SERIE RESEARCH MEMORANDA

THE DURATION OF UNEMPLOYMENT:

Stocks and Flows on Regional Labour Markets
in the Netherlands

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ABSTRACT.

In this paper flows into and out of the stock of unemployed are estimated by means of a statistical method using aggregate data of incomplete unemployment spells. A distinguishing feature of this method is that it is not based on a stationarity assumption of the stock of unemployed. Results are presented for the Netherlands from 1983-1987. Special attention is paid to interregional differences in inflow-outflow patterns of unemployed. An effort is made to explain the observed regional differences in the average length of completed spells of unemployment by differences in professional and demographic patterns and in the number of vacancies per region.

1. INTRODUCTION

Labour markets are the most visible factor markets; they mirror clearly fluctuations in the economy of a country, not only in a quantitative sense (e.g., the activity rate), but also in qualitative terms (e.g., shifts in technologies used).

The current stagnant economies in many countries are reflected in the labour market which also show signs of imbalances and structural changes. The unemployment rates in all countries have shown a dramatic increase (see for detailed information, Fischer and Nijkamp, 1987 and Gordon ,1987). In addition, structural changes (e.g., sectoral shifts, a rise in (female) labour participation rates) have contributed to the mismatch between supply and demand on the labour market. Despite active labour market policies this mismatch appears to be fairly persistent in most countries.

In addition, imbalances on the labour market appear to exhibit also clear (unequal) geographical dimensions, so that here also the dilemma of efficiency versus equity emerges (see for more details section 2). Such a geographical mismatch may be caused by lack of spatial mobility, by rigid professional structures or by specific age compositions in a region (cf. Herzog and Schlotmann, 1984). In recent years, most countries have developed a wide variety of (regional) labour market policies that seek to intervene at both the supply and demand side (manpower programmes, investment subsidies etc).

However, in many analyses a basic problem is often overlooked, viz. the dynamics in the pool of the unemployed. In general, this pool is characterized by a stock- flow process, so that people move in and out. Consequently, it would be a mistake to look only at the stock of unemployed (i.e., the size component) without paying attention to the throughflow (caused by individual changes). Seen from this perspective, the duration of unemployment (i.e., the length of stay of the pool of unemployed) is an equally important indicator for the functioning of a labour market.

It is evident that the duration of unemployment may be closely related to somebody's professional potential and his age, so that various age/professional cohorts may be distinguished. Clearly, professional and demographic patterns may be region-specific, so that the duration of unemployment may exhibit a regional bias. This hypothesis will be tested in the present paper.

Therefore we need to formulate a statistical model for the flows entering and leaving the labour market. This will be done in section 3. In section 4 we will present the empirical results of the estimation method and we will compare the regions with the classification system introduced in section 2. Finally, we will test the hypothesis of a regional bias of unemployment duration by means of a shift-share analysis and a simple regression model in section 5; some concluding remarks will be given in section 6.

2. THE DISTRIBUTION OF UNEMPLOYMENT DURATION.

In this section we will indicate briefly the socio-economic problems related to the duration and distribution of unemployment, at both the individual and the regional level.

2.1. The distribution of unemployment duration: individual level.

The usual measure of unemployment, the unemployment rate has a number of serious shortcomings (see for an overview, among others de Neubourg, 1987). An important limitation is that this rate does not tell us how long people are unemployed. Sometimes we do have a crude assessment of the duration of unemployment (for instance, on the basis of five cohorts: less than 1 month, between 1 and 3 months, between 3 and 6 months, between 6 and 12 months and more than one year unemployed), but for a more reliable insight this information has to be extended toward a more detailed picture. It is important to know how long people on average stay in the state of unemployment, since the duration of unemployment constitutes a measure of both efficiency and equity in the labour market. For instance, if this average period would be very short (e.g. less than 2 months), the problem of unemployment is much less severe than we might think at first glance. It is even plausible that a short period of unemployment might improve mobility and the matching process on the labour market. On the other hand if the average period of unemployment is long we are facing a real problem. In the latter case, often a small part of the labour force (namely the people with a long spell of unemployment) takes account for a large share of total unemployment and then we are facing a highly unequal distribution of (un-)employment.

In addition, it is also interesting to know the chances of the long-term unemployed persons to (re-)enter the labour market (see for example Theeuwes, 1987). It might happen, for instance, that there is a higher rotation of unemployment among people with favourable chances on the labour market because of their education, work experience, age etc., while there might at the same time be no dynamics at all for the group of long-term unemployed people who fail to have the right attributes. If the latter situation were true, we would not only find a higher average length of duration of unemployment for individuals once they leave the state of unemployment, but also a very low chance for long-term unemployed persons to leave this state.

Such an unequal distribution of unemployment will in general be regarded as undesirable by a government concerned with equity. The remedial policy might then for instance particularly focus on reducing the number of long-term unemployed people and not just on reducing indiscriminately the absolute number of unemployed people. For the diagnosis of the condition of the labour market it is therefore necessary to improve the information about the market. Besides the level of unemployment we need information on the inflow rate and the duration of unemployment. Only then we are in a position to see whether for instance a decline in the absolute level of unemployment is due to a decrease in either inflow or duration. The latter may be preferable when we look at it from an "equity" point of view as it seems reasonable to assume that especially long-term unemployment is involuntary and that the disutility of unemployment is progressively growing with duration.

This rising disutility is among others caused by reduced income, social isolation, reduced re-entry chances and stigmatization by the social environment.

2.2. The regional distribution of unemployment.

On the basis of the framework discussed in the previous subsection, we will now look at the distribution of unemployment over regions (see for example, Hyclak and Johnes, 1987). Again, the absolute and relative level of unemployment does not provide us with satisfactory information to enable us to conclude which region has the worst (or the best) performance of the labour market. For instance, a region with a higher level of unemployment might be ranked in a wrong order relative to a region with a lower level of unemployment, simply because the former region might have a much shorter average duration (but a higher inflow rate). In order to classify regions of a national system we have to use measures of regional inflow and regional duration compared to the national figures. This helps us to develop a more comprehensive explanation of why unemployment rates vary between regions. Do more people become unemployed in a certain area or do they stay longer unemployed in that area? This is actually the same question as in the previous paragraph, but now placed in a meso context.

In Figure 2.2.1 we show an example of a regional classification (cf. Armstrong and Taylor, 1985 a). The regions A and B may have rather similar unemployment rates, but the inflow-duration combinations are quite different.

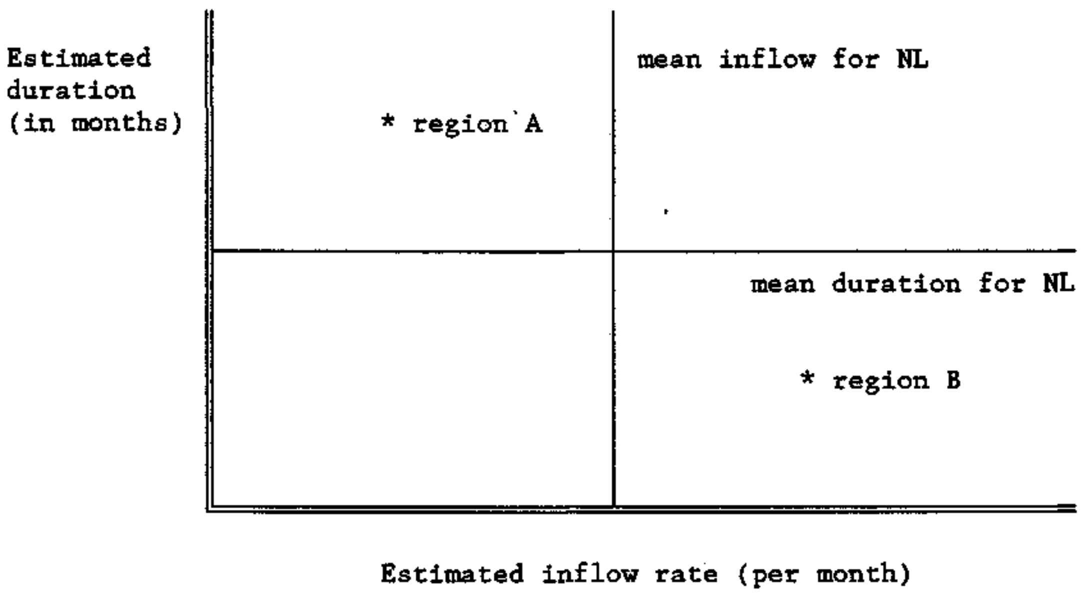


Figure 2.1.1. Unemployment stock, Unemployment Inflow rate and Mean Duration of Unemployment.

This asks for different remedial policies in region A and B. For the reduction of the duration level the following policies may tentatively be assumed to be relevant.

1. Special (re-)schooling programmes for the unemployed to improve their re-employment probabilities (re-entry policy).

2. The creation of new jobs (in the private and/or public sector) to enlarge labour demand (expansion policy).

3. Stimulating interregional mobility of the unemployed to get a better matching of supply and demand (spatial policy).

To arrive at a lower inflow different policies may be suggested, which are more concentrated on current employment and on people entering the labour force. One may think in particular of the following strategies:

1. Provision of the existing firms with incentives (subsidies) to continue their activities (e.g. when they are threatened by a bankruptcy).

2. Special programs for persons newly entering the labour force.

3. Modification of the regular education programmes in order to achieve a better matching of people leaving school with the (vacant) jobs on the labour market.

3. THE STATISTICAL MODEL.

In this section a statistical model will be formulated for the flows entering and leaving the stock of unemployed during each month. Since data on these flows are not available in the Netherlands, one needs a method to determine them in an indirect way. For this purpose, we will use data of registered unemployed people according to their duration of registration. Under certain conditions these figures can be used to estimate the inflow and outflow of unemployed persons separately (see for a comparative study of methods, Baker and Trivedi (1985)). We will present these conditions and describe the estimation method in full detail.

3.1. The continuation function.

Consider an individual who becomes unemployed at time 0. Let $p(t)$ be the continuation function i.e. the probability that the individual is still unemployed after a time interval t. If we may assume that the probability of leaving the unemployed stock is constant through time then we arrive at (see Bartholomew, 1973) :

(1) $p(t) = \exp(-ct)$,

where c is the leaving rate ($c>0$).
A relevant property of $p(t)$ as defined in (1) is

(2) $p(t_0+\delta t)/p(t_0) = p(\delta t)$

This means that the continuation function $p(\delta t)$ is not influenced by the past (t_0) (lack of memory is a well-known property of the exponential distribution). Thus, the probability that somebody leaves the stock of unemployed does not depend on the length of the period he was unemployed.

Consider next a cohort of individuals. Then the continuation function of the cohort, $p^c(t)$, is defined as the expected proportion of the cohort which is still vacant after a time interval t. If we may assume that the members of the cohort are homogeneous with respect to the leaving rate c, it is clear that $p^c(t)=p(t)$.

However, the members of the cohort will almost surely differ in many respects. We can think of differences in skill, age, sex, labour market history, region, etc. One way to model the heterogeneity of the members of a cohort is to assume different leaving rates for each individual. Let c be a random number drawn from the probability distribution g(c). Then

$$(3) \quad p^c(t) = \int_0^\infty g(c)*\exp(-ct)dc$$

If g(c) is gamma distributed with parameters α and β, one obtains

$$(4) \quad p^c(t)=(1+\beta t)^{-\alpha}$$

Such a continuation function (defined for a heterogeneous group of unemployed) has no longer the property that $p^c(t+\delta t)/p^c(t)$ is constant. The average probability for group members of staying unemployed one extra period is increasing with the preceding period of unemployment. This is because individuals with a high leaving rate will on average leave the unemployed stock earlier than other individuals. Hence, the composition of the cohort is gradually changing: the proportion of individuals with a low probability of leaving the stock increases more and more over the course of time. The gradual change in the average leaving rate of the group is due to the heterogeneity of the individuals. Unfortunately we do not have data on individual characteristics at the aggregated level to determine what kind of heterogeneity is responsible for the difference in leaving rate.

Without data on individual characteristics it is also impossible to distinguish between heterogeneity and duration dependence (see for a model with both duration dependence and heterogeneity, Kooreman and Ridder, 1983). Positive duration dependence means that people stay unemployed because they are already unemployed for some period.

3.2. The estimation method.

The basic idea is to compare a constructed distribution of duration of unemployment (in cohorts with a duration difference of one month) with the known distribution of duration of unemployment. The Central Bureau of Statistics publishes each month the number of unemployed registered at the Labour Exchange Office by age,province and duration of registration. The latter type of data will be used here. The duration classification exists of five parts, namely less than one month, between one and three months, between three and six months, between six and twelve months and more than twelve months unemployed.

If we might assume that the labour market is in a stationary state, it is not so difficult to estimate the duration of unemployment with these data. However, in reality the labour market is never in a stationary state because of seasonal fluctuations, and fluctuations related to the business cycle. Therefore, we have developed an estimation method which does not rest on the assumption that inflow and outflow have been constant for a long period. This assumption is replaced by the much weaker assumption that inflow and outflow remain unchanged during one month only (i.e. the time difference between two measurements points). Thus first, the continuation function is assumed constant for one month and second, the rate of inflow is also constant during that period. From a cohort of size N entering the state of unemployment remains after one month $N*p_1^c(1)$ unemployed and after two months because of the changing conditions $N*p_1^c(1)* p_2^c(2)/p_2^c(1)$ with

$$(5) \quad p_1^c(t) = \int_0^\infty g_1(c)*\exp(-ct)dc$$

and

$$p_2^c(t) = \int_0^\infty g_2(2)*\exp(-ct)dc$$

where $g_\tau(c)$ is the distribution of leaving rates during period τ.

Now define $A_\tau(i)$ as the expected number of unemployed with a duration of unemployment between i-1 and i months at the beginning of period τ and $N_\tau(1)$ as the number of unemployed who entered the stock during one month before the end of period τ.

Then

$$(6) \quad A_{\tau+1}(1) = N_\tau(1) * \int_0^1 p_\tau^c(t)dt$$

and

$$A_{\tau+1}(2) = N_{\tau-1}(1) * \int_0^1 p_{\tau-1}^c(t)*p_\tau^c(t+1)/p_\tau^c(t)dt$$

thus

$$(7) \quad A_{\tau+1}(2) = A_\tau(1)*\int_0^1 p_{\tau-1}^c(t)*p_\tau^c(t+1)/p_\tau^c(t)dt \;/\; \int_0^1 p_{\tau-1}^c(t)dt$$

In the same way it can be derived that

$$A_{\tau+1}(3) = A_\tau(2)*\int_1^2 p_{\tau-1}^c(t)*p_\tau^c(t+1)/p_\tau^c(t)dt \;/\; \int_1^2 p_{\tau-1}^c(t)dt$$

.
.
.
.

etc

So we are able to express the expected value of the number of unemployed in terms of the expected values of stocks one month before and of the continuation functions of period τ and τ-1. To represent all information in terms of period τ we approximate

$$(8) \quad \int_{i-1}^{i} p_{\tau-1}^{c}(t)*p_{\tau}^{c}(t+1)/p_{\tau}^{c}(t)dt \;/\; \int_{i-1}^{i} p_{\tau-1}^{c}(t)dt$$

by

$$(9) \quad \int_{i-1}^{i} p_{\tau}^{c}(t+1)dt \;/\; \int_{i-1}^{i} p_{\tau}^{c}(t)dt \;.$$

which has obvious computational advantages. In Rietveld (1984) it has been shown that this is a very reasonable approximation with an error term less than 0.2%.

Define the five parts of the stock of registered unemployed as follows:

$B_{\tau+1}(1)$= number with a duration less than 1 month
$B_{\tau+1}(2)$= number with a duration between 1 and 3 months
$B_{\tau+1}(3)$= number with a duration between 3 and 6 months
$B_{\tau+1}(4)$= number with a duration between 6 and 12 months
$B_{\tau+1}(5)$= number with a duration more than 12 months
and
S_{τ} = the stock of employed people at the beginning of period τ
q_{τ} = the inflow rate during period τ

Now we compare the calculated distribution of the stock with the real (but more aggregated) distribution and estimate the parameters of the continuation function by minimizing the differences with a nonlinear least square method.

So the goodness-of-fit model becomes

$$(10) \quad \min_{\alpha,\beta,q} \; \Sigma \, e_i^2$$

where

$$e_1 = B_{\tau+1}(1) - q_{\tau}*S_{\tau}*b_{\tau}(1)$$
$$e_2 = B_{\tau+1}(2) - A_{\tau}(1)*a_{\tau}(1) - A_{\tau}(2)*a_{\tau}(2)$$
$$e_3 = B_{\tau+1}(3) - A_{\tau}(3)*a_{\tau}(3) - \ldots - A_{\tau}(5)*a_{\tau}(5)$$
$$e_4 = B_{\tau+1}(4) - A_{\tau}(6)*a_{\tau}(6) - \ldots - A_{\tau}(11)*a_{\tau}(11)$$
$$e_5 = B_{\tau+1}(5) - A_{\tau}(12)*a_{\tau}(12) - \ldots - A_{\tau}(35)*a_{\tau}(35)$$

and $$b_{\tau}(i) = \int_{i-1}^{i} (1+\beta t)^{-\alpha}dt$$

$$a_{\tau}(i) = \int_{i-1}^{i} (1+\beta(t+1))^{-\alpha}dt \;/\; \int_{i-1}^{i} (1+\beta t)^{-\alpha}dt$$

The nonlinear minimization problem implied by (10) is solved by the general computer optimization programme GRMAX (on the basis of a Newton-Rhapson algorithm). On the basis of initial estimates of $A_\tau(1)..A_\tau(35)$ we are able to estimate the parameters of the gamma distribution (α,β) in period τ and the inflow parameter q_τ. For further details on the statistical background of the method, we refer to Rietveld (1984).

3.3. The adjusted model.

Data weaknesses give rise to the necessity to formulate an adjusted model. A close inspection of the available data reveals that the number of unemployed with a duration less than 1 month is clearly underrepresented. This is due to the fact that many unemployed enter the registers of the regional labour offices when they have been already unemployed for some weeks. If the estimation method presented above is not modified, one would arrive at a serious underestimation of the number of persons who become unemployed.

To correct for the underestimation of the inflow (rate) and to avoid the use of the unreliable first cohort figures, we construct a model in which only four cohorts are used.

The model then reads as follows:

$$(11) \qquad \min_{\alpha,\beta,q} \ \Sigma\, e_i^2$$

where

$$e_2 = B_{\tau+1}(2) - (q_{\tau-1}*S_{\tau-1}*b_{\tau-1})*a_\tau(1) - A_\tau(2)*a_\tau(2)$$
$$e_3 = B_{\tau+1}(3) - A_\tau(3)*a_\tau(3) - \ldots - A_\tau(5)*a_\tau(5)$$
$$e_4 = B_{\tau+1}(4) - A_\tau(6)*a_\tau(6) - \ldots - A_\tau(11)*a_\tau(11)$$
$$e_5 = B_{\tau+1}(5) - A_\tau(12)*a_\tau(12) - \ldots - A_\tau(35)*a_\tau(35)$$

and b_τ, a_τ defined as in the first model

In this model the inflow during period τ-1 is estimated by $q_{\tau-1}*S_{\tau-1}$. As a matter of fact we have substituted $q_{\tau-1}*S_{\tau-1}*b_{\tau-1}$ for $A_\tau(1)$ to arrive at an expression for the inflow. Consequently we use for the construction of e_2 not only the duration distribution of the previous period τ, but also the parameters of the gamma distribution of the leaving rate of period τ-1. For the first iteration we need good guesses of the distribution of $A_\tau(i)$ and of the parameters of the continuation function α and β.

Once the iterative process is started, we find estimates for α_τ, β_τ and $q_{\tau-1}$ each period (month). Then we are able to compute inflow in period τ-1 (by multiplying $q_{\tau-1}$ and $S_{\tau-1}$) and outflow (by summing inflow and δS). To compute the average length of duration, we impose the assumption of a steady state system (i.e., inflow=outflow). The distribution of unemployment durations of individuals leaving the stock of unemployed (completed spells) is given by

(12) $f(t) = - dp_{\tau}^{c}(t)/dt$

It follows that the average duration of completed spell (δ_b) is

(13) $\delta_b = 1 / ((\alpha-1)*\beta)$.

The mean duration of any individual who leaves the stock is shorter than the mean duration of the individual in the stock because of the heterogeneity of the unemployed individuals, a situation which gives rise to selective departures. Those with the "best" characteristics leave the stock earlier than others; so the people who stay are the ones with on average the lowest escape rates. Note that the mean duration of completed spells during period τ is computed under a steady state assumption. It is the mean duration which will be observed when the situation in period τ as reflected by the parameters α and β remains unchanged. Since in reality a steady state does not occur, δ_b is not equal to the mean duration actually experienced by the persons leaving the stock of unemployed.

When we compare the adjusted model with the original model, we find that the number of degrees of freedom (number of observations minus number of parameters) drops from (5-3) to (4-3) because of this modification. This makes it hard to arrive at reliable estimates. Therefore we decided to fix the β parameter at the value of 0.01, which does not influence the estimates of q and the value of the average duration of unemployment (δ_b).

It is noteworthy that there are more data weaknesses than the one discussed above. Not only are newly unemployed registered too late (leading to an underestimation of the inflow rate into the stock of unemployed), but it also frequently occurs that people who have left the stock of unemployed remain registered as unemployed for some time. The latter problem cannot be solved without additional information. As a consequence the durations of unemployment reported in the next section may to some extent be overestimated.

4. EMPIRICAL RESULTS.

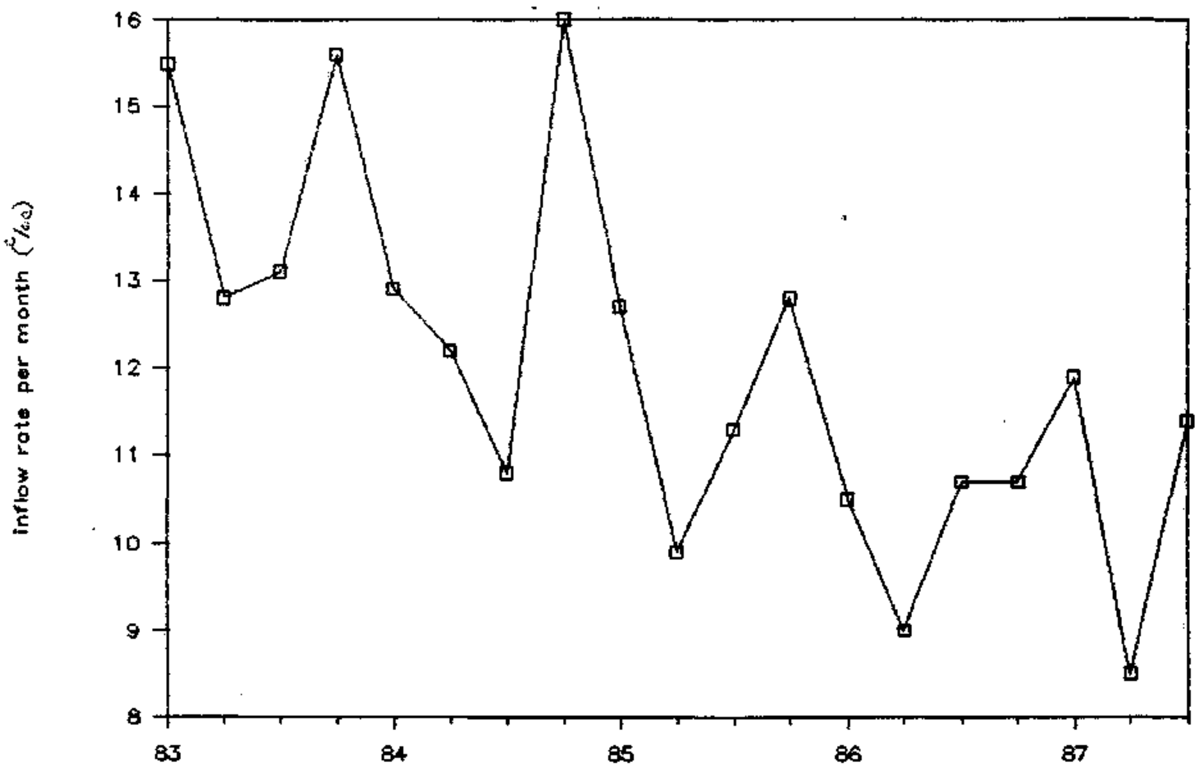
In this section some applications will be discussed of the statistical model presented in section 3. We start with unemployment figures for males in the Netherlands at the national level, followed by an investigation at the regional level.

4.1. The Netherlands 1983-1987.

For the Netherlands we estimated the parameter α_{τ} of the continuation function and the inflow rate $q_{\tau-1}$ for each month in the period 1983-1987. As explained in section 3.3, the β parameter has been fixed (at 0.01). The results are presented in appendix A. A reasonable goodness of fit is found: R^2-values are all in the range of 0.95 - 1.00.

Considerable seasonal fluctuation of both parameters can be observed. Note that as explained in section 3.3 the estimates of the inflow rate may be less precise than those of the parameter α. This is due to the unreliability of the data related to the first cohort (the number of unemployed persons with a duration less than 1 month) which gave rise to an adjusted version of the statistical model. As a consequence, the inflow rate becomes part of a compound cohort (B(2)) and is estimated less precisely. Therefore we have computed three monthly averages for the parameters. We have chosen the Winter (December,January,February) as the first period and consequently Spring,Summer and Autumn as the other three.

The development of the inflow rate over the period 83-87 has been presented in Figure 4.1.1. The average inflow rate during this period is about 1.2% per month. This means that yearly about 14% of the total labour force becomes unemployed.



years (subdivided into winter,spring,summer,autumn)

Figure 4.1.1. Inflow of Unemployed in the Netherlands during the period 1983-1987

We observe a substantial cyclical sensitivity with usually a high inflow rate in the autumn and a low inflow rate in spring (except in spring 1984). The high inflow rate in the autumn is related to lay offs in seasonally sensitive sectors such as construction and tourism, and to the new entrants in the labour force leaving school. During this five year period the inflow rate gradually decreases from about 0.014 to 0.010. This may reflect among others a decrease of the number of persons being laid off and a decrease of the number of persons newly entering the labour market (e.g. after leaving school).

In addition to inflow rates we consider the time path of the average completed spell of the unemployed. Here again three monthly averages have been computed (see equation (13) for the expression of δ_b).

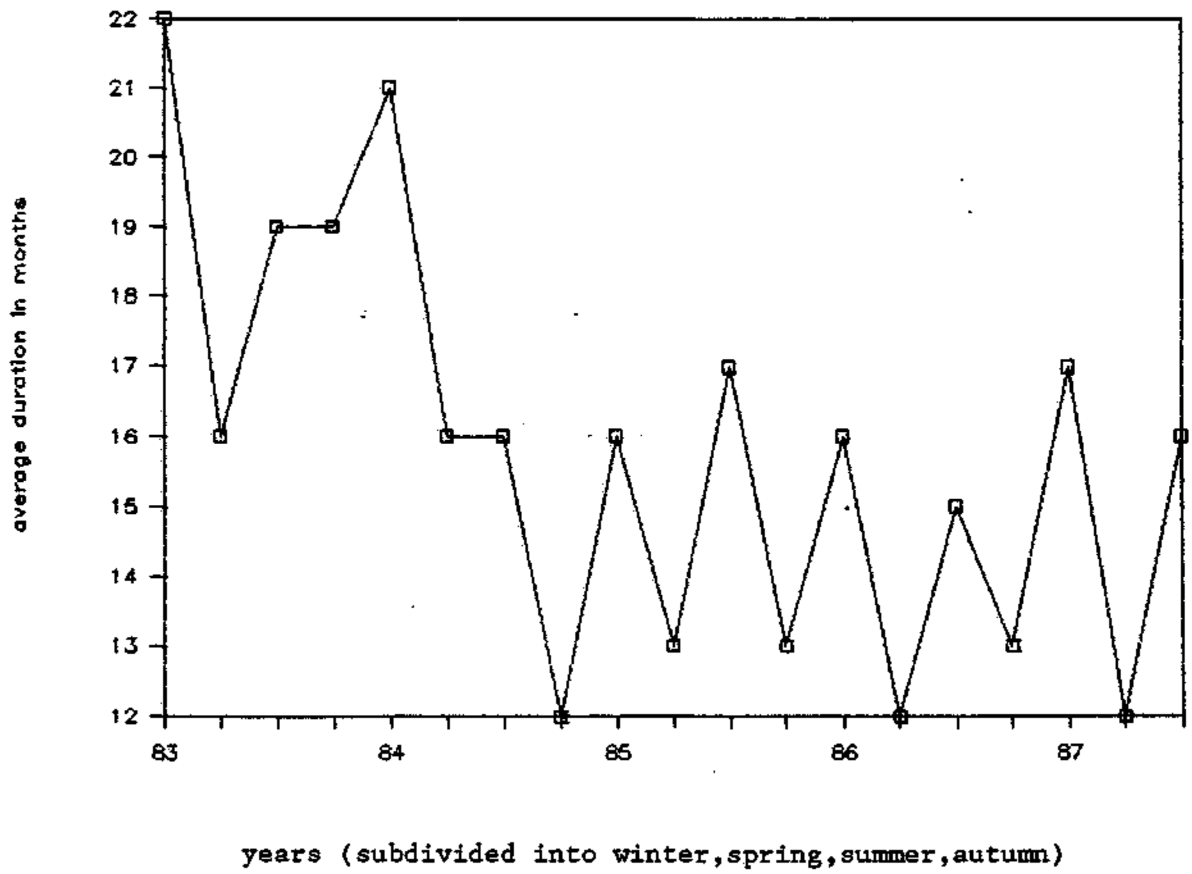


Figure 4.1.2. Average Duration of Unemployment for the Netherlands during the period 1983-1987

The mean duration of unemployment during this period was about 16 months, which is a very long period compared to the situation in the 1970's. The reduction in mean duration in 1984 is slightly overestimated because people who become unemployed and are older than 57 were not obliged to register any more (but the monthly figures tell us that this effect is small). Roughly speaking, we could say that the mean duration of completed spells has been reduced by about six months between 1983 and 1987, which is a remarkable result. So labour market conditions have improved considerably over the period 1983-1987. However, the problem of unemployment (and particularly long-term unemployment) has certainly not disappeared.

The outflow, which is the reciprocal of the length of average completed spell, follows in the last three years of the observed period (1985-1987) a regular cyclical pattern (see Figure 4.1.2). We observe a high outflow in spring and autumn, while in summer and winter outflow is much less. The hiring of new employees (from the unemployed stock) seems to be more concentrated in spring and autumn. However, we should remember that outflow from unemployment is not necessarily equal to the inflow into employment. People may leave the group of unemployed because of the discouraged worker effect or, probably more important, because of demographic reasons (ageing, death).

4.2. A regional comparison (1985-1986).

In section 2.2 we introduced a classification system which typifies the regions according to their inflow rate and average duration of unemployment. The underlying idea was that those two figures give us a better insight in the regional labour market conditions than a single unemployment rate figure does (cf. Armstrong and Taylor, 1985 b). Even if the latter does not vary much between the regions, the distribution of unemployment according to duration can be quite different. A high inflow rate (1.2%) combined with a low average duration (12 months) gives the same unemployment rate (13%) as a low inflow rate (0.8%) and a high average duration (18 months). The decomposition of the unemployment rate is also important from a policy viewpoint, because the causes of high inflow or high mean duration may be different, so that then different remedial labour market policies may be called for.

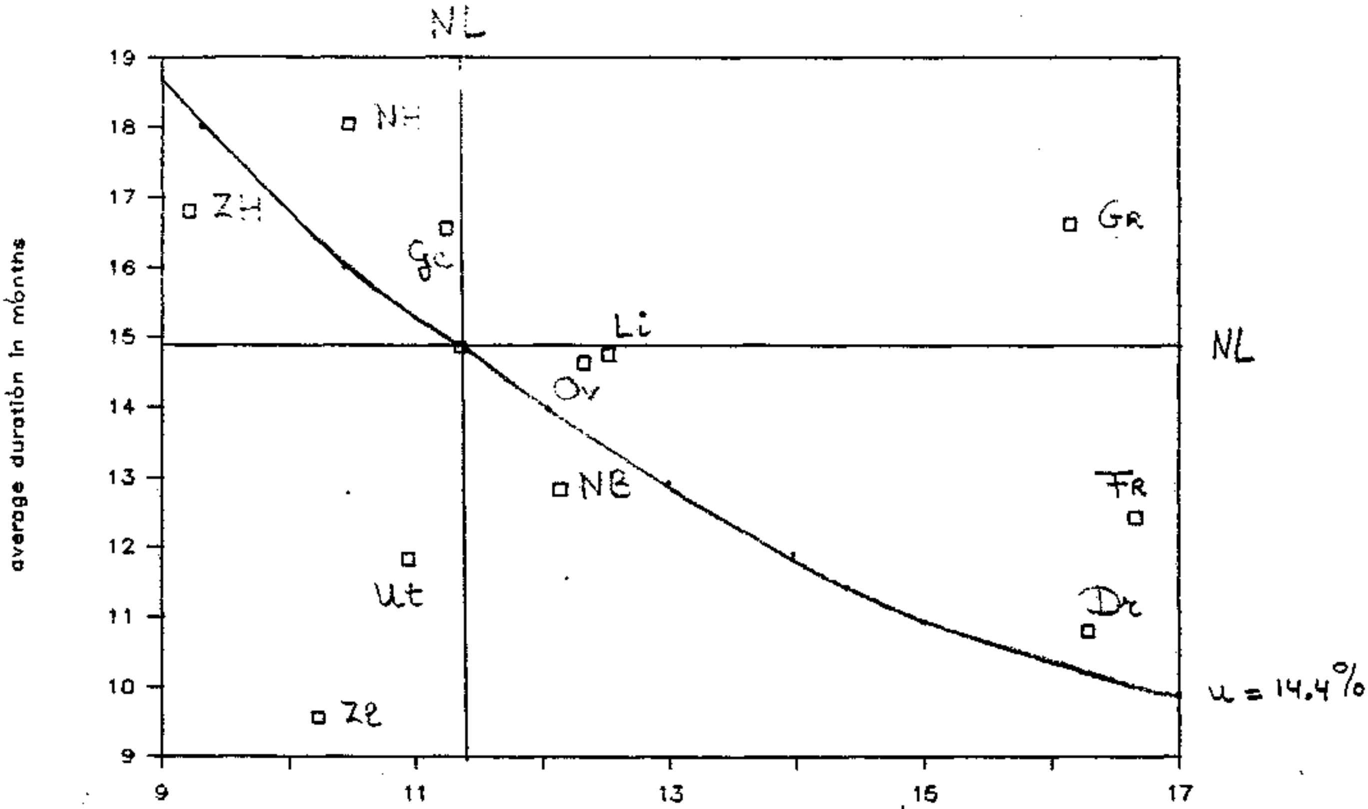
Thus, the estimation method discussed in section 3 has also been applied to data at the provincial level for the years 1985 and 1986. We will present graphs of the inflow-duration combinations of the Dutch provinces in those two years. We have chosen for annual figures because otherwise the seasonal influences would dominate and structural differences might be overlooked. Detailed information (monthly figures) about the regions can be found in appendix B.

In the graphs, the national inflow rate - duration combination is chosen as a reference point. The (iso-unemployment) curve through this point represents all combinations of points characterised by an equal unemployment rate as the national rate. The analytical expression of this curve can be shown to be:

(14) $q = u/((1-u)*\delta_b)$

with u : unemployment rate = U / L

This makes it possible for us to compare the regions with each other and with the national average.



inflow of unemployed per month (%.)

legend:

Fr = Friesland
Gr = Groningen
Dr = Drenthe
Ov = Overijssel
Ge = Gelderland
NH = Noord-Holland
ZH = Zuid-Holland
Zl = Zeeland
NB = Noord-Brabant
Li = Limburg
NL = Netherlands

Figure 4.2.1. Labour Market Features of Dutch Regions in 1985.

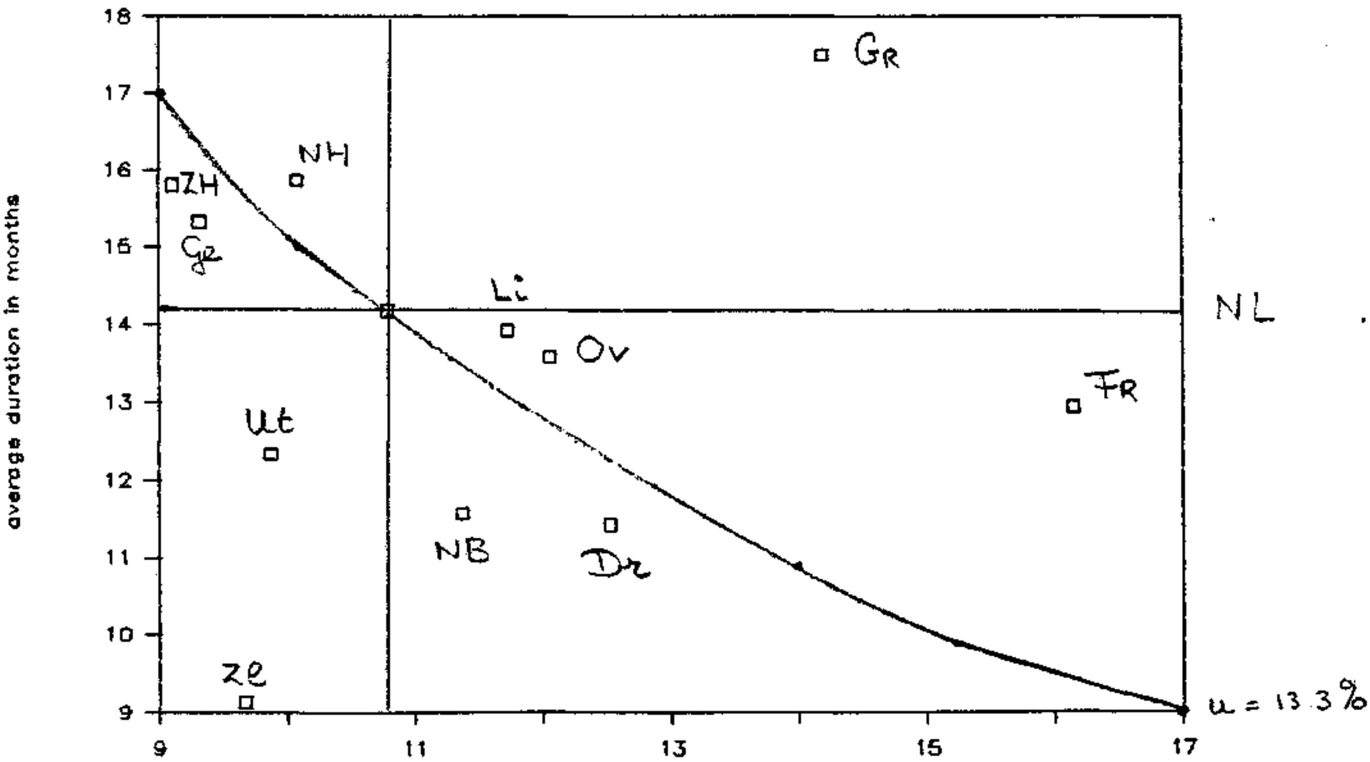
The graph shown in Figure 4.2.1 can be subdivided in four parts with the national reference point located in the center. The following classification of inflow and duration is then created:

duration of unemployment		rel. low inflow rate of unemployed	rel. high inflow rate of unemployed
	rel. high	A	B
	rel. low	C	D

The provinces located in C (Zeeland and Utrecht) are definitely better off than all the others, whereas for the province located in B (Groningen) the opposite is true. The provinces located in A (Noord-Holland, Zuid-Holland and Gelderland) are characterized by a relative low inflow rate and relative high mean duration, while the provinces located in D (Limburg, Noord-Brabant, Overijssel, Drenthe and Friesland) have a relative high inflow rate and a relative low mean duration of unemployment.

From Figure 4.2.1 we can also observe that the provinces located in A and C have rather similar unemployment rates (computed on the basis of the estimated in- and outflow and thus assuming a steady state condition) but are quite different with respect to their position in the graph. What do we learn from this? Despite a rather similar unemployment rate, regions can vary considerably with respect to the components inflow and duration. For a policy aiming at reducing unemployment this implies a differentiated approach in the various regions. The emphasis should be more on the duration (outflow) for the regions located in quadrants A and B and more on the inflow for the regions located in quadrants D and B.

Let us now take a look at the results for 1986.



inflow of unemployed per month (%.)

Figure 4.2.2. Labour Market Features of Dutch Regions in 1986.

The graph of 1986 shows us that the classification of the four groups still holds and that the national benchmark is slightly moved in the positive direction (the national unemployment rate decreases from 14.4% to 13.3%). Drenthe has improved substantially with respect to the inflow rate as we can also see from Figure 4.2.3. In this figure the differences in inflow rate between the regions and over the years 1985 and 1986 are shown.

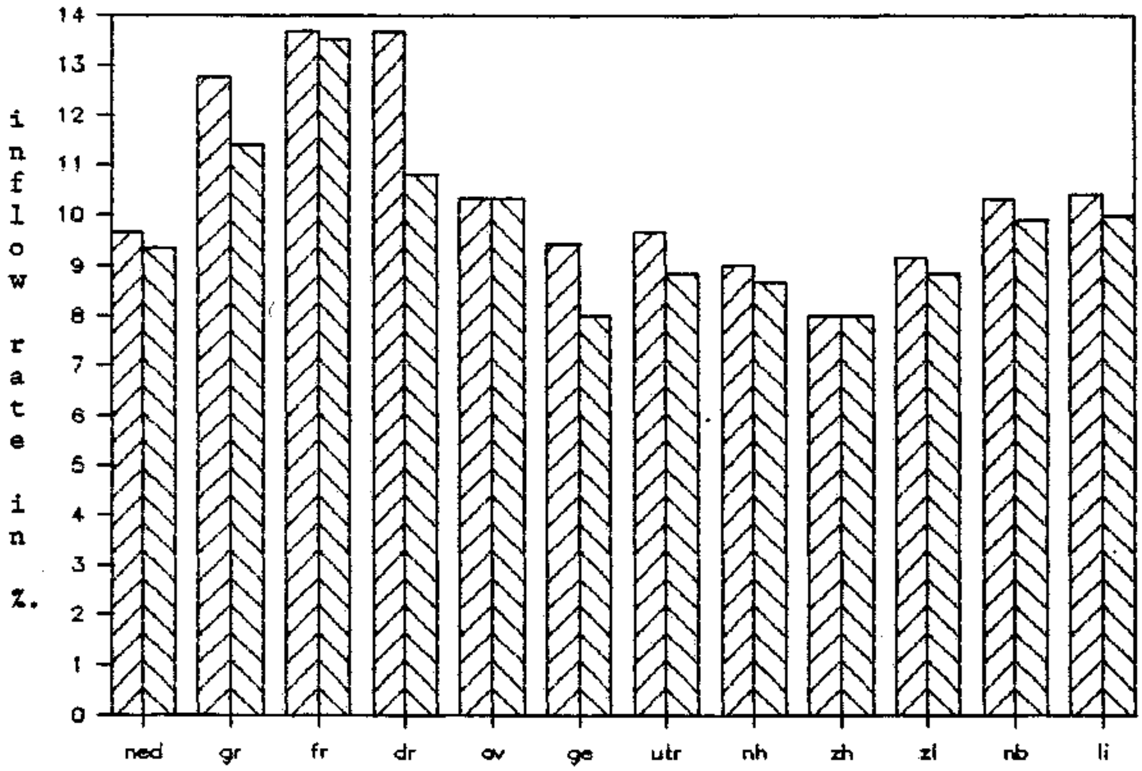


Figure 4.2.3. Inflow rates of unemployed for the Dutch Regions in 1985 and 1986.

In light of the previous obsevations, we will in the next section try to provide an explanatory framework for the results achieved so far.

5. AN EXPLANATORY ANALYSIS OF THE DURATION OF UNEMPLOYMENT.

In the previous section we have seen that regions with about the same level of unemployment may have divergent combinations of inflow and duration (outflow). We have also pointed out that a different unemployment structure of a region may give rise to the development of a differentiated remedial policy, which should focus more on either the reduction of inflow or on the reduction of outflow. For the choice of an adequate policy more insight into the causes of inflow and outflow is needed. Therefore we will examine some possible explanations for the existence of different flow rates in the various regions of a national economy. In this section we will look in particular at the differences in outflow from unemployment (measured in terms of duration).

5.1. A shift-share analysis.

The explanatory variables of age and occupational status are almost never missing in the exploratory analyses of unemployment duration. Because of the availability of data on the specific age structure and the occupational status of the unemployed in the regions, we are able to test whether differences in duration are due to the regional age composition or the regional distribution of the unemployed over the occupational groups. If not, other regional causes may also be held responsible for the observed differences. This test will be done here by means of a so-called shift-share analysis, a well-known analytical tool in regional economics. In this analysis the national distribution of the unemployed according to the relevant explanatory factor (age or occupational status) is applied to the region (by multiplying the regional cohorts with the national rates) to arrive at an estimate of regional unemployment caused by age or occupational status. It is noteworthy that we assume that the relation between the relevant factor and duration of unemployment is the same for each region.

First, we will present the shift-share analysis of the factor age. We examine the effect of the regional age distribution on the number of unemployed with a duration of more than one year (as a percentage of total regional unemployment). The latter is seen as an indicator of long-term unemployment and will, for the sake of convenience, be referred as "long-term unemployment incidence". Note that, although long term unemployment incidence and the duration of unemployment are closely related they are not perfectly correlated. For example, in Noord-Holland the average length of duration is the highest of all regions, but long-term unemployment incidence is below the national average. In 1985 Noord-Holland is the only region with a rising unemployment rate. This is reflected in a low flow out of unemployment and consequently a high average length of completed duration.

The shift-share analysis decomposes the difference between long-term unemployment incidence of the region and the Netherlands into a structural- and a regional component. The structural component is the difference between long-term unemployment incidence of the region (which we get as a result of the age distribution of the unemployed) and the national long-term unemployment rate. The results of the analysis for the year 1985 are presented in Table 5.1.1 and Figure 5.1.2 .

province	(1)	(2)	(3)
Groningen	2.2	-0.4	2.5
Friesland	-3.5	-0.8	-2.6
Drenthe	-7.7	-0.3	-7.4
Overijssel	1.7	-0.2	2.0
Gelderland	4.2	-0.3	4.4
Utrecht	-6.6	-0.3	-6.3
Noord-Holland	-3.3	0.3	-3.7
Zuid-Holland	1.8	0.8	0.9
Zeeland	-5.7	0.5	-6.2
Noord-Brabant	0.6	0.3	0.3
Limburg	1.8	-0.5	2.3

legend:
(1): the difference between the regional and the national long-term unemployment incidence.
(2): the structural effect related to age composition
(3): the regional effect

Table 5.1.1. Decomposition of the difference between Long-Term Unemployment Incidence of the Region and the Netherlands.

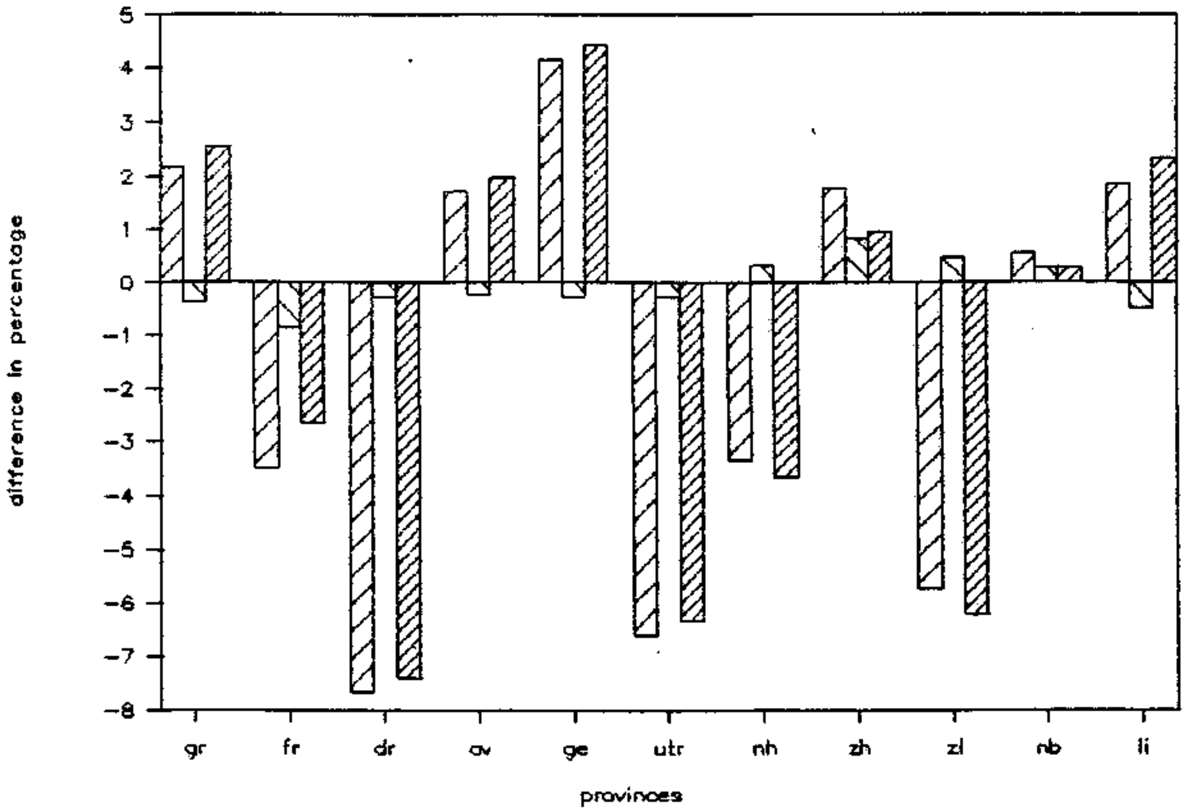


Figure 5.1.2. Shift-Share Analysis of long-term unemployment with structural effect of age

From Figure 5.1.2 we can conclude that the regional age structure does not explain much of the difference between the regional and the national long-term unemployment incidence. In other words, after correcting for a structural effect (age) the regional differences have not changed much. Substantial favourable regional effects are observed for the provinces Drenthe, Utrecht and Zeeland, while the province Gelderland has the highest unfavourable regional effect.

Second, the shift-share analysis is carried out for the structural effect of belonging to a certain occupational group upon unemployment duration (here also measured as the number of unemployed with a duration longer than one year as a percentage of total regional unemployment). After correcting for the distribution of the unemployed over the occupational groups, the following regional differences remain. (see Figure 5.1.3)

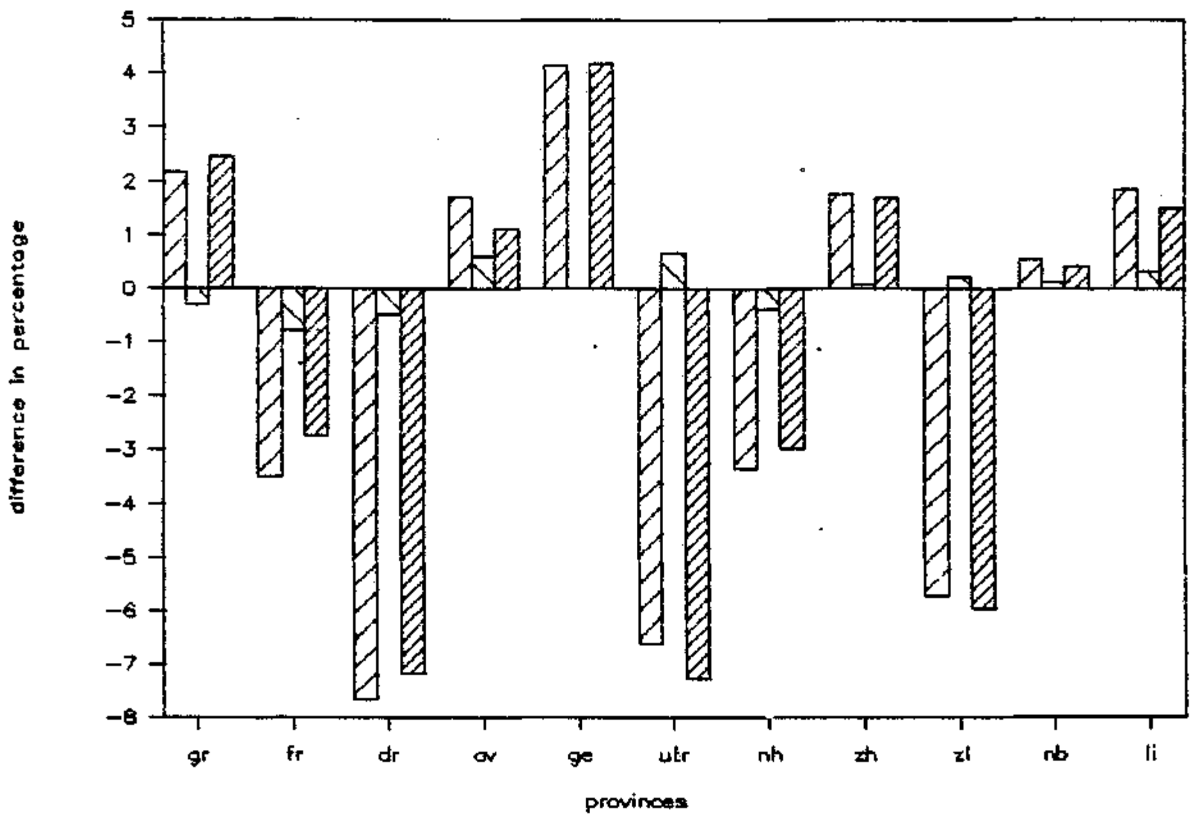


Figure 5.1.3. Shift-Share Analysis of long-term unemployment with effect of occupational status

We observe a similar picture as in the previous case based on the structural effect of age. The regional distribution of unemployment according to occupational status causes just small structural effects (see the second column for each region in Figure 5.1.3). Again Drenthe, Utrecht and Zeeland have favourable regional effects and Gelderland has an unfavourable regional effect.

Both shift-share analyses were carried out under the assumption of an equal influence of the structural effect on each region. Bearing this in mind we notice that certain provinces have a persistent regional influence on unemployment duration. This regional effect might be related to regional demand. We will examine this possibility by means of a multi-variate analysis in the next paragraph.

5.2 A multi-variate analysis

The next step in the explanatory analysis is the combination of the two structural effects (age and occupational status) in a multi-variate analysis of regional unemployment duration. Besides supply-side factors we also add an indicator of regional labour demand, namely the number of vacancies. A simple OLS-regression model, with the average duration of unemployment (for people leaving the state of unemployment) for each region as the dependent variable, is estimated. The explanatory variables taken into consideration are the following.

The first is the percentage of unemployed younger than 26 years. At a national level the relation between age and duration is clearly shown by Table 5.2.1. Thus the unemployed younger than the age of 26 are expected to have a negative effect on duration.

age	number of unemployed (duration longer than one year)
< 26	37%
26-39	60%
> 39	68%

Table 5.2.1. Percentage unemployed (with a duration longer than one year) according to age.

The second variable is the percentage of unemployed belonging to the occupational group " construction workers ". This group includes about one fifth of total national unemployment and appears to be one of the few occupational groups for which the share of that group of total regional unemployment varies considerably over the regions.

The third variable is the number of vacancies divided by the regional labour force. We interpret this variable as an indicator of regional labour demand and thus expect it to be negatively correlated with duration. Thus the following regression equation results:

$$(14)\quad y = \alpha_0 + \alpha_1 . x1 + \alpha_2 . x2 + \alpha_3 . x3 + \epsilon$$

with
y = average duration of regional unemployment
x1 = percentage of unemployed younger than 26
x2 = percentage of unemployed construction workers
x3 = number of vacancies divided by regional labour force
ϵ = error term ($N(0,\sigma^2)$ distributed)

We have run a regression model for data from 1985, because only for this year we have data on the third explanatory variable, the number of vacancies. In a second run, we have left out the region Noord-Holland (NH) because this region is a notable outlier of the model (see also page 16). The estimation results are presented in Table 5.2.2.

	α_0	α_1	α_2	α_3	R^2
all regions	56.6	-1.02 (0.86)	-0.22 (0.28)	-5.32 (5.76)	0.28
without NH	68.9	-0.90 (0.65)	-0.48 (0.24)	-14.63 (5.73)	0.55

Table 5.2.2. OLS estimates of the determinants of the duration of unemployment (standard errors in parentheses).

These results confirm the expected negative signs of the coefficients of the variables age and number of vacancies. The negative sign of the "occupational status" variable indicates a higher than average throughflow by unemployed construction workers. Although the R^2-value and the t-values of the second regression are satisfactory, it is not entirely acceptable to use this model for prediction purposes, because we have only used 10 observations, while also the explanatory variables are only proxies for the underlying phenomena. In general we conclude that the regional age-structure of the unemployed, the share of unemployed construction labourers in total regional unemployment and the regional vacancy rate have a (significant) influence on unemployment duration. Especially the result for vacancies has a direct policy relevance: duration of unemployment can apparently be substantially reduced when new jobs are created.

6. CONCLUDING REMARKS.

In this paper we have developed a statistical model for the estimation of regional flows into and out of the pool of the unemployed on the basis of data on the duration of registration at the Labour Exchange Office. We have used estimates of in- and outflow (duration) to decompose unemployment in those two components. We have also pointed out the importance of such a decompositon and suggested some possible appropriate policies.

The outcomes of the estimation method have been analysed for the Netherlands during the period 1983-1987 and we have found that both inflow and duration have decreased considerably. In addition, we have examined the regional differences of unemployment during the years 1985 and 1986.

We have tried to explain the observed regional differences by a shift-share analysis and a simple multivariate regression model. The shift-share analysis led us to the conclusion that neither the age composition nor the occupational status of the unemployed did contribute much to the difference in long-term unemployment (measured as the number of unemployed with a duration of more than one year). However, combined with a demand-side factor, namely the number of vacancies, we arrived at a OLS-regression model which gave us more satisfactory results.

Apart from the result that regional differences in unemployment duration do exist (even if the unemployment rates are almost equal), we have also found from the explanatory analysis regarding the duration of unemployment that regional demand plays a role here.

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APPENDIX A

Estimation results for THE NETHERLANDS (during the period 1983-1987). The parameters α and q are obtained from the minimization procedure (11) in the paper; the third parameter is set at β=0.01.

The R^2-values correspond with the estimates of α (of that period) and the estimate of the inflow (q) of the previous period. Note that the value of α in the first peroid (Jan 1983) was fixed (at 6.5).

1983	α	q ($*10^{-3}$)	R^2
jan	6.5	13	-
feb	5.9	10	1.00
mar	6.5	10	1.00
apr	8.1	9	0.99
may	6.7	13	0.99
jun	7.1	12	0.98
jul	5.0	14	0.98
aug	6.5	7	0.98
sep	5.4	14	0.98
okt	7.9	9	0.98
nov	5.5	16	0.99
dec	5.4	11	0.99

1984	α	q ($*10^{-3}$)	R^2
jan	5.7	15	0.99
feb	6.5	6	0.99
mar	6.3	11	0.99
apr	8.1	5	0.98
may	7.3	14	0.98
jun	8.3	7	0.98
jul	7.3	15	0.98
aug	6.2	5	0.98
sep	8.1	15	0.98
okt	9.9	9	0.99
nov	10.0	16	0.99
dec	8.8	12	1.00

1985	α	q ($*10^{-3}$)	R^2
jan	7.9	13	1.00
feb	5.5	7	1.00
mar	8.9	9	1.00
apr	8.9	7	0.98
may	9.0	9	0.98
jun	8.2	11	0.97
jul	7.1	11	0.98
aug	6.0	7	0.98
sep	8.6	11	0.98
okt	9.0	9	0.97
nov	7.9	13	0.98
dec	7.0	10	0.99

1986	α	q (*10^{-3})	R^2
jan	7.1	11	0.99
feb	6.8	6	0.99
mar	8.4	8	0.99
apr	10.2	7	0.97
may	8.9	8	0.97
jun	8.4	11	0.97
jul	8.4	8	0.97
aug	6.3	9	0.97
sep	8.4	8	0.97
okt	8.3	9	0.97
nov	9.0	11	0.98
dec	6.6	13	0.98

1987	α	q (*10^{-3})	R^2
jan	7.8	9	0.99
feb	6.5	9	0.98
mar	8.6	7	0.98
apr	8.9	8	0.97
may	9.8	7	0.96
jun	8.7	12	0.96
jul	7.1	8	0.97
aug	6.2	10	0.96
sep	9.3	-	0.96
okt	-	-	-
nov	-	-	-
dec	-	-	-

APPENDIX B

Estimation results for the regions (provinces) in the Netherlands for the years 1985 and 1986. The parameters α and q are obtained from the minimization procedure (11) in the paper (applied to the regional distribution of the unemployed according to their duration of registration); the third parameter is fixed at β=0.01. The R^2-values are not reported, but are all in the range of 0.95 - 1.00.

	Groningen		Friesland	
1985	α	q ($*10^{-3}$)	α	q ($*10^{-3}$)
jan	4.8	15.5	6.0	16.3
feb	6.1	16.9	6.2	15.3
mar	8.9	9.1	12.7	10.1
apr	8.2	16.8	12.2	15.2
may	8.7	11.5	11.0	12.4
jun	7.1	22.7	12.4	20.7
jul	4.2	11.3	7.6	10.8
aug	3.8	13.7	7.6	14.3
sep	7.7	12.6	9.2	13.2
okt	9.2	17.7	9.4	19.2
nov	8.7	21.3	7.4	27.4
dec	6.8	24.9	6.9	25.0

	Drenthe		Overijssel	
jan	6.0	13.1	5.6	12.2
feb	6.6	15.7	5.8	12.2
mar	17.3	8.7	10.2	7.3
apr	11.8	21.0	9.7	12.2
may	15.7	9.7	8.8	9.6
jun	11.9	25.1	8.5	17.8
jul	7.5	8.3	5.2	9.4
aug	8.4	17.7	6.7	10.6
sep	13.8	10.7	8.6	10.7
okt	8.5	18.9	10.0	11.9
nov	9.3	19.9	7.7	18.9
dec	6.4	26.9	7.1	15.2

	Gelderland		Utrecht	
jan	6.1	13.3	8.6	13.8
feb	5.3	9.7	8.0	10.3
mar	7.8	8.5	11.0	10.2
apr	8.2	9.7	10.2	10.2
may	6.9	8.4	9.8	9.1
jun	8.4	14.3	9.4	14.7
jul	4.6	11.8	8.1	10.1
aug	6.1	9.4	8.6	11.2
sep	8.1	10.7	10.7	11.3
okt	8.8	10.7	10.7	10.2
nov	8.1	15.4	9.2	11.3
dec	6.0	12.9	9.1	9.0

1985	Noord-Holland α	Noord-Holland q (*10^{-3})	Zuid-Holland α	Zuid-Holland q (*10^{-3})
jan	7.2	14.0	5.6	11.6
feb	5.3	11.7	6.7	8.1
mar	7.4	10.5	6.5	9.3
apr	7.9	9.3	7.4	6.9
may	7.0	8.1	7.8	6.9
jun	6.3	12.8	6.7	10.3
jul	7.0	11.6	6.0	10.3
aug	4.8	9.3	7.6	6.9
sep	6.3	10.4	6.3	10.3
okt	6.6	8.2	8.7	8.0
nov	6.0	11.6	7.1	12.6
dec	6.7	8.2	7.0	9.2

	Zeeland α	Zeeland q	Noord-Brabant α	Noord-Brabant q
jan	7.0	9.1	7.4	13.2
feb	8.6	9.2	6.1	10.8
mar	16.2	5.7	10.9	8.4
apr	12.9	10.2	8.9	10.8
may	12.8	6.7	10.0	8.3
jun	13.2	14.5	9.3	15.2
jul	11.6	8.9	7.1	14.0
aug	7.5	7.7	7.2	9.3
sep	12.2	12.2	9.6	12.8
okt	15.9	11.1	12.0	10.5
nov	10.7	13.2	8.4	17.4
dec	9.0	14.3	8.7	15.0

	Limburg α	Limburg q
jan	8.4	14.7
feb	5.3	8.6
mar	8.9	11.0
apr	7.8	12.2
may	8.1	9.7
jun	7.7	15.6
jul	7.5	13.1
aug	6.4	10.7
sep	8.9	11.9
okt	9.1	13.1
nov	8.4	15.4
dec	6.8	14.2

1986	Groningen α	Groningen q (*10^{-3})	Friesland α	Friesland q (*10^{-3})
jan	4.8	14.9	5.7	14.5
feb	5.0	12.6	5.7	13.5
mar	8.8	10.2	11.2	8.7
apr	8.5	15.2	15.3	16.0
may	7.7	8.8	13.5	11.0
jun	7.0	18.6	10.9	20.3
jul	5.5	8.6	6.3	8.3
aug	3.9	13.5	6.6	14.1
sep	7.0	8.7	8.5	11.8
okt	7.3	16.1	7.8	20.1
nov	8.2	17.3	7.6	23.6
dec	6.9	25.9	5.6	31.9

	Drenthe α	Drenthe q	Overijssel α	Overijssel q
jan	7.6	14.1	5.1	16.5
feb	5.7	11.9	7.1	7.1
mar	13.9	4.8	8.3	10.8
apr	17.1	15.6	13.8	8.3
may	14.8	5.9	9.3	10.6
jun	9.8	16.1	9.0	16.3
jul	8.1	5.7	6.9	9.3
aug	7.1	11.4	7.1	10.4
sep	9.6	6.9	9.8	8.1
okt	9.3	13.7	7.1	11.6
nov	7.3	17.0	9.6	15.0
dec	6.7	27.2	7.2	20.7

	Gelderland α	Gelderland q	Utrecht α	Utrecht q
jan	7.0	11.8	10.1	10.1
feb	6.2	7.1	8.9	7.8
mar	7.6	8.3	9.6	7.8
apr	9.6	7.1	10.2	9.0
may	8.5	8.2	9.6	7.8
jun	7.9	11.6	7.5	13.4
jul	6.1	9.2	8.2	8.9
aug	5.4	9.2	7.7	12.2
sep	9.4	7.0	10.9	9.0
okt	7.6	9.3	9.0	11.2
nov	8.6	10.4	10.0	10.1
dec	6.4	12.7	7.6	11.2

1986	Noord-Holland α	Noord-Holland q ($*10^{-3}$)	Zuid-Holland α	Zuid-Holland q ($*10^{-3}$)
jan	6.6	10.5	7.0	11.4
feb	8.7	5.8	7.3	6.9
mar	6.4	9.3	7.2	9.2
apr	6.2	7.0	8.1	6.9
may	7.7	9.4	7.6	8.0
jun	6.5	14.0	7.3	11.4
jul	14.2	10.5	7.4	9.1
aug	6.6	10.5	6.9	9.1
sep	3.3	10.5	7.1	10.2
okt	7.9	10.4	7.6	9.1
nov	7.7	11.6	8.7	10.2
dec	5.8	11.6	5.7	8.0

	Zeeland α	Zeeland q	Noord-Brabant α	Noord-Brabant q
jan	10.1	12.1	7.2	13.9
feb	8.1	6.7	7.2	7.0
mar	15.8	7.8	10.3	9.3
apr	16.5	10.0	14.4	8.2
may	15.9	6.6	9.6	10.5
jun	13.0	10.9	11.7	13.8
jul	12.2	7.6	7.9	11.4
aug	6.9	8.7	6.8	9.1
sep	15.1	8.8	11.7	10.3
okt	10.5	12.0	10.8	11.4
nov	11.4	13.0	10.1	13.6
dec	7.9	12.0	8.0	18.1

	Limburg α	Limburg q
jan	7.6	14.2
feb	5.2	8.3
mar	8.7	9.5
apr	10.1	11.9
may	8.7	7.1
jun	9.0	16.4
jul	8.3	10.5
aug	6.0	11.6
sep	9.2	9.3
okt	9.0	12.8
nov	9.0	11.6
dec	7.3	17.4

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