errors in parenthesis)[6].

```
lnTv =   1.90  -  0.80*LIMB  +  0.68*DD  -  0.06*t  +
        (0.17)   (0.40)        (0.15)      (0.02)

      - [  0.39  -  0.39*LIMB  ] * (lnV-lnU)                    (8)
         (0.05)    (0.15)
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[5] There is however, a change in the definition of unemployment from 1989 onwards.

[6] LIMB=province of Limburg

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Adjusted R Square = 0.488, Standard Error = 0.441,
Residual Sum of Squares = 28.591, F = 28.090

Interestingly, we do not find region-specific effects in the matching technology as measured by the estimated parameters on unemployment and vacancies (except for Limburg). Again with the exception of Limburg, we also do not observe differences in the regional or fixed effects that include regional differences in labour market efficiency[7].

The regional labour market of Limburg shows a high parameter value on vacancies (close to 1) which means that unemployment has little or no effect on vacancy duration in Limburg. Moreover, the constant term appears to be significantly higher in Limburg. The different results of Limburg might be explained by its specific geographical location at the German-Belgium Border. It is plausible that jobs in the region of Limburg attract people living in the adjacent border regions in Germany and Belgium, so that the potential reservoir of unemployed job seekers within the region is hardly utilized when filling vacancies.

It is also noteworthy that the estimate for *a* (equal to about 0.4) corresponds to the value found by others for the Dutch labour market (see Belderbos and Teulings, 1988, Van Ours, 1991, Gorter and Van Ours, 1994).

When we relax the constant returns to scale assumption in the matching function, we obtain the following results:

$$\ln Tv = 1.47 + 0.71\ DD - 0.06\ t - 0.33\ \ln U + 0.37\ \ln V \quad (9)$$
$$(0.54) \quad (0.16) \quad (0.02) \quad (0.07) \quad (0.08)$$

Adjusted R Square = 0.463, Standard Error = 0.451,
Residual Sum of Squares = 28.085, F = 31.653

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[7] Note that in previous studies of regional differences in labour market efficiency favourable results were found for the Northern provinces (see Gorter, 1991, Van Ours, 1992 and Gorter and Van Ours, 1994). The latter study was however, based on a shorter observation period (1980-88), while the first two were based on different empirical models and other data sources (i.e., unemployment and vacancy duration).

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In this unrestricted model, we find no significant regional effects at all. Moreover, it appears that the sum of the flow elasticities is equal to 0.96. So, we may conclude that the matching relation exhibits constant returns to scale (i.e., the restriction of the sum equal to 1 can be imposed).

We proceed our analysis next by testing our (restricted and unrestricted) models on misspecification. First, we have to check whether our results are not biased due to autocorrelation. Looking at the results of the latter (unrestricted) model specification, the Durbin-Watson statistic (1.85) and a visual (graphical) inspection of the residuals show no reasons for concern. So we do not have indications of a misspecified model due to autocorrelation. Second, we would like to test for heteroscedasticy. Performing the Goldfeld-Quandt test for our dataset reveals that heteroscedasticy is not present in the unrestricted model. Moreover, a graphical check of our residuals confirms that there are no residual problems.

Similar results are obtained when we perform these tests for the model in which a constant returns to scale matching function is assumed.

The efficiency-parameter λ is estimated by using the results for the constant term ($c = \ln(1 /\lambda)$). Using our second (unrestricted) model specification, we simply get

$$\lambda = \exp(-1.47-0.71 \ DD +0.06t) \tag{10}$$

DD is the definition-dummy and t is the linear trend component (with an interruption at 1985). Likewise we calculate k for the Netherlands and Limburg using the results from the restricted model. Efficiency is lower in the restricted model, and only in Limburg efficiency is higher. There is a sharp decrease in labour market efficiency in 1989. This could be due to a "genuine" fall in efficiency for that period or due to a statistical effect, i.e., the influence of the change in definition of unemployment on our estimates. Therefore, we would like to assess the extent to which the new definition of unemployment causes a decrease in labour market

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efficiency. Suppose U is unemployment using the old definition and U^* is unemployment using the new definition. The relationship between these two values is $U^* = \mu U$, as the change in the definition reduces unemployment with a fraction (1 $-\mu$). Our data series on unemployment (U) consists - in fact - of a combination of U and U^*. So in later years the term $a \text{Ln} U$ becomes $a \text{Ln} U^* = a \text{Ln} \mu U = a \text{Ln} \mu + a \text{Ln} U$ in which μ is a constant. The value of μ is difficult to determine because we do not observe U(89). We computed μ as $U^*_{NL}(89)/U_{NL}(88)$ which makes $a \text{ln} \mu$ equal to 0.2 (with $a = 0.328$). Since there are no regional variations in μ, this is the most straightforward choice. The "adjustment factor" $\lambda^* - \lambda$ can now be easily calculated as[8]

$$\lambda^* - \lambda = \exp(-1.47 - 0.71 DD + 0.06t + 0.2DD) - \exp(-1.47 - 0.71 DD + 0.06t) \quad (11)$$

In Figure 2, we observe that the "genuine" decline in labour market efficiency at the end of the 1980's is quite significant.

It is noteworthy that the decline in labour market efficiency coincides with the rapid increase in vacancy duration during 1989-90[9]. In sum, we conclude from our estimates that labour market efficiency is rising in the recession (80-83) and also during the recovery period (84-88), is falling dramatically when entering a boom (1989-90) and is returning to about its initial level of the beginning of the 1980's (in 1991-93)[10]. The latter observation implies that the regions showed no deterioration of the labour market's functioning over the business cycle (1980-93).

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[8] We implicitly assumed that the change of definition only affects the absolute size of unemployment which seems justified because the correction in the unemployment data is mainly a matter of excluding incorrect registrations.

[9] The pattern of labour market efficiency can also be investigated by plotting the so-called "change-duration" curves (see for more details, Gorter et al., 1994).

[10] We carry out an additional test on the robustness of this result by re-estimating the matching model with time dummies included (instead of the third-order polynomial of time t). The pattern of labour market efficiency over time shows up as before: increasing during 1980-84, more or less constant in 1986-88, sharply decreasing in 1989 and 1990, and returning to (at least) its initial level in 1991-93. Moreover, the conclusion of no region-specific effects remains unchanged.

Figure 2 Labour market efficiency in the Netherlands (1980-93)
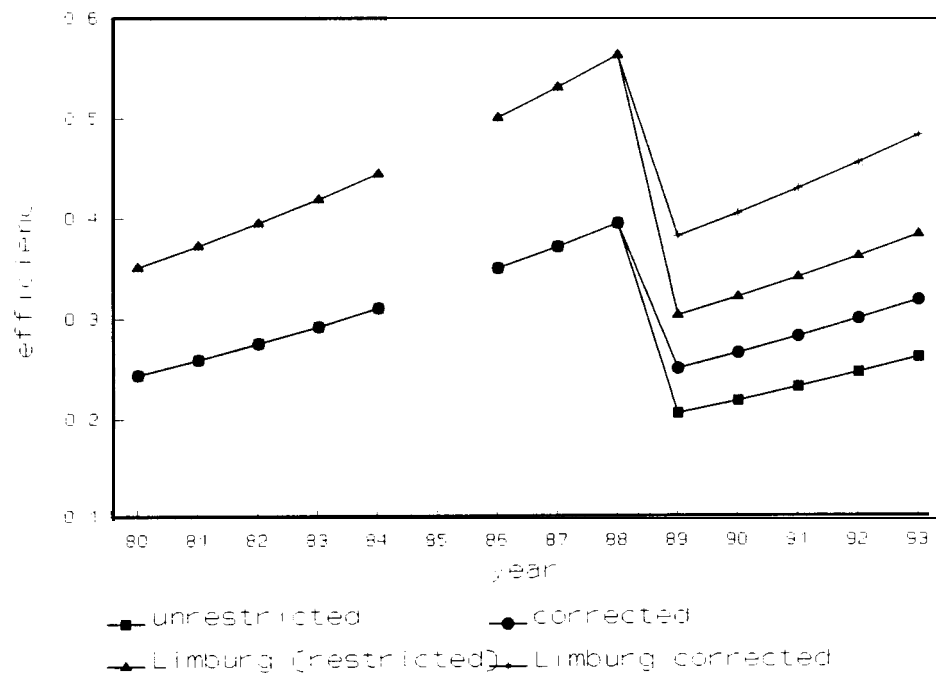
5. Employed and unemployed job search

There are two opposite cases with respect to employed and unemployed job search. Employed and unemployed job seekers may be in different pools applying for different vacancies and competing only among themselves. They may also be in the same pool competing for the same vacancies. Previous research suggests that an intermediate situation applies: employed and unemployed job seekers are in different pools partly competing for the same vacancies (Van Ours, 1995).

Therefore, we start our investigation by assuming that there are separate pools for employed and unemployed job seekers and thus there are separate matching functions. We assume that the number of employed job seekers is a constant fraction of the number of employed workers

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(E)[11] and we assume that both matching functions have constant returns to scale:

$$F_{u,it} = \lambda_{1i}\, U_{it}^{\alpha}\, V_{uit}^{1-\alpha} \tag{12a}$$

$$F_{e,it} = \lambda_{2i}\, E_{it}^{\beta}\, V_{eit}^{1-\beta} \tag{12b}$$

in which V_u are the vacancies relevant for unemployed job seekers and V_e are the vacancies relevant for employed job seekers. Employed and unemployed job seekers compete if the stocks of vacancies are partly or completely overlapping.

To estimate the matching functions in (12a) and (12b) we use information on stocks and flows of job seekers from Dutch labour force surveys held in 1981, 1983 and 1985 (Belderbos and Teulings 1988). There are data for 8 regions, so for both employed and unemployed job search there are 24 observations.

The flow information is based on a comparison of the labour market situation at the moment of the survey with the situation one year before. If a person had a job on the survey date and one year before was a student, doing his military service, was outside the labour market or had a job but was bound to loose it, this person is considered to be an unemployed worker who found a job. If a person had a job on the survey data and one year before had a different job, and the job change was to get a better job, this person is considered to be an employed job seeker who found a new job.

In the analysis both the information on the number of notified vacancies and the total number of vacancies is used. The information on notified vacancies is collected by the public employment offices and comes from the Ministry of Social Affairs and Employment. The information on the total number of vacancies is collected by regular vacancy surveys and comes from the Central Bureau of Statistics. Since employers

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[11] We also estimate the model by using the direct information on the number of employed job seekers (S), but this model appears to perform much worse than the model that assumes S to be a fraction of total employment (E).

sometimes use more than one recruitment channel per vacancy (see, e.g., Russo et al., 1994) we assume that

$$V_u = V_n + \delta_1 (V - V_n) \tag{13a}$$

$$V_e = \delta_2 V_n + (V - V_n) \tag{13b}$$

with V_n as the number of notified vacancies and δ_1 and δ_2 as parameters to be estimated. If $\delta_1 = 0$, then only notified vacancies are relevant for unemployed job seekers, if $\delta_1 = 1$ all vacancies are relevant for unemployed job seekers. In the same way, if $\delta_2 = 1$ all vacancies are relevant for employed job seekers and if $\delta_2 = 0$ only those vacancies not notified at the public employment office are relevant for employed job seekers.

An obvious problem with respect to the data is that the empirical model is specified in continuous time while the data refer to discrete time. By ignoring this problem we have two implicit assumptions. First, over the yearly period there is a steady state labour market, meaning that the outflows from the stocks of job seekers and vacancies are compensated by inflows of the same size. Second, the escape rates are not duration dependent, i.e., they do not change over the year.

After taking logarithms we estimate the models by Non-Linear Least Squares. The first column of table 1 shows the estimation results of the basic model. It appears that the flow elasticity of job seekers is higher for unemployed than for employed. The vacancy coefficient δ_1 does not differ significantly from zero, while the vacancy coefficient δ_2 has a value of 0.64, significantly different from zero and from one at conventional levels of significance. This means that for unemployed job seekers only notified vacancies are important. For employed job seekers about 65% of the notified vacancies are relevant plus all vacancies not notified to the public employment office. Since at the beginning of the 1980s about 65% of the notified vacancies were also advertised in newspapers this suggests the

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following[12]. For unemployed job seekers notified vacancies are relevant, for employed job seekers vacancies advertised in newspapers[13]. There is competition between unemployed and employed job seekers for those vacancies for which both the public employment office and advertisements are used as a recruitment Channel. If this is correct the competition between employed and unemployed job seekers is introduced by employers who use different recruitment channels for the same vacancy.

Table 1 <u>Estimation results</u>[a]

	14 regional intercepts		δ_1 restricted to zero	no constant returns to scale
λ_1	1.76 (0.24)	1.69 (0.24)	1.88 (0.28)	2.24 (0.59)
λ_2	0.84 (0.23)	0.99 (0.39)	0.96 (0.38)	0.68 (0.13)
a	0.63 (0.03)	0.62 (0.04)	0.61 (0.04)	0.58 (0.06)
				0.38 (0.04)
β	0.31 (0.07)	0.27 (0.08)	0.27 (0.08)	0.33 (0.13)
				0.72 (0.08)
δ_1	0.16 (0.13)	0.40 (0.24)	0 (-)	0 (-)
δ_2	0.59 (0.20)	0.64 (0.23)	0.69 (0.24)	0.66 (0.24)
RSS,	0.154	0.314	0.383	0.372
RSS$_2$	0.487	0.773	0.776	0.761
R$_1{}^2$	0.972	0.943	0.931	0.932
R$_2{}^2$	0.954	0.928	0.928	0.929

[a] Coefficients are estimated using nonlinear least squares; standard errors in parentheses, RSS = Residual Sum of Squares, R^2 is the correlation coefficient corrected for degrees of freedom.

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[12] From the vacancy surveys of the Central Bureau of Statistics it appears that in October 1981, 1983 and January 1986 for 73%, 56% and 70% additional search channels are used.

[13] A similar outcome is observed for the Dutch labour market in a recent study (see Gorter et al., 1993) in which the focus is on the allocation of vacant jobs to job seekers from a demand-side perspective.

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To check the robustness of the estimation results some sensitivity analyses are performed. The second column of table 1 shows that the estimation results hardly change when the regional specific intercepts are excluded. The third column shows the same when the coefficient δ_1 is restricted to zero. Finally, the fourth column shows the estimation results when both matching functions have no constant returns to scale imposed. It appears that the sum of the flow elasticities of unemployed job seekers is equal to 0.96, while this sum for employed job seekers is equal to 1.05. So, both matching functions indeed have constant returns to scale. All in all it appears that the estimation results are quite robust.

6. Conclusions

In our analysis we use two different datasets to study the matching process in the Dutch regional labour markets. These two datasets differ in the length of time period and the detail of information about the relevant stocks and flows. We have a long dataset with few details and a short datasets with many details. In the analysis we have to make assumptions some of which are the same for each dataset and some of which are dataset-specific.

The following conclusions are the same for both analyses. First, we find no significant differences in regional labour market efficiency. Furthermore, we conclude that matching functions have constant returns to scale.

Some of the conclusions are based on only one of the analyses. From the first analysis we conclude that there are no regional differences in matching technology. From the second, we conclude that there are vacancies for which competition between employed and unemployed job seekers is absent but there are also vacancies for which this competition occurs. The vacancies for which there is competition seem to be equivalent to those vacancies for which more than one recruitment channel is used. The results of this analysis suggest that the competition between employed and unemployed job seekers is introduced by employers who use different recruitment channels for the same vacancy.

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However, we also find that conclusions from one model are not in line with assumptions made in the other model. From the second analysis we conclude that the matching technology for unemployed job seekers is different from that of employed job seekers. This conclusion is at odds with the assumption of the first analysis that the matching technology is the same. Another inconsistency arises because we find a rising level of labour market efficiency at the beginning of the 1980's in the first analysis, while the second assumes that labour market efficiency is constant during this period. For the moment we have no solution for these contradictions since the data we have used are limited in many respects. Consequently we leave some of the issues of the regional matching process to future research.

References

Belderbos R.A. and C.N. Teulings (1988) A New Empirical Specification of the UV-Relation with an Application to the Netherlands, Research Memorandum, University of Amsterdam.

Blanchard, O.J. and P. Diamond (1989) The Beveridge Curve, Brookinas Papers on Economic Activity, nr. 1, 1-76.

Gorter, C. (1991) The Dvnamics of Unemolovment and Vacancies on Reaional Labour Markets. Amsterdam: Thesis Publishers.

Gorter, C., P. Nijkamp and P. Rietveld (1993) The Impact of Employers' Recruitment Behaviour on the Allocation of Vacant Jobs to Unemployed Job Seekers, Empirical Economics, 18 (2), 251-269

Gorter, C., P. Nijkamp and E. Pels (1994) Spatial variations in vacancy duration over the business cycle: An empirical investigation of the Dutch labour market, Paper presented at CURE-II, Ameland, The Netherlands

Gorter, C. and Ours, J.C. van (1994) Matching Unemployment and Vacancies in Regional Labour Markets; an Empirical Analysis for the Netherlands, Papers in Reoional Science, 73, 1-15.

Holt, C.C. and David, M.H. (1966) The Concept of Job Vacancies in a Dynamic Theory of the Labour Market. In: <u>The Measurement and Interpretation of Job Vacancies,</u> National Bureau of Economic Research, New York, 73-110

Jackman, R., Layard, R., and C. Pissarides (1989) On Vacancies, <u>Oxford Bulletin of Economics and Statistics</u>, 6, 377-394.

Jackman, R. and Savouri, S. (1992) Regional Migration in Britain: An Analysis of Gross Flows using NHS Central Register Data. Economic <u>Journal,</u> November

Ours, J.C. van (1991) The Efficiency of the Dutch Labour Market in Matching Unemployment and Vacancies. <u>De Economist,</u> 358-378.

Ours, J.C. van (1992), Regional Differences in the Efficiency of the Dutch Labour Market. In: <u>On the Mysteries of Unemployment,</u> eds. C.H.A. Verhaar and L.G. Jansma, The Netherlands: Kluwer Academic Publishers, 179-188.

Ours, J.C. van (1995) An Empirical Note on Employed and Unemployed Job Search, <u>Economics Letters,</u> *forthcoming*

Pissarides, C. (1990), *Equilibrium unemployment theory,* Cambridge: Basil Blackwell

Plane, D.A. and Rogerson, P.A. 1986, Dynamic Flow Modeling with Interregional Dependency Effects: An Application to Structural Change in the U.S. Migration System. *Demography, 23, 9 1-104*

Russo, G., P. Rietveld, P. Nijkamp and C. Gorter (1994), A Microeconomic Model for Employers' Search in the Labour market: The number of Recruitment Channels, Tinbergen Institute Discussion Paper, Ti 94-156, Tinbergen Institute, Amsterdam

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