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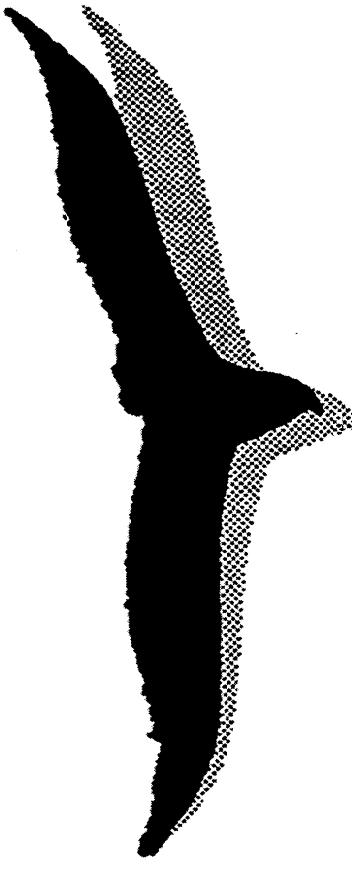
Constructing Labour Market Flows for The Netherlands using Macro Data from Social Security Provisions; 1970-1995

Udo Kock

Research Memorandum 198-40

August 1998



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Constructing Labour Market Flows for The Netherlands using Macro Data from Social Security Provisions; 19704995

August 1998

. Abstract

This paper extends and improves a construction method for macro labour market Bows developed by Broersma and Den Butter (1994). We use administrative data to derive a set of worker and job flows at the macro level for the Dutch economy for the period 1 970-1995 and pay special attention to different social security provisions (welfare, unemployment insurance, occupational disability provisions and (early) retirement). Contrary to the discrete time approach taken by Davis, Haltiwanger and Schuh (1996) our continuous time approach to labour market flows takes into account all flows of workers and jobs in a consistent way and we cover the entire economy. It is argued that labour market dynamics in The Netherlands have increased since the recession in the beginning of the 1980's. This is mainly due to increased job to job movements and higher inflow into employment from non-participation and unemployed entitled to unemployment insurance provisions.

* Free University Amsterdam, Faculty of Economics, Applied Labour Economics Research Team (ALERT) and Tinbergen Institute, Keizersgracht, 1017 EG Amsterdam, tel: +31 (0)20 551 35 48, email: kock@tinbinst.nl.

1. Introduction

Up to now empirical analysis of labour market flows has been conducted mainly on the basis of panel data sets. Broersma and Den Butter (BDB, 1994) developed a method to use macro data for flow analysis for The Netherlands. This paper extends and improves that consistent data set of annual time series for labour market flows for the period 1 970-1 995. In addition we incorporate social security into the analysis of worker flows and job flows. In the traditional analysis of labour markets there is a lot of attention for the impact that social security, especially unemployment provisions$_2$ has on the labour market (see for The Netherlands Vijlbrief, 1992). In the flow approach social security has not been an important part of the analysis so far. Our specification of a system of worker and job flows gives a comprehensive picture of labour market dynamics in The Netherlands and provides some insight in the role of several social security provisions.

Many studies on flows of jobs and workers are based on panel data (e.g. Davis, Haltiwanger and Schuh (1996) for the US; Albaek and Sorensen (1995) for Denmark, Broersma and Gautier (1997) for The Netherlands, Konings (1995) for the UK and Konings, Lehmann and Schaffer (1996) for Poland). These panel-data studies face a number of data-problems. Job creation and destruction is mostly measured in a discrete time way, following Davis, Haltiwanger and Schuh (DHS, 1996). They measure job creation as the difference between the number of new jobs in opening establishments plus the number of new jobs in expanding establishments between time t and $t+1$. Job destruction is measured as the difference between the number of eliminated jobs in contracting establishments and the number of eliminated jobs in closing establishments between time t and $t+1$. Depending on the frequency used, annual (Broersma and Gautier) or quarterly (DHS), this underestimates the job flows as job creation and destruction at the plant level that is revised within the sample period can not be captured. Furthermore, most of the studies on job flows in the DHS tradition cover only one sector of the economy, mostly manufacturing.In most of the studies it is assumed that this sector resembles the whole economy, but this is obviously a strong assumption.

As DHS indicate, omitting job movers is an important missing piece in their story (1996: 149). A consequence is that they are not abfe to analyse vacancy chains, a process in which a person moving from one job directly to an other induces a 'chain of vacancies' in which a

number of people switch jobs. Through the vacancy chain macroeconomic labour market conditions influence labour market dynamics observed at the micro level, Increasing labour supply for example reduces the number of hires from employment. This shortens the vacancy chain and therefore overall hires will be lower (Schettkat, 1996b).

Some panel data studies (such as the one by DHS) do not observe the flow of workers who quit and leave the labour force or unemployed who stop searching. Therefore these studies are not able to investigate the cyclicallity of job movements directly. DHS find an a-cyclical or mildly pro-cyclical movement of total worker reallocation as well as a highly counter-cyclical pattern of job reallocation, which is a part of worker reallocation. Combined with the suggestion that quits to non-participation are a-cyclical they infer that 'employment-to-employment quits' are highly pro-cyclical. Although this is plausible, it can not be observed directly.

Worker flows have also been investigated using panel data. Blanchard and Diamond (1990) measure transitions between Employment, Non-participation and Unemployment by following individuals in adjacent months and tracing changes in labour market status. These panels face measurement problems, such as misclassification of labour market status- It is difficult to distinguish between unemployed workers and workers out of the labour force. Furthermore the measurements of worker flows obtained in this way are difficult to match with the measures of job creation and destruction based on the DHS method.

The system of worker and job flows that we use in this paper is different from the pane1 data studies on labour market flows in a number of ways. Our flows of workers and jobs are based on published data from the Council for Supervision of Social Insurances (CTSV, 1996a). These data are based on administrative sources that register the social security transactions of almost al Dutch citizens. We can differ from a number of the limitations that the panel data studies face.

Our flows of workers and jobs are continuously measured so the time interval of the sample period dues not matter. In the DHS study, which uses panel data with a 3 months time interval, consecutive job destruction and job creation within a period of 3 months is not captured. The same applies to panel data studied by Gautier, with a time interval of one year.

In our approach we are able to avoid this problem. For example, in case of unemployment we observe every flow into unemployment if the person receives unemployment compensation. Therefore there are no compensating flows, as these are in the discrete time method, and as a result all worker and job flows are taken into account (see Schettkat, 1996a).

Flows of workers and jobs are calculated at the macro level instead of the sector level, so our approach covers the whole economy. The sector specific panel data studies might give an incomplete impression of labour market dynamics if there are differences in job and worker flows among sectors of industry. For the Dutch case Broersma and Gautier (1997) calculated that in the period 1979-93 the average annual number of created and destructed jobs was 15 % of total employment, whereas fur the same sample period we found a much higher annual job turnover rate of 26 %.

Another advantage of our approach is that it includes job to job movements in a consistent way so we are able to analyse vacancy chains. We link worker flows tot job flows in a consistent way and we avoid any misclassification because we use administrative data instead of panel data based on questionnaires.

Our method also has a disadvantage compared to the panel data approach. In the latter approach at least a part of job creation and destruction is observed directly. In our system we observe worker flows directly, but we do nut observe all job flows. We use time series form primary sources to set up the system of labour market flows. From the relationships that are implied by the accounting system we are able to derive a number of other time series. However, we have to make a number of assumptions to close the system because not enough time series are available from primary sources. The most important assumptions are concerned with the amount of job destruction cawed by separations. We base our assumptions on studies and surveys at the micro level.

In the next paragraph we will give an overview of the job and worker flows that can be constructed using our accounting system. In the third paragraph we will present the construction method of our flow data in detail. We will elaborate on the assumptions and we give a sensitivity analysis. The fourth paragraph contains an analysis of labour market flows in The Netherlands in the period 1970-1995. Paragraph five compares our flow data to other

information and studies on labour market flows in The Netherlands and in other countries. Concluding remarks are in the fast paragraph. The Appendixes give an overview of the entire system of labour market flows (I), provide information on the sources and definitions of the data (II), elaborate on the accounting system (III), give descriptive statistics of all worker and job flows (IV) and provide graphs on flow and duration characteristics of the Dutch labour market (V). Throughout the paper all flows are on an annual basis and reported in thousands, unless indicated else.

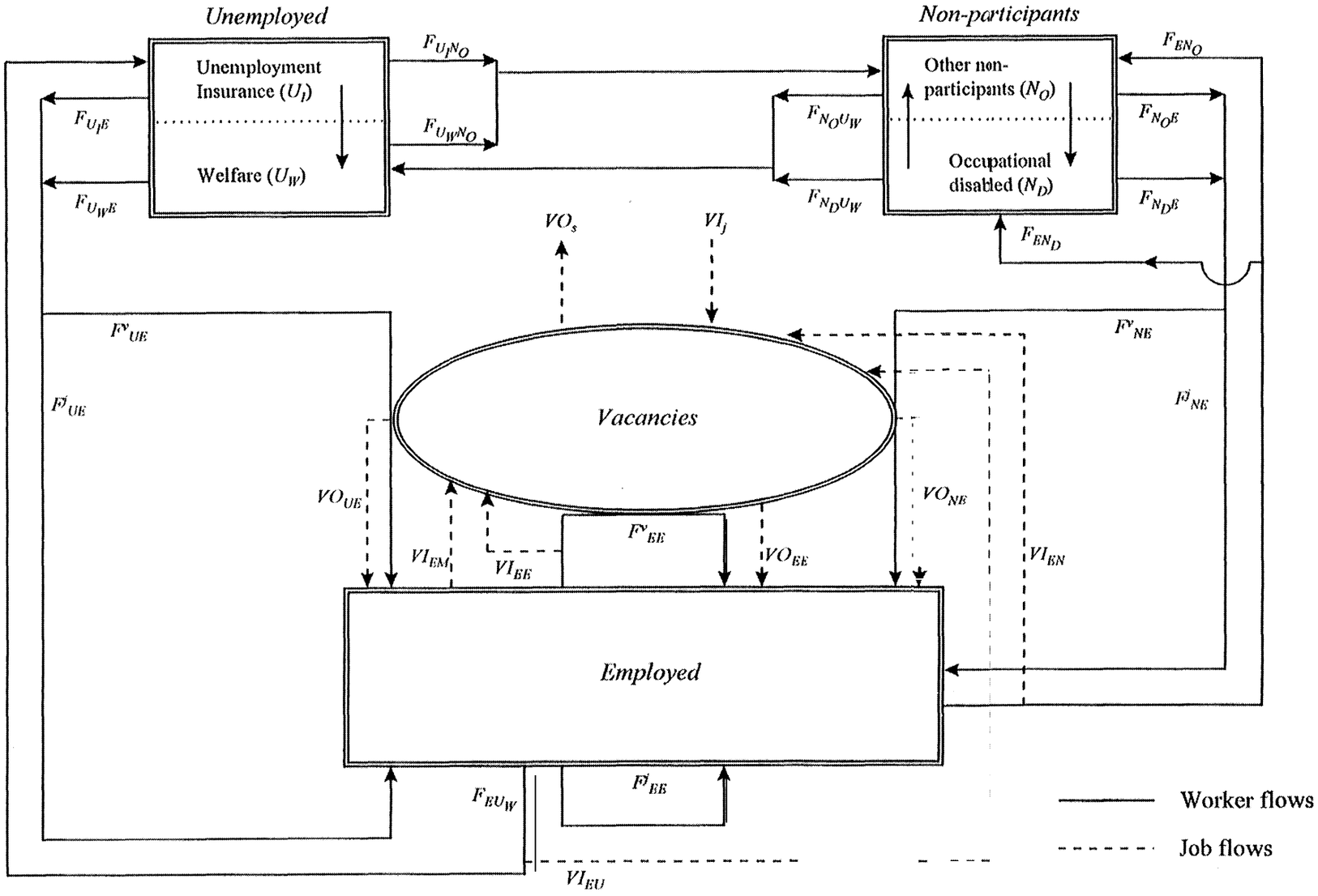
2. Flows of Jobs and Workers

Based on the system of labour market flow developed by BDB we distinguish four stocks in our system of labour market flows: Employed (E), Unemployed (U), people outside the labour force or Non-participants (N) and Vacancies (V). Figure 1 shows these stucks and 27 relevant flows included in our national accounting system of labour market flows. The flows are indicated by the general symbol F_{xy}^{z}, which denotes the flow from x to y ($x, y = U_W, U_I, E, N_D, N_O$) with, when relevant $z = j$ in case of newly created jobs and z = v in case of jobs for which a vacancy existed.

The set of time series includes the most important social security benefits[1]. Unemployment is defined as the sum uf unemployed who receive unemployment insurance payments U_I ('WW/WWV') and the number of unemployed who receive welfare U_W ('RWW'), $U = U_I + U_W$. Welfare applies to unemployed who are nut entitled to unemployment insurance payments.

[1] The Dutch system of social benefits consists of two distinct types of arrangements: insurance and assistance schemes. This distinction is based on the way of financing. The provisions based on insurance are paid for by means of premiums. Assistance schemes are financed through tax levying. The social insurance schemes distinguish employee and public arrangements. See Compayen and Den Butter (1992), Chapter 4, for a short introduction to the Dutch social benefit system, including the provisions omitted here.

Figure 1 Stocks and flows in the labour market



Non-participation includes everyone above age 14 who is no part of the labour force and is defined as the sum of disabled workers N_D ('WAO') and other non-participants N_O, $N = N_D + N_O$. Nun-participants not being occupational disabled include people on retirement ('AOW') and early retirement ('VUT'), students, people on social assistance ('ABW') and those who work at home. Social assistance applies to nun-participants who are no part of the labour market and have no other resources to live on like single mothers with young children- Due to a lack of data we are not able to include the employee insurance fur tempurary illness ('ZW'). However, as soon as (parts of) these data become available, tempurary illness provisions can be introduced in the flow system with little effort.

Employment (E) includes all persons who have a regular job for at least 12 hours a week, including those who are temporary ill, and all self employed. Part-time and irregular jobs of less than 12 hours a week (on average) are nut captured. Also unemployed who search fur a jub of less than 12 hours a week are not included. In our accounting system the group of other non-participants is a rest category. For the consistency of the system there is no need to have data on it. Yet it can be set to the working age population WP (all people above age 14) minus employed, unemployed and disabled workers, so $N_O = WP - E - U - N_D$. Our construction method implies that every Dutch citizen abuve age 14 is allocated to one of the groups. Children under age 14 are left out. It is not possible to be in more than one group at the same time.

In every period many people change labour market status. Unemployed End jobs, employed quit or are laid off or they move out of the labour force and become non-participants. Note that in The Netherlands tempurary layoff' s are rare[2], so almost all of the separations from employment are quits or permanent layoff's. Apart from these movements of workers between unemployment, employment and nun-participation there are also movements within these groups. Unemployed who receive unemployment insurance move to welfare if their maximum eligibility period expires. All disabled workers who reach retirement age (65 in The Netherlands) move out of the disability provisions but of course do not enter the labour force. Some disabled workers never enter the labour force because they become disabled at an early age and move to disability provisions right after they leave school. Table 1 provides all worker flows in 1995.

[2] In 1995 about 0.25 % of total unemployment insurance payments was due to short time unemployment.

Table 1 *Worker* **flows, 1995**

(x 1000)

To	*From* Employ-ment	Unemploy-ment insurance	Welfare	Occupational disability	Other non-participation	**Total inflow**
Employment	479	345	323	30	328	1305
Unemployment *insurance*	579					*579*
Welfare		90	-	*13*	100	*203*
Occupational disability	74				6	80
Other non-participation	41	158	*82*	74		355
Total outflow	1173	593	205	117	*434*	

Worker flows and job flows can be related either through vacancies or directly. If a non-participant takes up a job fur which no vacancy existed or he or she starts his own business, *a* new job is created (included in F_{NE}^{j}). More in general, all flows indicated by index j include jobs of employers, who successfully searched using informal channels or who did not register their vacancies or both. These so called latent vacancies play an important role in the labour market.

If a worker leaves a job, in general there are two possibilities. When the employer creates a vacancy no new job is created, as the job for which the vacancy is created already existed, and hence no job Wows occurs (VI_{EU}, VI_{EE} and *VI,*). On *the* other hand, if no vacancy is created, the worker's job is destroyed. This constitutes a job flow. Hence, worker flows and job flows are related but they are not identical.

Vacancy flows are integrated in our system of labour market flows. By definition employment inflow by filling a vacancy leads to an outflow of a vacancy. For example when an unemployed job searchers finds a job by filling a vacancy: the vacancy vanishes and it leads to an outflow from unemployment to employment ($F_{UE}^{v} = VO_{UE}$). The same applies job movers and nun-participants who find a job by filling a vacancy ($F_{EE} = VO_{EE}$ and $F_{NE}^{v} = VO_{NE}$). Some vacancies are destroyed, fur example because the employee thinks filling the vacancy is no

longer beneficial or because the vacancy is difficult to fill (VO_s). These scrapped vacancies are part of job destruction.

New vacancies are opened fur reasons of expansion ('new jobs') or fur reasons of substitution ('existing jobs'). When the employer creates a vacancy fur reasons of substitution no new job is created, as the job fur which the vacancy is created already existed, and hence no job flows occurs. Job creation takes place when a vacancy is created fur a new job (VI_j). Table 2 provides our estimates of job flows that relate to vacancies for 1995.

Table 2 **Job flows, 1995**

(x 1000)

due to	*Vacancy Inflow*	*Vacancy Outflow*	**Balance**
Job movers	312	182	130
Unemployed	6	178	-172
Non-participants	29	136	-107
Modality	7		7
Scrapped		16	-16
New jobs	172		172
Total	526	512	14

3. Construction of the Flow System

3.1 Worker Flows

In the constructing process we will frequently use a very simple accounting rule which says that the net change in a stock (S) equals inflow minus outflow ($\Delta S = SI - SO$), all measured over a certain period. From this simple rule it follows that inflow can be calculated as the sum of net change and outflow ($SI = \Delta S + SO$) and that outflow can be calculated as inflow minus net change ($SO = SI - \Delta S$). As nut all the stocks and flows are available from published sources, we will use some of the assumptions made by BDB and we will have to make some additional assumptions. In the rest of this paragraph we will first develop the system of worker flows and later include jobs. In the Xast section we present a sensitivity analysis of the assumptions.

The stocks depicted in Figure 1 in the previous paragraph are all available from published sources:

E : Employment [1]

U_I : Unemployment insurance [2]

U_W : Welfare (unemployment assistance) [3]

N_D : Occupational disability [4]

N_O : Nun-participation (out of the labour force) [5]

If a worker becomes unemployed his labour market status changes. However a worker flow can also occur without a change in labour market status. We distinct four such flows: two within non-participation and one within unemployment and employment. From primary sources are available:

F_{EE} : job-movers [6]

$F_{U_I U_W}$: from unemployment insurance to welfare [7]

$F_{N_O N_D}$: from out of the labour force to occupational disability [8]

Unemployed are entitled to unemployment insurance payments for a limited period. If they are still unemployed after their right to insurance payments has expired, they receive welfare ($F_{U_I U_W}$). F_{EE} represents workers with a regular job who move directly to a different job (job movers). Within non-participation we observe the flow from N_O into the group of disabled workers ($F_{N_O N_D}$). This flow consists mostly of early disabled workers. The second flow within non-participation, from occupational disability to other non-participation ($F_{N_D N_O}$), can only partly be observed and will be constructed later using an assumption. Data on the following flows between unemployment, employment and non-participation are available from primary sources:

F_{EU_I} : from employment to unemployment insurance [9]

F_{EN_O} : from employment to non-participation [10]

F_{EN_D} : from employment to occupational disability [11]

F_{U_1E} : from unemployment insurance to employment [12]

$F_{U_1N_O}$: from unemployment insurance to non-participation [13]

It turns out that must information is available on employment outflow (to unemployment insurance, occupational disability and other non-participation) and the flow out of unemployment insurance provisions (to employment and nun-participation). The assumptions are mostly concerned with the outflow out of occupational disability, flows in and out of welfare and vacancy inflow that occurs when a worker leaves employment and the jub is nut destroyed.

We start the construction of our time series by making assumptions with respect to the outflow of occupational disabled- The assumptions are based on flow data that are available from primary sources and on scattered information from previous studies and surveys. From primary sources we observe the total outflow out of occupational disability and we can distinguish disabled workers who die, retire or recover from their disability. Those who retire obviously gu from occupational disability to other non-participation (denoted as $N_{D(65+)}$), but for those who recover from their disability (denoted as $N_{D(\text{recovery})}$) we do nut know whether they find a job, become unemployed and go to welfare or leave the labour force[3]. In a recent study by the Council fur Supervision of Social Insurances (CTSV, 1996b) it was found that one year after a re-examination of disabled wurkers had indicated a decreasing level of occupational disability, 73 % of these wurkers did nut pick up wurking or increased the number of hours worked. One half of these people received some other social benefit, the other half did nut and obviously left the labour force. For those who received some other benefit the same applied or they became unemployed and received welfare. Therefore we assume that those who did not receive a benefit (73 % x 0.5 = 36.5 %) plus half of those who did receive a benefit (73 % x 0.5 x 0.5 = 15.25 %) left the labour force (36.5 % + 18.25 % ≈

[3] Occupational disabled who become unemployed are assumed not to be entitled to unemployment insurance provisions, since it is a prerequisite for receiving an unemployment insurance benefit to have recent previous work experience.

55 %). The other half of those who received a benefit one year after recovering are assumed to be unemployed (73 % x 0.5 x 0.5 ≈ 20 %),

$$F_{N_D N_O} = N_{D(65+)} + 0.55 * N_{D(\text{recovery})} \qquad [A\text{-}1]$$

$$F_{N_D U_W} = 0.20 * N_{D(\text{recovery})} \qquad [A\text{-}2]$$

These two assumptions can also be supported by scattered information form the IPS, the Income Panel Survey (CBS, 1996, Table 59). For the year 1989 there is scattered data on the transitions between income groups. 6 % of those who received occupational disability payments received no income a year later or they received pension payments or welfare. This amounts to 50.7 thousand persons, which is close to the flow from occupational disabled to non-participation of 49.9 thousand that we find for the same year based on assumption [A-l]. The IPS reports fur 1989 that 8.4 thousand persons moved from occupational disability to welfare, measured in terms of income transfers. Using assumption [A-2] we find a flow of 5.7 thousand persons.

We can ROW derive the flow of occupational disabled who find a job. Because outflow equals inflows minus net change we calculate the flow out of occupational disability to employment by deducting the net change in the number of occupational disabled from the total inflow and then correcting for the other flows out of occupational disability

$$F_{N_D E} = F_{N_O N_D} + F_{EN_D} - \Delta N_D - F_{N_D N_O} - F_{N_D U_W} \qquad [14]$$

We now turn to tie other category fur which we have to make assumptions, the flows in and out of welfare. Concerning inflow into welfare form nun-participants, BDB report that only for scattered years in the 1980's some information on the flow of school-leavers into unemployment is available, which amount to some 60 to 70 % of the school-leavers. We follow BDB, who note that in the 1980's employment changes were unfavourable, and assume that over the entire sample on average 50 % of the total number of school-leavers does nut find a job right after they graduated and therefore receive unemployment welfare,

$$F_{N_O U_W} = 0.50 * N_{O(\text{schoolout})} \qquad [A\text{-}3]$$

Unemployed are no longer entitled to welfare if they find a job or if they cease to be part of they labour force, i.e. they become non-participants. None of these flows out of welfare is available from primary sources. However, because we can calculate the total inflow into welfare from assumption A-2, A-3 and tie inflow into welfare from unemployment insurance [7], the total outflow out of welfare can be determined by $U_W O = U_W I$ - AU, . This gives us a starting point for deriving the separate flows out of welfare as $U_W O = F_{U_W E} + F_{U_W N_O}$. We make an assumption on the Bow from welfare to non-participation (the reverse flow of assumption A-3) so we can derive the inflow into employment from welfare. We base our assumption on a recent survey from the Dutch Ministry of Social Affairs and Employment (1994), which gives some scattered information on the flows of unemployed out of welfare ($U_W O$). It appeared that in 1990, 61.5 % of those who left welfare found a regular job, 5 % found an additional job and 33.5 % left welfare because of other reasons, e.g. people who marry and are no longer entitled to welfare or unemployed who reach retirement age. We do not consider additional jobs and therefore assume that 40 % of the total outflow out of welfare enters non-participation,

$$F_{U_W N_O} = 0.4 * U_W O \qquad \text{[A-4]}$$

This enables us to derive the inflow into employment from welfare,

$$F_{U_W E} = U_W O - F_{U_W N_O} \qquad \text{[15]}$$

So far we constructed all flows depicted in Figure 1 except for one: the inflow into the labour market of non-participants who find a job, e.g. women re-entering the labour market. We obtain this flow by subtracting the flow of occupational disabled who find a job from the total flow from non-participation to employment,

$$F_{N_O E} = EI - F_{U_W E} - F_{U_I E} - F_{N_D E}, \qquad \text{[16]}$$

where $EI = EO + \Delta E = F_{EU_I} + F_{EN_D} + F_{EN_O} + F_{EM} + \Delta E$, with F_{EM} representing worker mortality. This completes the construction of the worker flows.

We will introduce a number of definitions concerning labour market dynamics, that will be of use when discussing flows of jobs in the next section. The labour force consists of the sum of employed and unemployed.,

$$L = E + U_I + U_W \qquad [17]$$

We distinct workers who quit and workers who get laid off. Some separations take place because workers do no longer want to be in the labour force or, in case of occupational disability, are no longer able to be in the labour force or they found themselves a different job, These workers quit their jobs (Q). On the other hand, there are workers who got laid off and become unemployed (LO), so we define

$$Q = F_{EN} + F_{EE} \qquad [18]$$

$$LO = F_{EU} \qquad [19]$$

Separations (S)is defined as the sum of quits and laid off workers and hires (H) is simply the sum of job movers and the inflow into employment,

$$S = Q + LO = EO + F_{EE} \qquad [20]$$

$$H = EI + F_{EE} \qquad [21]$$

Labour turnover (LT) is defined a the sum of hires (new contracts) and separations (quits and layoffs) (see Schettkat, 1996a)[4],

$$LT = F_{UE} + F_{NE} + F_{EU} + F_{EN} + 2*(F_{EE}) \qquad [22]$$

[4] Hires are sometimes called engagements and separations are sometimes referred to as disclosed contracts.

3.2 Job Creation, Job Destruction and Vacancies

In the above section we described worker flows. Here we will use these flows to determine job creation, job destruction and vacancy flows. The number of vacancies (V) and the total inflow *of* vacancies (VI) are know from published sources,

$$\mathbf{V}: \text{number of vacancies} \qquad [23]$$

$$VI: \text{inflow of vacancies} \qquad [24]$$

The number of jobs equals the sum of all employed and the number of vacancies,

$$J = E + V \qquad [25]$$

Following BDB we will make use of two sets of definition equations in the construction of the vacancy BOWS. The first relates to the fact that a person, be it a job mover, unemployed or non-participant., can End a job by filling a vacancy (e.g. F_{UE}^{v}) or by applying for a non existing job and filling a latent vacancy (e.g. F_{UE}^{j}). In the former case no new job is created and in the later case there is. We use the following definition equations:

$$F_{EE} = F_{EE}^{v} + F_{EE}^{j} \qquad [26]$$

$$F_{UE} = F_{UE}^{v} + F_{UE}^{j} \qquad [27]$$

$$F_{NE} = F_{NE}^{v} + F_{NE}^{j} \qquad [28]$$

The flows from unemployment and nun-participation to employment in [27] and [28] actually consists of two Bows each, welfare and unemployment insurance and occupational disability and other non-participation, but we combine these flows to simplify the matter. The first term in the employment inflow definitions above concern unemployed, non-participants ***and*** job movers who fill a vacancy. By definition this is linked with the outflow of vacancies with respect to these groups.

So we define

$$VO_{EE} = F^{v}_{EE} \qquad [29]$$

$$VO_{UE} = F^{v}_{UE} \qquad [30]$$

$$VO_{NE} = F^{v}_{NE} \qquad [31]$$

The sum of these three flows defines the total flow of filled vacancies,

$$VO_f = VO_{EE} + VO_{UE} + VO_{NE} \qquad [32]$$

The total outflow of vacancies (VO) *consists of* filled vacancies(VO_f)and scrapped vacancies (VO_s). We *can* calculate this total outflow because total inflow of vacancies and the number of vacancies are available from primary sources,

$$VO = VI - \Delta V = VO_s + VO_f \qquad [33]$$

According to survey information from the USA (1988) 40 % of the vacancies are difficult to fill. We follow BDB and assume that every year 75 % of these vacancies are scrapped (40 % x 75 % = 30 %),

$$VO_s = 0.30 * V \qquad [A\text{-}5]$$

The number of filled vacancies can easily be calculated as $VO - VO_s$.

In our system of worker flows we distinguish job searchers filling a vacancy and job searchers who take up a job fur which no vacancy existed, in which case employment inflow is accompanied by job creation. As there is no information on the relative weight of these two types of employment inflow, we have to make assumptions on one of them. We assumed that the inflow into employment when no vacancy is filled, is a fraction of the total flow into employment. This fraction ξ is the share of total hires which do not lead to an outflow of vacancies in a particular year, $\xi = \left(H - VO_f\right)/H$.

The assumed job creating flows into employment are:

$$F_{EE}^{J} = \xi F_{EE} \qquad [A\text{-}6]$$

$$F_{UE}^{J} = \xi F_{UE} \qquad [A\text{-}7]$$

$$F_{NE}^{J} = \xi F_{NE} \qquad [A\text{-}8]$$

This assumption is more sophisticated than the other assumptions in the accounting system because we do not use a fixed proportion of total employment inflow. Instead the fraction depends on specific labour market conditions in every year, namely the yearly number of latent vacancies that is filled. The assumptions imply that if the number of hires increases but the number of filled vacancies dues not, then there will be more hiring without filling a vacancy. The assumption is also robust because only time series obtained from primary sources are included.

Using these assumptions and definition equations [26]-[28] we can calculate the flows into employment due to filling a vacancy. These flows, by dei5n.ition.s [29]-[31], equal their respective vacancy outflows.

Finally we have to calculate the vacancy inflow. From primary sources only the total vacancy inflow is available, but it is unknown which part of that inflow arises due to separations. Therefore we have to make three more assumptions linking the worker flows out of employment to their respective vacancy inflow and we have to make an assumption for the vacancies that arise due to workers who die. From survey information from the OSA (1994) it appears that if a worker muves to a different job to replace a colleague who left the organisation, in 66 % of the cases the vacant position will be filled. This gives us sume indication on the amount of vacancy inflow in case of job mobility. We assume that 65 % of the jobs of workers who move to a different employer will nut be destroyed,

$$VI_{EE} = 0.65 * F_{EE} \qquad [A\text{-}9]$$

Unfortunately we are not aware of any scattered information that could help us to link vacancy inflow to worker flows in case of quits to non-participation, layoffs or when a worker dies. We assume that this share will be very low in case of a layoff, because in The Netherlands firing-and-hiring is not allowed. Vacancy inflow generated by workers who leave the labour

force due to occupational disability is likely to be lower than vacancy inflow due to job movements because in The Netherlands there is a lot of hidden unemployment among occupational disabled (Hassink, Van Ours and Ridder, 1997). We assume that

$$VI_{EU} = 0.01 * F_{EU} \qquad \text{[A-10]}$$

$$VI_{EN} = 0.25 * F_{EN}, \qquad \text{[A-11]}$$

where F_{EN} actually consists of two flows, namely employment outflow to occupational disability and other non-participation, but we combine these two flows to simplify notation. Furthermore we assume that

$$VI_{EM} = 0.25 * F_{EM}, \qquad \text{[A-12]}$$

where $F_{EM} = 0.05 * E$, so $VI_{EM} = 0.0125 * E$. Total vacancy inflow consists of vacancies fur new jobs, denoted as VI_j, and the inflow of vacancies due to separations, according to the above assumptions. The inflow of vacancies which is a part of job creation can now easily be calculated,

$$VI_j = VI - VI_{EE} - VI_{EU} - VI_{EN} - VI_{EM} \qquad [34]$$

Using the flows of workers and vacancies developed in this paragraph we are able to construct time series of job creation and destruction. Job creation consists of tires fur which no vacancy existed, including people who start their own business. Filling a vacancy fur a job therefore dues nut create a jub, this already took place when the vacancy was created, but it destroys a vacancy. Job creation also consists of newly created vacancies. However new jobs and new vacancies are nut the same. Part of the vacancy inflow is due to the fact that workers quit their job or gut laid off, while the job itself was nut destroyed. Obviously this type of vacancy inflow does nut concern job creation. Job creation is defined as

$$JC = VI_j + F_{EE}^j + F_{UE}^j + F_{NE}^j \qquad [35]$$

Job destruction consists of two components- The first is vacancies which are scrapped before they were filled (VO_s). The second part of job destruction is caused by workers who left their job because they were laid-off or because they quit their job. However, sometimes these

separations generate a new vacancy, in which case the job will be preserved- The same applies to workers who die (F_{EM}). We define job destruction as

$$JD = VO_s + (F_{EE} - VI_{EE}) + (F_{EU} - VI_{EU}) + (F_{EN} - VI_{EN}) + (F_{EM} - VI_{EM}) \quad [36]$$

Job turnover (JT) is simply the sum of job creation and job destruction: $JT = JC + JD$.

3.3 **Sensitivity Analysis**

In constructing our data set we have used a number of assumptions in order to close our accounting system. Above we indicated that results form microeconomic studies and surveys were a major selection criterion for the assumptions. Another important criterion is that, because *of* the accounting character of the flow system, the construction may not yield negative values. It turns out that in general the effects of changing the assumptions are rather small, so the system of labour market flows seems not to be very sensitive in the assumptions.

We will consider seven alternatives and see how they effect the major indicators *of* labour market dynamics (see Table 3). Our sensitivity analysis partly covers the one BDB did on their system *of* labour market flows, which allows us to investigate whether our construction of labour market flows is less sensitive to the assumptions than the framework of BDB. We elaborate on this in Appendix III.

1. In the fist alternative we assume that only a fraction of occupational disabled who recover goes to unemployment (5 %) and that the majority leaves the labour force (90 %). It turns out that changing assumption A-J. and A-2 has no significant effect on the worker flows and other labour market indicators. We also considered alternatives where only 35 % of those who recover leave the labour force, with about the same results.

2. Here we change our third assumption and assume that all students who leave school become unemployed, instead of 50 %. As a result unemployment flows increase and therefore unemployment duration is lower.

Table 3 Sensitivity analysis fur the assumptions

(results x 1000)

	basic version	*1*	*2*	*3*	*4*	*5*	*6*	*7*
UI	444	440	562	444	444	444	444	444
UO	418	414	536	418	418	418	418	418
F_{U_WE}	110	107	180	164	103	110	110	110
F^v_{UE}	159	157	199	189	160	157	261	159
F^j_{UE}	131	130	161	155	124	133	29	131
EI	513	513	513	513	513	513	513	513
EO	477	477	477	477	477	477	477	477
VI_j	223	223	223	223	223	223	223	154
JC	698	698	698	698	698	706	334	630
$JC - VI_j$	475	475	475	475	475	484	111	475
JD	668	668	668	668	668	676	668	599
JT	1366	1366	1366	1366	1366	1383	1002	1229
LT	2152	2152	2152	2152	2152	2152	2152	2152
E_{du} (years)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
U_{du} (weeks)	46.4	46.8	36.4	46.4	46.4	46.4	46.4	46.4
V_{du} (weeks)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
V_{ch} (index)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	4.5

1: $F_{N_DN_O} = N_{D(65+)} + 0.90 * N_{D(\text{recovery})}$, $F_{N_DU_W} = 0.05 * N_{D(\text{recovery})}$;

2: $F_{N_OU_W} = N_{O(\text{schoolout})}$; 3: $F_{U_WN_O} = 0.1 * U_WO$; 4: $F_{U_WN_O} = \left(U_{lt}/U\right) * U_WO$;

5: $V_s = 0.40 * V$ 6: $\xi = 0.10$; 7: $VI_{EE} = 0.70 * F_{EE}$, $VI_{EN} = 0.50 * F_{EN}$ and $VI_{EM} = 0.50 * F_{EM}$

3. Our fourth assumption relates to unemployed workers who leave the labour force. Under assumption [A-4] 40 % of the workers who left welfare was assumed to leave the labour market. As an alternative we assume here that only 10 % leaves the labour market. All indicators of labour market dynamics, except for the flow from unemployment to employment, remain the same.

4. Here we assume that the share of workers that leave welfare and leave the labour force in each year equals the share of long term unemployment, so $F_{U_WN_O} = \left(U_{lt}/U\right) * U_WO$. On average the share of long term unemployment equals the share we assume in our basic version, 40 %. Again, none of the indicators listed in Table I is affected by this assumption, except for some minor changes in the flow from unemployment to employment.

5. In the basis projection we assumed that 30 % of all vacancies was scrapped in a year. Here we assume that 40 % is scrapped, i.e. all vacancies that are difficult to fill. This change has very small effects on the number of workers that find a job and on job destruction and job creation.

6. In this alternative most jobs are filled via a vacancy ($\xi = 0.10$ in every year). In the basic version on average about 40 % of the jobs were filled via a vacancy. Naturally more jobs are occupied via a vacancy. Job creation falls significantly due to the fact that fess people take up a job for which no vacancy existed.

7. Under this alternative assumption 50 % of the separations due to workers who leave the labour force generates a vacancy, instead of 25 %. Furthermore 70 instead of 65 % of the job-movers leaves a vacancy behind, which can be refilled. The vacancy chain index rises because more job movers leave a vacancy behind. For the same reason job destruction is lower. Job creation is also lower. This is due to a lower value for the inflow of vacancies fur new jobs (VI_j). In fact, in some years this assumption causes negative values fur VI_j, so our flow system is quite sensitive to changes in these assumptions.

Employment inflow, -outflow and labour turnover is not affected by any of the assumptions because these flows are constructed using primary sources only. Unemployment flows, job destruction and the inflow of vacancies for new jobs are not very sensitive to the assumptions. It is possible that there are large changes in flows that underlie the aggregate flows presented in Table 3, but apparently these are compensated somewhere else in the accounting system. It turns out that the most crucial assumptions are those on the extent to which a vacancy arises in case of separations to unemployment, non-partkipation (including occupational disability) and job mobility.

Table 4 Composition of worker and job flows

Flows	*Obtained from*
Job movers	
F_{EE}	Primary source
F_{EE}^{j}	Assumption A-6
Employment inflow	
F_{UE}^{j}	Assumption A-7
F_{NE}^{j}	Assumption A-8
$F_{U_I E}$	Primary source
$F_{U_W E}$	Assumptions: A-2, A-3, A-4 Primary sources: ΔU_W, $F_{U_W N_O}$
$F_{N_O E}$	Assumptions: A-1, A-3, A-4 Primary sources: ΔN_D, ΔE, ΔU_W, $F_{U_I E}$, $F_{N_O N_D}$, $F_{U_I U_W}$, F_{EN_O}, F_{EU_I}
$F_{N_D E}$	Assumptions: A-1, A-2 Primary sources: ΔN_D, $F_{N_O N_D}$, F_{EN_D}
Employment outflow	
F_{EU_I}	Primary source
F_{EN_O}	Primary source
F_{EN_D}	Primary source
Unemployment inflow	
$F_{N_O U_W}$	Assumption A-3
$F_{N_D U_W}$	Assumption A-2
$F_{U_I U_W}$	Primary sowce
Non-participation inflow	
$F_{U_I N_O}$	Primary source
$F_{U_W N_O}$	Assumption A-4
$F_{N_O N_D}$	Primary source
$F_{N_D N_O}$	Assumption A-1
Vacancy inflow	
VI_j	Assumptions: A-9, A-10, A-f1, A-12 Primary source: total vacancy inflow VI
VI_{EE}	Assumption A-9
VI_{EU}	Assumption A-10
VI_{EN}	Assumption A-11
VI_{EM}	Assumption A- 12
Vacancy outflow	
$V_s = 0.30 * V$	Assumption A-5
$VO_{EE} = F_{EE}^{v}$	Definition
$VO_{UE} = F_{UE}^{v}$	Definition
$VO_{NE} = F_{NE}^{v}$	Definition

Table 4 gives an overview of all labour market flows and how they are constructed. Our system of labour market flows consists of 6 stocks (2 unemployment, 2 non-participation, employment and vacancies) and 27 flows of which 18 are worker flows and 9 axe job flows. All stocks and 8 flows are available form primary sources. Most of these flows concern the outflow out of employment and unemployment insurance. 11 out of the 27 flows are determined by definition equations or axe obtained from primary sources. It turns out that we have to make 12 assumptions - of which some are related - and that, using these assumptions and the 8 flows from primary sources we are able to derive the 4 resulting flows.

3. Trends in Worker and Job Flows in The Netherlands

3.1 Labour Market Dynamics

Using the method described in the paragraph above we are able to construct a set of time series for labour market flows in The Netherlands. Table 5 shows the most important trends at the macro level that appear from these flows.

Table 5 **Key figures on labour market flows in The Netherlands**

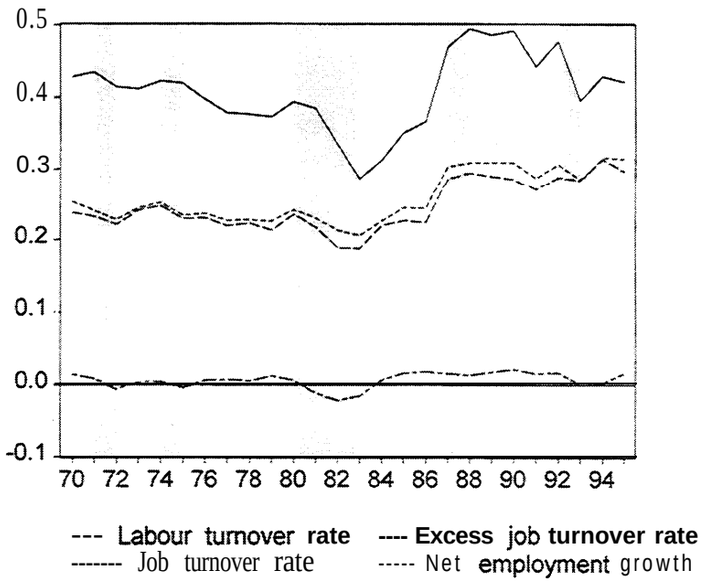
(Annual averages; x 1 000 persons/jobs)

	1971-75	*1976-80*	*1981-85*	*1986-90*	*1991-95*
Inflow into unemployment	344	347	450	484	649
Outflow out of unemployment	306	338	401	472	611
Mow into occupational disability	60	104	93	100	97
Outflow out of occupational disability	33	56	74	81	103
Job creation	565	595	533	839	899
Job destruction	629	576	581	735	863
Job turnover	1184	1171	1115	1574	1762
Labour turnover	2097	1948	1659	2460	2506
Vacancy inflow	813	835	428	617	501
Vacancy outflow	848	833	431	605	513

Annual job creation and job destruction are. on average, larger than inflow in and the outflow out of unemployment. This is due to the fact that in some cases job destruction dues not cause unemployment, for example when a worker retires or finds a different job instantly. Moreover,

not al newly created jobs are occupied by unemployed, but to a large extend by non-participants and workers who change jobs. Job turnover is often referred to as an indicator for the pace of labour market dynamics. Furthermore there are employed who change their job for an existing new job, non-participants who fill a vacancy for an existing job and workers who become unemployed or quit because of (early) retirement and who's job is preserved. In these situations there is no change of jobs but there is a change of personnel. That is why the labour turnover in Table 5 is much higher than job turnover. In recent years annual labour turnover was about 2.5 million as against 1 .7 million annual job turnover. As from 1970 on labour turnover is on average almost 60 % higher than job turnover, although the difference decreases in recent years.

Figure 2 **Job turnover, excess job turnover and labour turnover**
(percentage of total employment)



Increased labour market dynamics also appears form Figure 2. The shaded areas indicate periods of cyclical downturn. The picture shows labour turnover, job turnover, excess job turnover and net employment growth as a share of employment. Excess job turnover is defined as the amount of job turnover that was not induced by changes in employment, $JT_{exc} = JT - |\Delta E|$. It can be seen as the substitution effect of labour market dynamics and as such it is an indicator of labour market dynamics that is independent of the business cycle.

Notice that after the economic recession in the beginning of the 1980's excess job turnover is substantially higher than before the recession.

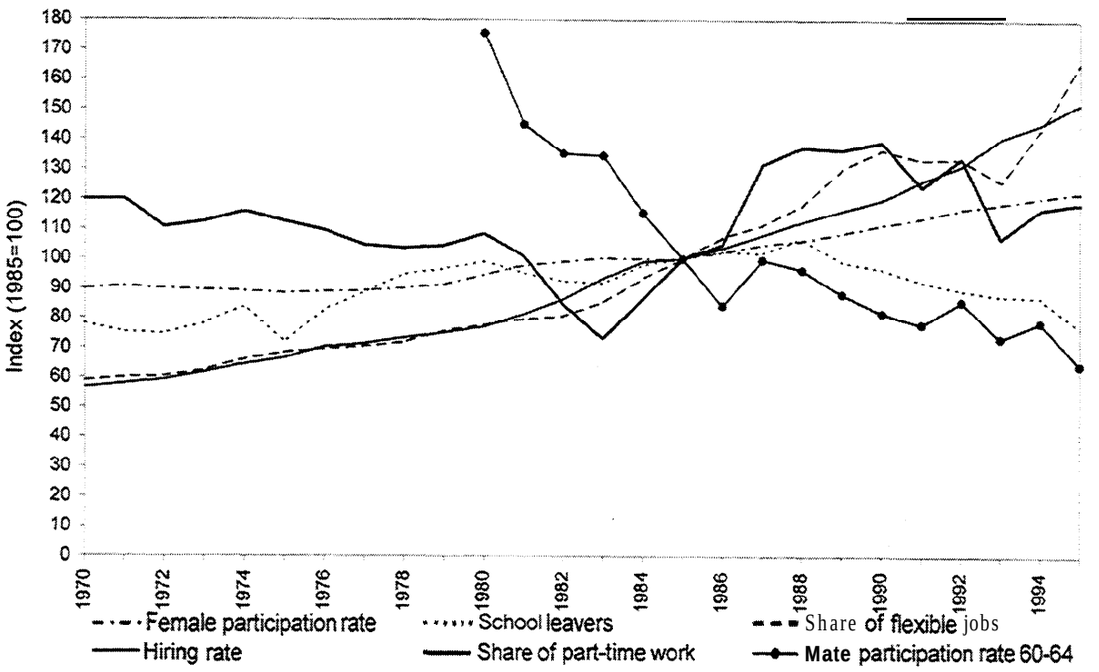
There are a number of possible explanations fur increased labour market dynamics. Some of them have to do with social and legal institutions. The most common explanation of this type is the reduction of the average duration of employment. If the duration of education increases or the (early) retirement age decreases, more hires are needed to keep empluyment at a fixed level. Average retirement age did fall since the beginning of the 1970's due to, among other reasons, the introduction of early retirement schemes (see Figure 3). Labour participation among male workers in the age 60-64 dropped from 74 % in 3 97 1 to 37 % in 1 983 and 18 % in 1995 (OECD, 1 995). This could be an explanation for increased labour market dynamics in the 1980's, but it can nut tell the whole story since the most significant decrease in elderly participation rates took place in the 1970's.

Another explanation might be the increased demand of workers for part time jobs. If employment in terms of full time jobs is fixed and the average number of hours per job decreases, more hires will be needed to equate inflow and outflow of employment. The share of part-time employment (measured in total number of hours worked) has been rising steadily fur the last twu decades (see Figure 3). In 1995 nearly 18 % of all hours worked was due to part time job, whereas in 1970 this was only 7 %. However, this can only partly explain the increase in labour market dynamics since the beginning of the 1980's because the demand fur part time work has been increasing since the beginning of the 1 970's. The increase in flexible labour contracts is another explanation for the observed increase in labour market dynamics. In the 1970's the share of flexible jobs rose only marginally from 2 % in 1970 to 3 % in 1983. In 1996 this share had more then doubled. Flexible jobs are jobs without a fixed number of working hours or a fixed contract term. It is likely that job turnover of flexible jobs is higher than for jobs with fixed working hours and a fixed term. However it is unclear to what extent this source of increased labour and job turnover shows up in our data. 'Flex workers' whu become unemployed are often nut entitled to unemployment insurance benefits.

Two other possible supply side causes of increased job and worker flows are changes in the number of school leavers and the female participation rate (see Figure 3). Female labour participation is likely to be an important determinant of increased labour market dynamics as

the participation rate started to increase substantially in the mid 1980's. The rising number of part-time jobs that we mentioned before is closely linked to this development. Labour market entry due to school leavers has been decreasing since the end of the 1980's. In the next section we will show that employment inflow from non-participation was a main source of increased hiring, so increased female labour participation more than compensated the decline in the number of school leavers-

Figure 3 **Possible explanations for increased labour market dynamics**



Apart from the social and legal causes labour market dynamics can also increase due to structural change. Technological change ox demand driven shifts within and between industries can increase labour market dynamics. Later on, when we discuss vacancies, we will pay attention to possible explanations of increased labour market dynamics &at originate from developments on the labour market itself.

3.2 Employment and Unemployment

In recent years employment has increased substantially in The Netherlands. Data on net job creation however conceal both the dynamics and the composition of employment. **Figure** 4 shows a decomposition of hires in the period 1970-1995. The inflow into employment has increased substantially in recent years. Over 1.2 million people got a new job in 1995, some of them more than once. Almost 40 % of these people already was employed, but switched jobs. It turns out that increased labour market dynamics are due to three factors: job to **job** movements, hires from unemployment insurance and hires from non-participation. Inflow into employment from welfare and occupational disability did not contribute to the increase in hires after the 1981-83 recession.

Figure 4 **Hires into employment**
(x 1 000 workers)

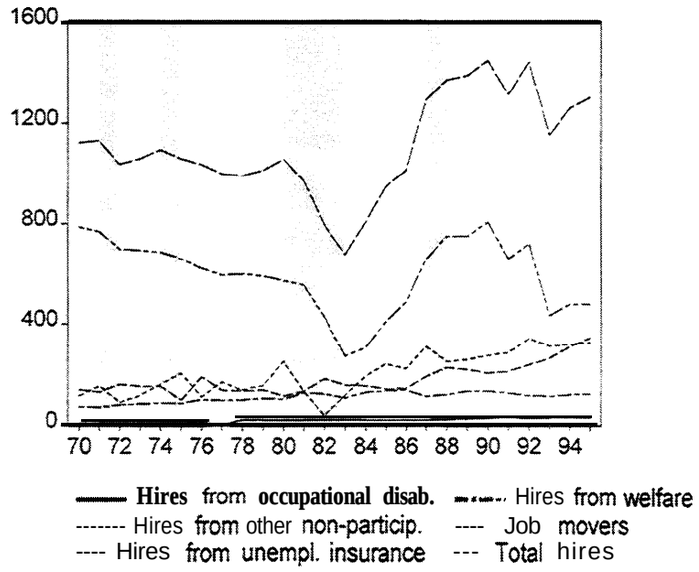
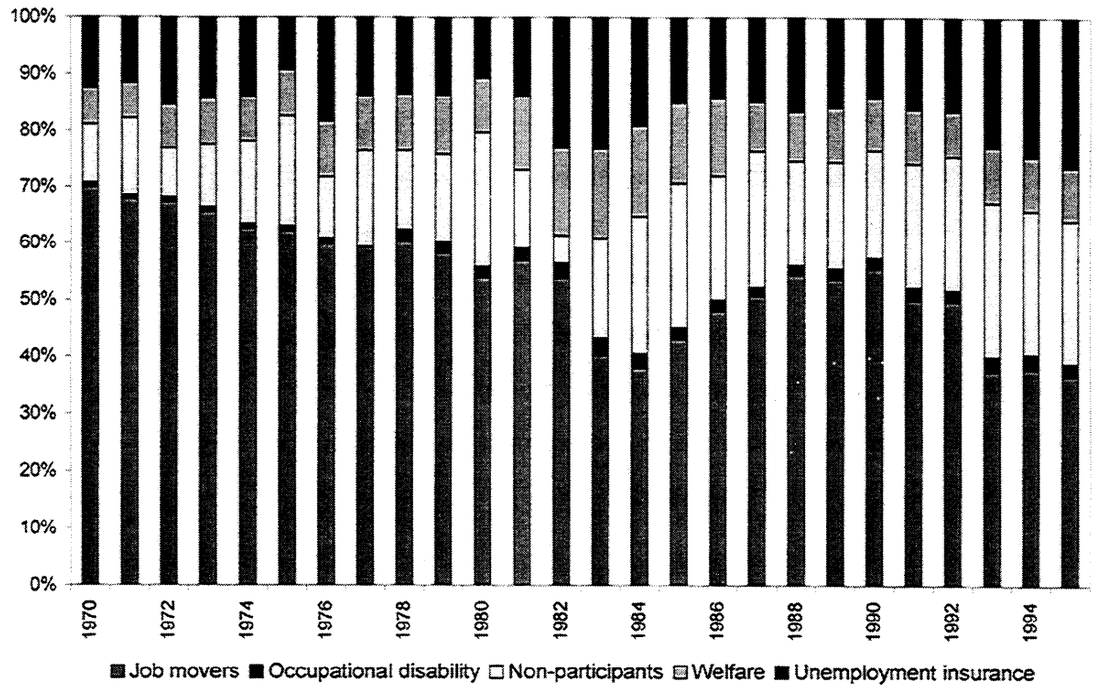


Figure 5 depicts the development over time of the relative importance of the different sources of hires. Although job to job movements did contribute to the increase in labour market dynamics in the 1980's, its share of total hires at the beginning of the 1990's is about one third lower than in the 1970's. The share of non-participants and unemployed receiving unemployment insurance benefits has increased. In recent years the number of hires from unemployment and non-participation (employment inflow) exceeds the number of job movers.

Figure 5 Composition of hires



increased labour market dynamics since the beginning of the 1990's can also be illustrated by that fact that both inflow and outflow of unemployed is one third higher than in the 1980's (Figure 6). Increasing inflow into unemployment is mostly due to workers loosing their job. The number of mm-participants that is entitled to welfare has been decreasing in recent years because of a decline in the number of high-school graduates. Since 1970 every year, except fur 1986 and 1990, more employed became unemployed than the other way around. This is because the outflow out of welfare has hardly increased, opposite to the outflow out of unemployment insurance provisions. The number of workers on welfare that found a job in 1990 (110 **thousand) is even** slightly lower than **ten years** before. Long term unemployed, fur whom it is difficult to find a job, are all dependent on welfare. Rapid inflow into employment is more common for unemployed dependent on unemployment insurance provisions than unemployed on welfare. Unemployed who get on welfare already have a long history of unemployment and fur that reason will have difficulties in finding a job. This unemployment persistence can be due fur example to ranking by employers, a loss of skills with the unemployed or decreased search intensity (see Snower, 1997).

Figure 6 Flows between **unemployment** and employment (x 1000 workers)

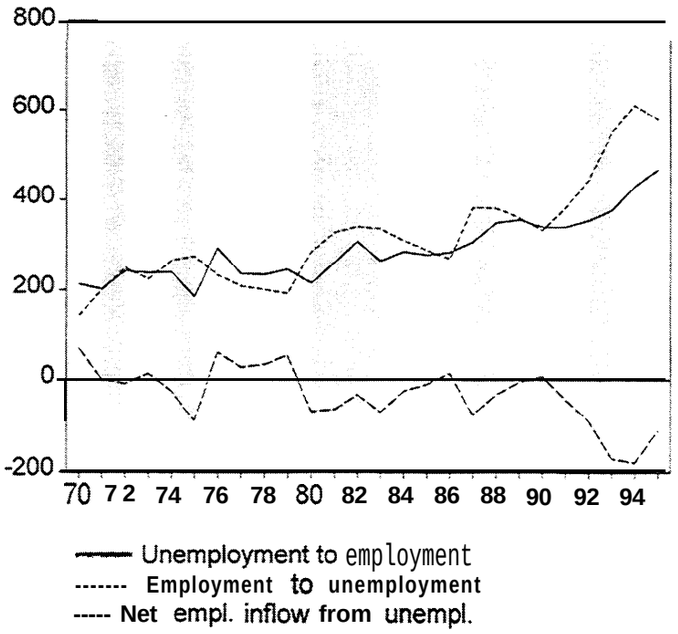


Figure 7 **The odds of leaving unemployment** (outflow to employment / unemployment)

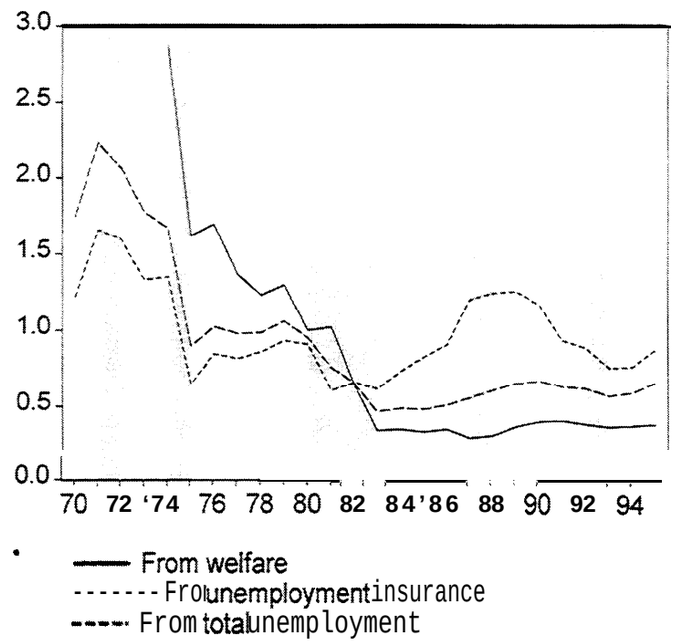


Figure 7 depicts fur the period 19'704995 the 'odds' of an unemployed worker receiving unemployment insurance payments or welfare to find a job. This 'outflow chance' on the y-axis is defined as the ratio of the outflow to employment and the stock of unemployed. In the beginning of the 1970's this ratio was very high, especially fur workers receiving welfare (that is why data for the period X970- 1975 were not included in the graph) because only very few workers were on welfare at that time. After the recession in the beginning of the 1980's the 'chance' of finding a job reaches a low. After the recession the odds of finding a job get better for unemployed entitled to unemployment insurance; provisions.

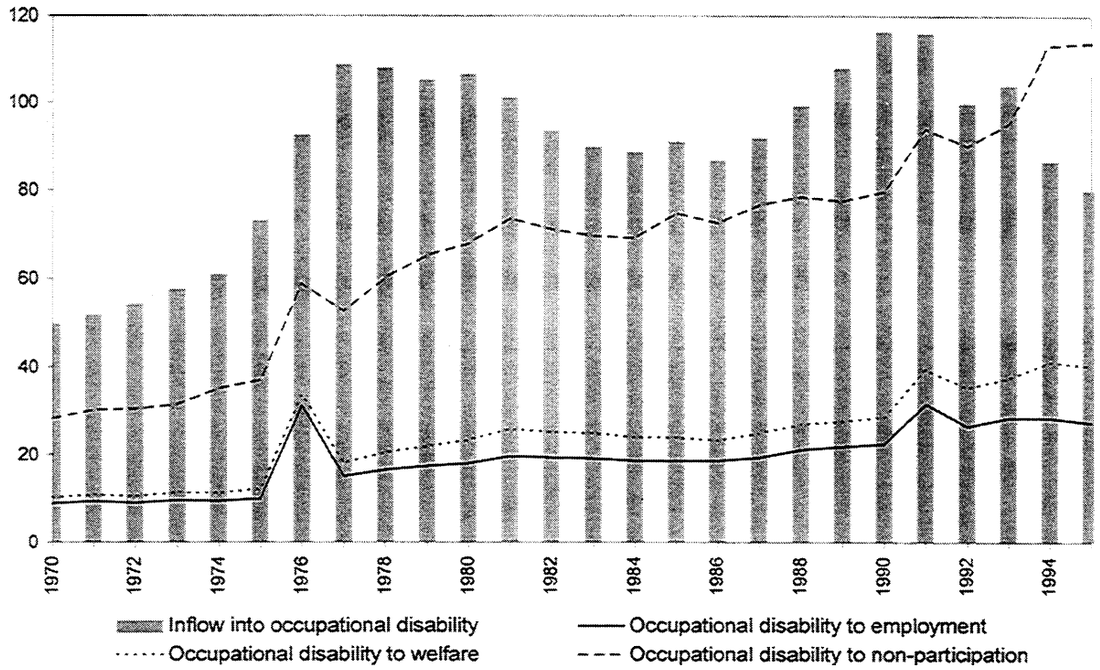
The present structure of Dutch unemployment provisions evolved in the 1960s. In 1985 unemployment insurance benefits were lowered from 80 to 70 % of the workers previous income. Another important policy change took place in 1991. Since then unemployed workers must have worked for a particular length of time in order to be entitled to unemployment insurance benefits. These policy measures were meant to improve the incentive structure of the benefit system (see Teulings, Van der Veen and Trommel, 1997, Part I). Only recently substantial policy changes have been made in the unemployment insurance system, again restricting the accessibility of unemployment insurance provisions. It is not clear to what extent the policy changes influenced unemployment inflow and outflow. From Figure 6 it appears that unemployment inflow from employment strongly fluctuates with the business cycle whereas unemployment outflow is much less sensitive ta fluctuations in the business cycle.

3.3 Occupational Disability

The Dutch occupational disability act (WAO) was introduced in 1967 and has been changed since then a number times. In 1976 self employed and early disabled became entitled to occupational disability provisions. This explains the rise in the inflow at the end of the 1970's. After the recession in the beginning of the 1980's a first wave of policy changes took place. In 1985 the maximum benefit was lowered from 80 to 70 % of the previous wage of the disabled worker. In 1987 the government abandoned the possibility that partially disabled wurkers could get a full equivalent benefit if unemployment was high in their industry. The direct effect of that policy change can nut be seen from Figure 8, which shows inflow and outflow

since 19'70, as it does not distinguish between full and partially disabled workers. However both this policy measure and lowering the maximum benefits did not limit the inflow into occupational disability, as can be seen from the graph. The peak in 1976 is due to the fact that we used a dummy for part of the inflow, because in that year civil servants and self employed became eligible fur occupational disability payments.

Figure 8 **Flows in and out of occupational disability**
(x 1000 persons, lines represent cumulated outflow)

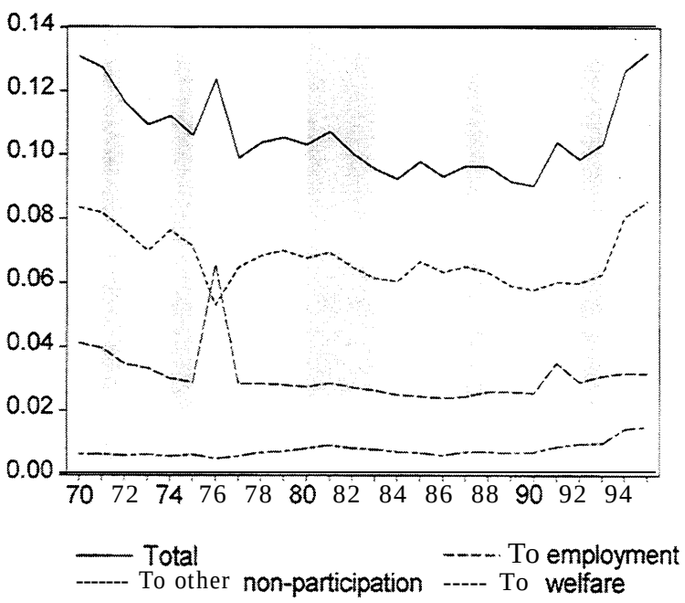


In **the beginning of the** 1990's a second wave of policy changes was made in the Dutch occupational disability schemes. The policy changes had to limit excess to the disability provisions and increase the outflow. The relative share of benefits for partly disability increased as a result of the policy measures. Easy access to these provisions caused the number of occupational disabled to reach almost one million by the end of the 1980's. The changes that were made in the beginning of the 1990's did have an impact in the inflow. These policy measures limited the duration of occupational disability benefits and hence made occupational disability benefits less attractive to workers. In the beginning of the 1990's inflow into occupational disability declined to the level prevalent in the mid 1970's, at which time annually 75 thousand workers became eligible for occupational disability payments. The

policy measures have been far less successful when it comes to the outflow out of occupational disability provisions. Although in recent years more people flow out of the provisions, most of them do so because they reach the retirement age (see Figure 8). In fact they outgrow the occupational disability provisions. The number of occupational disabled that finds a job has been fluctuating around 35 thousand a year for a long period and seems to have been not influenced by the recent policy measures.

Figure 9 gives the 'outflow chance' of occupational disability, defined as outflow divided by the number of occupational disabled. The peak in outflow 'chance' in 1976 is due to the fact that in that year early disabled, self employed and civil servants became entitled to occupational disability benefits and we used a dummy to correct for that.

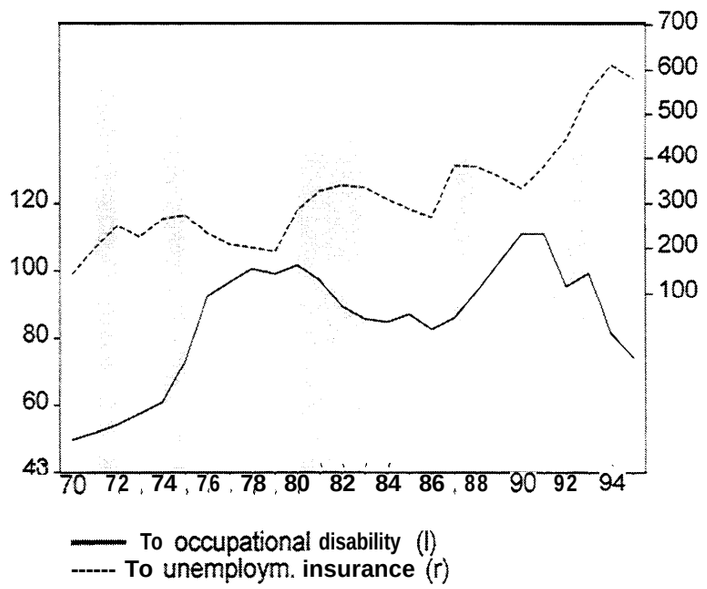
Figure 9 **The odds of leaving occupational disability**
(outflow of occupational disability / stock of occupational disabled)



Some research has been done on the relation between occupational disability and unemployment provisions. It is well known that part of the workers that became entitled to occupational disability provisions were in fact redundant. For both workers and employees occupational disability provisions were a more favourable way of adjusting the firm's employment level. Some empirical studies confirm that before the policy changes of the mid

1980's about 30-50 % of the inflow into occupational disability was in fact due to labour market conditions (Roodenburg and Wong Meeuw Hing, 1985, Aarts and De Jong, 1992). Hassink et al. (1997) find that even at the end of the 1980's still about 10 % of the inflow into occupational disability was due to redundancy of the worker. These results are supported by Figure 10, as there appears some negative correlation between the business cycle (the shaded areas) and the flow from employment to occupational disability (correlation is - 0.23). It is remarkable that until the policy reforms of 1987 higher inflow into unemployment from employment seems to coincide with increasing inflow into occupational disability provisions. In the period 1989-95 these two sources of unemployment outflow are correlated negatively (correlation = -0.85).

Figure 10 Employment outflow
(x 1000 workers)



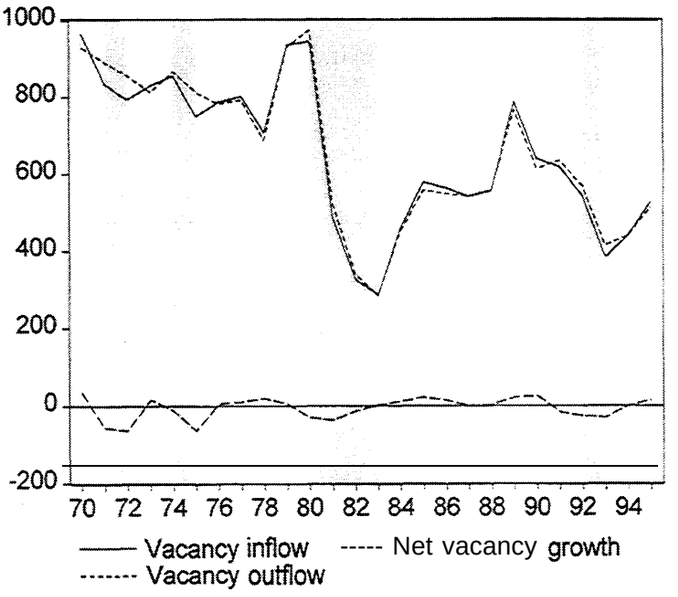
3.4 Vacancies

The analysis of vacancies is integrated in the system of labour market flows. As mentioned in the previous paragraph, the outflow of vacancies, for example, is by definition connected to the inflow of employed who occupy a vacancy. Apart from the vacancies created by firms and the government, the inflow of vacancies consists of vacancies that arise because employees

switch jobs, become unemployed or leave the labour market. Both inflow and outflow of vacancies have decreased in recent years, although the level of the flows is still above the early 1980's level (see Figure 11). Since the 1970's the inflow of new vacancies exhibits a downward trend, with upward fluctuations during periods of strong economic expansion.

Figure 11 Inflow and outflow of vacancies

(x 1000)



Vacancies can be cancelled in two ways. The most common way is that vacancies are filled by job searchers, If the job searcher is employed it is referred to as on-the-job-sear&. Furthermore, vacancies are scrapped because they can not be filled or because the vacancy has been cancelled, fur example because it was hard to fill. The decreased outflow of vacancies is caused largely by the decline in the number of workers who switch jobs by filling a vacancy. The number of non-participants and, to *a* lesser degree, the number of unemployed that fills a vacancy has been remarkably constant over a long period of time, apart from strong fluctuations during the recession in the early 1980's.

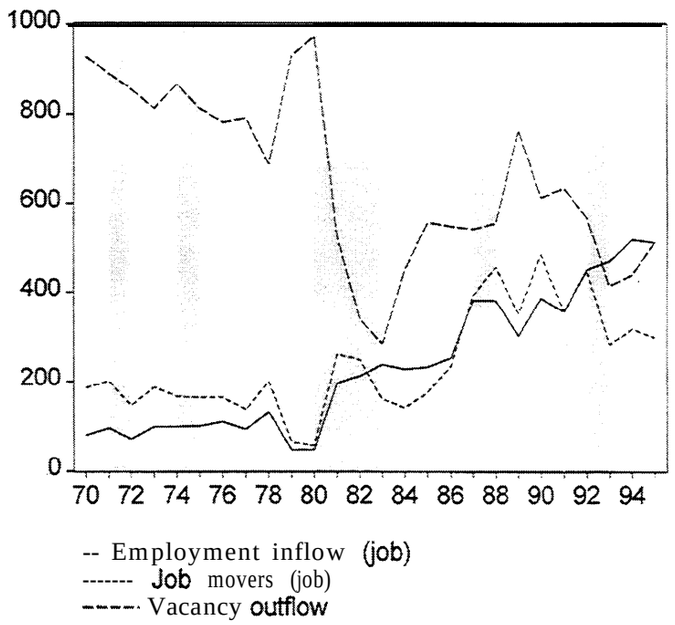
A concept that can give information on labour market dynamics is the so called vacancy chain. The vacancy chain index shows to what extent job moving in combination with filling a vacancy generates new vacancies. If one firm attracts a worker from a second firm the latter

could create a vacancy. If this firm indeed creates a vacancy and the job is nut destroyed it can hire a new worker, which agg could create a vacancy in a third firm. By this mechanism hiring a worker form the pool of workers can trigger a chain of vacancies. In this paper the average length of the vacancy chain index is equal to unity when all jobs of job movers are destroyed and the length is equal to infinity when non of these jobs is destroy& and all new vacancies emerge because of job quitting (see Appendix I). As Schettkat (1996b) indicates, the length of the vacancy chain depends on overall labour supply. If there is large excess supply of labour, the probability that a firm will hire a worker from the pool of employed declines. This shortens the vacancy chain and reduces labour turnover. According to Schettkat this mechanism underlies the decline in labour turnover in Germany from the early 1970's to the 1980's. It is doubtful if the same type of mechanism is also relevant fur The Netherlands. After the economy recovered from the 1981-83 recession excess labour supply was still very high. Although labour supply from the large pool of unemployed might not have been very effective due to mismatch, effective labour supply from the pool of non-participants was very high. The inflow into employment form non-participation has been increasing since the beginning of the 1980's (Figure 4). Contrary to the German case the vacancy chain in The Netherlands did nut decline. Instead, since the mid of the 1980's the vacancy chain strongly fluctuates with the business cycle (Figure 12).

Figure 12 Vacancy chain and hiring rate index

For The Netherlands it seems that other factors than job to job movements and the vacancy chain caused higher labour market turnover, such as increased female labour participation and a higher share of part--time and flexible jobs. From our data it appears that since the beginning of the 1980's the inflow into employment has risen largely because more people found a job without filling a vacancy (Figure 13). This explains how increased labour market dynamics through more hires can coincide with lower vacancy Bows. The growing importance of latent vacancies is also reported by other studies. The OSA (1994) reports that the share of organisations that uses informal channels to hire workers rose from 29 % in 1989 to 54 % in 1993.

Figure 13 **Hiring through latent vacancies and vacancy outflow**
(x 1000 workers/vacancies)



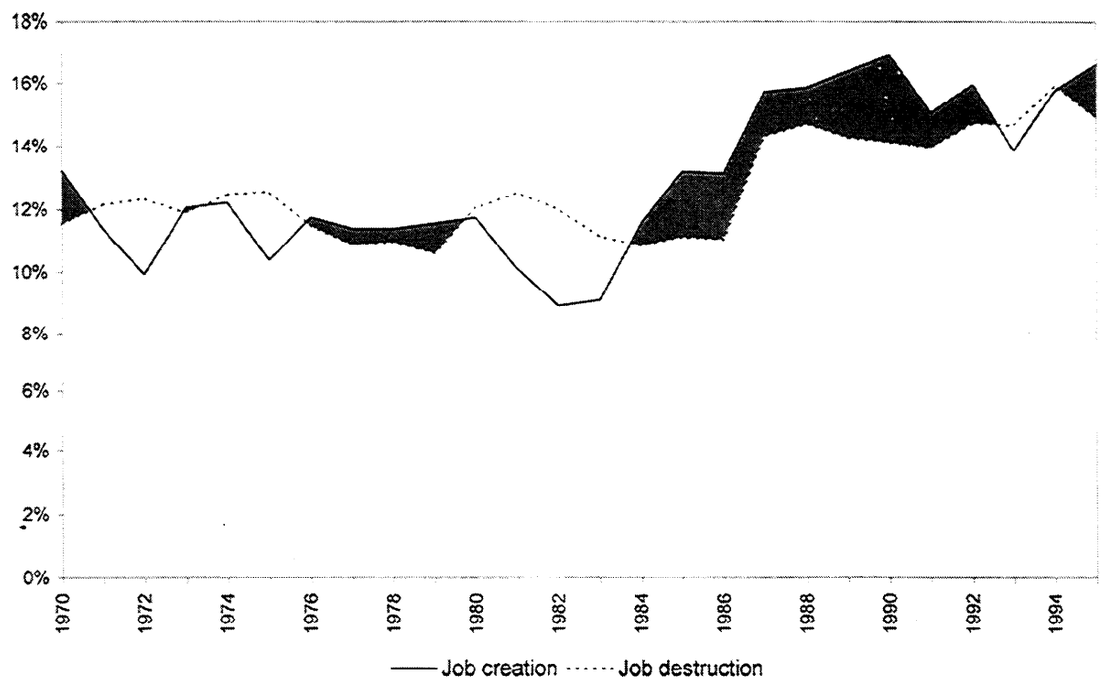
3.5 The Business Cycle

The relation between labour market dynamics and the business cycle is at the core of the theoretical models of job creation and job destruction. It is obvious that must job creation takes place during an economic upswing as job destruction is concentrated in periods of economic decline. From a lot of empirical research however, it appears that even in recessions

many jobs are created and therefore job turnover has an anti-cyclical pattern. It indicates that most reallocation takes place during recessions. From a theoretical point of view this can be explained because during recessions only part of the production capacity is needed to meet the demand and therefore the claim that reallocation has on the production capacity is less costly. This 'cleansing role of recessions' indicates that mild economic fluctuations do not necessarily have a negative impact on welfare. On the other hand, the modern business cycle theory does indicate that it is necessary to synchronise the processes of job creation and job destruction (Gautier, 1997).

Figure 14 shows job creation and job destruction in the period (19'704995). It is remarkable that the anti-cyclical behaviour of job destruction and the p-cyclical behaviour of job creation applies very strongly to the 1970's and 1980's, but during the economic downturn of 1993-94 there is only limited net job destruction. This might indicate better synchronised job creation and job destruction in The Netherlands. The correlation between the rates of job creation and destruction in the period 1970-83 is -0.32. In the period after the recession (3 984-95) job creation and destruction are correlated strongly positive (0.81).

Figure 14 Job creation and job destruction
(percentage of total employment)



The OECD (1987, Chapter 4) defined a rough measure of the so called structural level of job reallocation. i.e. job turnover that is independent of the business cycle. It is defined as the sum of job destruction in an economic boom and job creation in an economic recession. We find that about 95 % of job reallocation is structural. It seems that job creation is more variable over the business cycle than job destruction as the ratio of variances is 0.54 for the entire sample. The differences in variance are smaller for recent years.

In order to shed more light on the empirical relation between labour market dynamics and business cycle fluctuations in The Netherlands 'Table 6 presents some simple correlations between the state of the business cycle and labour market flows[5]. The results to some extent confirm the pattern of Figure 1 4. Flows in and out of unemployment and employment seem to be more synchronised in recent years. Over the whole sample period job destruction seems to behave a-cyclical instead of anti-cyclical. In recent years job destruction seem to show the usual anti-cyclical pattern. Of course no strong conclusions can be drawn on the basis of these simple correlations, especially while the number of observations is limited.

Table 6 **Correlation between the business cycle and labour market Bows**

	1970-95	*1970-88*	*1989-95*
Unemployment inflow	-0.16	-0.33	-0.43
Unemployment outflow	0.08	0.06	-0.17
Job creation	0.37	0.50	0.49
Job destruction	0.02	-0.09	-0.30
Job turnover	0.23	0.30	0.16
Labour turnover	0.25	0.20	0.56
Employment inflow	0.10	0.11	-0.36
of which			
unemployed	0.11	0.11	-0.11
occupational disabled	-0.04	-0.06	-0.60
non-participants	0.07	0.08	-0.62
Employment outflow	-0.19	-0.41	-0.48

One possible explanation for the seemingly **better** synchronisation of **job creation** and destruction is the fact that labour market **flexibility and the structure** of **the** social security **system** have an impact on labour-turnover costs (see Snower, 1997). The Dutch labour market

[5] The business cycle indicator is the change in the volume of gross added value in the market sector (excluding mining and real estate) measured in factor costs (CPB).

has become more flexible in recent years, for example by relaxing legal restrictions on layoffs. It is therefore likely that the labour-turnover costs have decreased in The Netherlands. This has a twofold impact on unemployment dynamics. On the one hand employees will hoard fess labour in times of declining demand because than it is easier to adjust employment and firing costs are lower. This is illustrated by the fact that recently the inflow into unemployment has a stronger anti-cyclical pattern than before. The other side of this effect is that the business cycle has less influence on the outflow out of unemployment. Even in periods of economic uncertainty, when it is unclear if demand will rise, employees will hire personnel because they do not have to fear superfluous personnel if the economic tide turns. Lower labour-turnover costs might also induce employers to anticipate a turn in the business cycle because adjustment costs are lower if they misinterpreted the development of demand. In this way lower labour-turnover cost can explain why in previous recessions the outflow of unemployment stagnated, as the 1993 recession hardly had any impact on the number of people that left unemployment.

Appendix IV provides descriptive statistics for all labour market Bows and Appendix V contains additional graphs for some labour market indicators (e.g. duration) that we did not elaborate on in this paragraph.

4. Comparison with other Data and Studies

To see how plausible our results are, we will compare the data of the flow system with survey data and other research and we will compare the results for The Netherlands with other countries.

One of the data sources of labour market flows in The Netherlands is the Labour Population Survey ('Enquete Beroepsbevolking, EBB') from the Central Bureau of Statistics (CBS). This is an annual survey conducted since 1987 that contains retrospective questions on labour market status from which flow data are derived. Their survey contains both a panel and a random sample of respondents. These data are in fact no real flow data as they report a change in labour market status between two points in time, similar to the DHS method. The CBS data are therefore subject to the limitations of the discrete time approach that we mentioned in the

first paragraph. Labour market flows are likely to be underestimated as compensated flows are not taken into account. Table 7 lists employment inflow and outflow as reported by the Labour Population Survey and our study. The total flows in and out of employment reported by the survey are about one third lower than the flows that we find. The outflow to unemployment is about 75 % lower in the Labour Population Survey. Apart from the reason mentioned above this large difference tight also be due to the fact that in the Labour Population Survey a more narrow definition of unemployment is used. We count unemployment by the number of unemployment benefits. In the Survey workers are only counted as unemployed if they have searched actively in the past few weeks fur a job of more than 12 hours a week and are able to take up the job immediately.

Table 7 **Comparing employment inflow and outflow from different data sources, 1994**

(x 1000 workers)

	Our study	*Panel data (LPS)*[1]	*Retrospective information (LPS)*
Inflow	720	497	389
Outflow	772	456	412
to unemployment	611	.	152
to non-participation	132	.	260
mortality	29	.	.

[1] 1993, LPS = Labour Population Survey.

Table 8 reports more detailed flow data based on the Income Panel Survey ('Inkomenspanelonderzoek'). These flow data face the same fallacy as the data based on the Labour Population Survey. The survey reports transitions in primary income source between two points in time (l-l-89 and I-1-90). Some of the findings from the Income Panel Survey match very well with our findings. Especially the flows from occupational disability to other labour market status are similar because there are very few compensating flows in this category. The compensating flows account for the fact that in all but one category we find larger labour market flows than reported by the Survey.

● h Table 9 we compare the net changes in employment and unemployment that result form our labour market flows with the standard macro data from the Dutch Central Planning Bureau **(CPB). The** table reports the 5-year average employment inflow and outflow, unemployment inflow and outflow and the net change in employment and unemployment as reported by the

CPB. It turns out that both measures of net employment change are almost identical. Our measure of unemployment change diverges from the CPB measure. This difference arises because our unemployment flows are based social security provisions, whereas the uses CPB a different definition of unemployment.

Table 8 **Comparing flows between sources of income, 1989**
(transitions as a percentage of relevant stock; employment, welfare, unemployment insurance and occupational disability)

	Our study	*Income Panel Survey*[1]		*Our study*	*Income Panel Survey*[1]
Employment to			*Unemployment insurance* to		
unemployment insurance	6.6	2	employment		31
welfare	1.9	0	welfare	38.6	5
disability		1	disability	.	1
non-participation	8.6	5	non-participation	44.4	12
Welfare to			*Disability* to		
employment	36.5	16	employment	3.5	3
unemployment insurance	.	1	unemployment	0.8	1
non-participation	24.3	x2	non-participation	6.6	6
disability	.	1			

[1] Source: CBS (1996), Table 59.

Table 9 **Comparing net changes in employment and unemployment**
(x 1000)

	71-75	*76-80*	**81-85**	*86-90*	*91-95*
Employment inflow	376	425	445	615	742
Employment outflow	371	387	476	514	681
Net change					
Inflow - outflow	5	38	-31	100	60
CPB employment	3	38	-31	104	57
Unemployment inflow	344	347	450	483	636
Unemployment outflow	306	338	401	474	599
Net change					
Inflow - outflow	39	9	48	9	37
CPB registered unemployment	24	16	60	14	14

A few studies have been conducted on flows of workers and jobs in The Netherlands. Table 10 lists the results for two of these studies as well as our results and the results from BDB for similar sample periods. Fur all indicators of labour market dynamics we find higher values than BDB do using their specification of the accounting system. The reason for this is that we include inflow and outflow of welfare.

Table 10 Comparison of indicators of labour market dynamics in different studies

	This studie	*Broersma and Den Butter*	*Hammermesh et al.*	*Broersma and Gautier (1997)*
H_t/E_{t-1}				
1990	26.6	23.2	11.9	
1979-1993	21.0			
S_t/E_{t-1}				
1990	23.7	20.3	10.1	
1979-1993	19.7			
LT_t/E_{t-1}				
1990	50.4	43.5	22.0	
1979-1993	40.9			
JC_t/E_{t-1}				
1990	17.2	14.3	4.4	
1979-1993	13.6	10.6		6.6
JD_t/E_{t-1}				
1990	14.3	10.9	2.6	
19794993	12.9	9.7		7.9
JT_t/E_{t-1}				
1990	31.6	25.1	6.6	
1979-1993	26.5	20.3		14.5

Hamermesh, Hassink and Van Ours (X994) used survey data for 1988 and 1990 to estimate job and worker flows. Employees are asked how many workers they hired in a particular year, independent of the net change in employment. The advantage of this survey data approach is that they also take account of compensated flows, i-e. job creation in contracting firm and job destruction in expanding firms. Furthermore their data cover all sectors in the economy. They find much lower values for job and worker flows. This is partly due to the fact that they only include large, continuing firms (> 10 employees).

Broersma and Gautier (1997) apply the panel data approach as discussed in the introductory paragraph. They find much lower values for job creation and destruction, which is due to the

fact that they do not take into account compensating flows and their panel covers only the manufacturing sector. Employment in The Netherlands grew substantially since the mid 1980's, especially due to an increase in the number of part time jobs. As part-time jobs were created more in the service sector than in the manufacturing sector this could also explain the differences (BDB, 1994). Furthermore the panel uses a threshold value of 10 employees for a firm to be observed in the panel.

Finally, we check the plausibility of our results by comparing them to results found for other countries. The study of Burda and Wyplosz (1994) enables us to compare our worker flow rates with those in a number *of* other industrialised counties for the year 1987. The OECD (1996) has information on job flows for the year 1991. In Table 11 we compare the results from these two sources with the values that we found for The Netherlands in the same year.

Table 11 Comparison of Dutch labour market flow rates with rates in some other countries

	UI/U^1	UO/U^1	EVE'	EO/E^1	WE'	S/E^1	JC/E^2	JD/E^2	JT/E^2
United States	2.38	2.43			0.25	0.27	0.12	0.11	0.23
Japan.	1.18	1.16	0.09	0.09			0.05	0.04	0.09
France	1.51	1.51			0.29	0.31	0.12	0.13	0.25
Germany	1.49	1.46			0.22	0.21	0.10	0.07	0.17
Spain	2.21	2.12							
United Kingdom	1.12	1.29	0.07	0.07			0.08	0.06	0.14
Netherlands	**0.94**	**0.79**	0.12	0.10	0.25	0.22	***0.15***	0.14	0.29

[1] Source: Burda and Wyplosz (1994). For Germany, France and Spain unemployment is defined as the number of new registrations at employment offices, whereas we use the ILO unemployment definition for me Netherlands. All data refer to **1987.** United States and Japan are based on survey data and are therefore less comparable with the results for other countries.

[2] Source: OECD (1996). Data refer to 1991. Germany and United States based on plant data, United Kingdom based on firm data, Japan only based on continuing firms and our Dutch flows are based on labour flows.

Table 11 shows that our results are plausible as they are in line with tie values that are reported for other OECD countries. Unemployment flow rates turn out to be relatively low in The Netherlands. This implies that unemployment duration in The Netherlands will be relatively high; once unemployed, there is less chance of leaving unemployment in The Netherlands than in other European countries. Overall labour turnover, as measured by the separation rate and the hiring rate, does not seem to deviate from other countries. Considering

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similar flow models that incorporate flows between social secur

with theory, with respect to the relation between the different flows and the business cycle, and tuned out to be similar to other studies and survey data of Dutch labour market flows. Also from an international perspective our results turned out to be plausible.

We explored the development of labour market flows in the period 1970-1995. It turned out that labour market dynamics have increased since the economy recovered from the 1981-83 recession. The increased hiring rate is caused by more job to job movements, more hires from unemployment insurance and more hires from nun-participation. Although the number of job movers increased in recent years, its relative share in the total number of hires is about a third lower than in the 1970's. In recent years the number of hires from employment is dominated by hires from unemployment and non-participation.

Recent policy measures with respect to occupational disability provisions ('WAO') were only partially successful. Inflow into occupational disability did decrease and is now about a quarter lower than in 1991, when 115 thousand workers became entitled to occupational disability benefits. The policy measures seem to have had no influence on the outflow from occupational disability. The number of occupational disabled that finds a job hardly increased and retirement is still the most likely way of leaving the occupational disability schemes.

Social and institutional aspects, like a shorter working life and more part time and flexible jobs, are likely to explain a part of increased labour market dynamics. Although excess labour supply was high during the 1980's this did not cause a shortening of the vacancy chain.. Structural change can be an important cause of increased labour market dynamics. A hypothesis is that social security facilitated this process of structural change because it provides workers and employees with tools to cope with the consequences of this process and hence increases labour market dynamics. In this view the security provided by the system facilitates the destruction of old jobs which have become obsolete and it can avoid possible frictions that might occur when employees want to hire new workers. Of course this role of social security differs across labour markets. In the US, where workers are quite mobile and dismissal legislation is limited, social security might improve labour market flexibility because it protects workers from the consequences of displacement. In a labour market with only few institutions that limit flexibility social security in terms of unemployment compensation and risk sharing can provide workers the sectity needed to cope with the

consequences of structural change and therefore improve labour market dynamics (Davis, Haltiwanger and Schuh, 1996: 164). In the European labour market social security might play a different role. In most European countries dismissal legislation is more tight than in the US and workers are less mobile. In such a labour market social security could provide employees with the necessary tools for labour market flexibility. In both labour markets social security can be viewed as an irrigation system (Korpi, 1985).

We noticed that job creation and destruction seem to move more synchronised during the last economic recession. If social security indeed facilitates structural changes and labour market dynamics then this same type of reasoning might provide an explanation for the seemingly better synchronisation of job creation and destruction. An hypothesis is that the policy changes in the social security system made in the 1980's and 1990's improved the irrigation function of the system and reduced the difference in fluctuations of job creation and destruction over the business cycle.

Future research can focus on the way in which social security influences labour market dynamics, more specific it can address the hypothesis proposed above. The data constructed by Broersma and Den Buttter (1994) were used to calibrate several macro simulation models to evaluate the impact of structural change on the labour market, e.g. with respect to labour market dynamics, wage formation (Gautier and Den Butter, 1995), cyclical shocks and negative duration dependence (Den Butter and Van Dijk, 1997) and on the job search (Den &utter and Gorter, 1998). The data constructed in this paper enable us to develop and calibrate similar flow models that incorporate flows between social security provisions.

Appendix I

List of Symbols and Composition of all Stocks and Flows

Stocks

E	Employment
U_I	Unemployment insurance
U_W	*Welfare* (unemployment assistance)
N_O	Other non-participation (out of the labour force)
N_D	Occupational disability
V	Vacancies
J	Jobs ($E+V$)
L	Labour force ($E+U_I+U_W$)

Flows of persons

F_{xy}^z	Flow from x to y ($x,y = U_W, U_I, E, N_D, N_O$) *with, when relevant* $z = j$ *in* case of newly created jobs and $z = v$ in case of vacancies.
F_{EE}^j	Job-movers who find a job fox which no (registered) vacancy exists,
F_{EE}^v	Job-movers who find a job by filling a vacancy.
F_{UE}^j	Unemployed who find a new job for which no (registered) vacancy exists.
F_{UE}^v	Unemployed who find a new job by filling a vacancy.
F_{U_IE}	Unemployed receiving unemployment insurance payments who find a job fur which no (registered) vacancy exists or by filling a vacancy.
F_{U_WE}	Unemployed receiving welfare who find a job for which no (registered) vacancy exists or by filling a vacancy ($U_WO - F_{U_WN_O}$, where U_WO is the total outflow from welfare).
F_{NE}^j	Non-participants who find a job *for* which no (registered) vacancy exists.
F_{NE}^v	Nun-participants who find a job by filling a vacancy.

$F_{N_O E}$ Other nun-participants (e.g. school leavers and workers re-entering the labour market) who find a job for which no (registered) vacancy exists or by filling a vacancy ($EI - F_{U_W E} - F_{U_I E} - F_{N_D E}$, where EI is the total inflow into employment).

$F_{N_D E}$ Occupational disabled who find a job for which no (registered) vacancy exists or by filling a vacancy ($F_{N_O N_D} + F_{EN_D} - \Delta N_D - F_{N_D N_O} - F_{N_D N_W}$).

F_{EU_I} Workers who become unemployed and are entitled to unemployment insurance payments.

F_{EN} Workers who quit their job and leave the labour force.

F_{EN_O} Workers who quit their job and leave the labour force excluding occupational disabled (e.g. retirement and early retirement).

F_{EN_D} Workers who become occupational disabled and leave the labour force.

F_{NU} Non-participants who register as mempluyed.

$F_{N_O U_W}$ Other nun-participants (e.g. school leavers) who register as unemployed ($0.50 * N_{O(\text{schoolout})}$).

$F_{N_D U_W}$ Occupational disabled who recover and register as unemployed ($0.20 * N_{D(\text{recover})}$).

$F_{U_I U_W}$ Unemployed who's entitlement to unemployment insurance payments expires and register to receive welfare.

F_{UN} Unemployed leaving the labour force ($F_{U_I N_O} + F_{U_W N_O}$).

$F_{U_I N_O}$ Unemployed receiving unemployment insurance payments who leave the labour force.

$F_{U_W N_O}$ Unemployed receiving welfare who leave the labour force ($0.4 * U_W O$, where $U_W O$ is the total outflow from welfare).

$F_{N_O N_D}$ Other nun-participants who become occupational disabled.

$F_{N_D N_O}$ Occupational disabled who retire or recover but do nut re-enter the labour market ($N_{D(65+)} + 0.55 * N_{D(\text{recovery})}$).

Flowsof jobs

VI	Inflow of vacancies.
VI_j	Vacancies for new jobs ($VI - VI_{EE} - VI_{EU} - VI, - VI_{EM}$).
VI_{EE}	New vacancies because of job mobility ($0.65 * F_{EE}$).
VI_{EU}	New vacancies because of workers who become unemployed ($0.01 * F_{EU}$).
VI_{EN}	New vacancies because of workers who leave the labour force ($0.25 * F_{EN}$).
VI_{EM}	New vacancies because of workers who die ($0.25 * F_{EM}$).
VO	Outflow of vacancies ($VI - \Delta V = VO_s + VO_f$).
V_s	Scrapped vacancies ($0.30 * V$).
VO_f	Filled vacancies ($VO_{EE} + VO_{UE} + VO_{NE}$).
VO_{EE}	Vacancies filled by job movers (F_{EE}^{v})
VO_{UE}	Vacancies filled by unemployed (F_{UE}^{v}).
VO_{NE}	Vacancies filled by non-participants (F_{NE}^{v}).

Indicators of labour market dynamics

LT	Labour turnover $\left(F_{UE} + F_{NE} + F_{EU} + F_{EN} + 2*\left(F_{EE}\right)\right)$.
H	Hires ($EI + F_{EE}$, where EI is the total inflow into employment).
LO	Workers who are laid off (F_{EU}).
Q	Workers who quit their jobs ($F_{EN} + F_{EE}$).
S	Separations ($EO + F_{EE}$, where EO is the total outflow out of employment).
JT	Job turnover ($JC + JD$).
JC	Job creation ($VI_j + F_{EE}^{j} + F_{UE}^{j} + F_{NE}^{j}$).
JD	Job destruction $\left(VO_s + \left(F_{EE} - VI_{EE}\right) + \left(F_{EU} - VI_{EU}\right) + \left(F_{EN} - VI\right)_{EN} + \left(F_{EM} - VI_{EM}\right)\right)$.
E_{du}	Average employment duration in years ($E/0.5 * LT$)
U_{du}	Average unemployment duration in weeks $\left(\left(U/0.5 * \left(UI + UO\right)\right) * 52\right)$
V_{du}	Average vacancy duration in weeks $\left(\left(V/0.5 * \left(VI + VO\right)\right) * 52\right)$
V_{ch}	Average length of the vacancy chain index $(1 + (VI, /(VI - VI_{EE})))$

Appendix II

Data Sources and Description

Stocks

U_I Number of persons receiving unemployment insurance benefits, excluding civil-servants and self-employed. About 70 % of the working population is covered by the unemployment insurance act (WW). Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 6.6, 6.2 and own calculations.

U_W Number of persons receiving welfare, i.e. RWW and IOAW. Source: CTSV (I 996a), Kroniek van de Sociale Zekerheid, Table 2.1.

E Number of workers (employees and self-employed) with a regular job of 12 hours a week or more. Source: CPB, Lange reeksen.

N_D Number of occupational disabled. In 1976 self employed and civil servants became eligible fur these benefits. Whenever using the first difference in the number of occupational disabled we included a dummy for 3976 for these two groups to remove the peak in that series. Source: CTSV (1996a), Kroniek van de Scociale Zekerheid, Table 5.5.

N_O Number of non-participants (above age 14) other than occupational disabled. Source: CBS, Bevolkingsstatistiek.

V Number of vacancies. Source: CBS, Sociaal Ecun5miscb.e Maandstatistiek and Muysken, Bierings and De Regt (1991).

Flows

$F_{U_I U_W}$ Inflow into welfare form unemployment insurance, excluding civil servants and self-employed. We use data that represent unemployed receiving unemployment insurance payments who are no longer entitled to these benefits

because they have reached the maximum term. Outflow due to reaching the maximum term can also take place to non-participation, but we make the reasonable assumption that these people continue to be part of the labour market and all flow into welfare. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 6.2.

F_{EE} Job movers. Source: Broersma and Den Butter (X994), OSA (1995) and CBS.

$N_{D(65+)}$ Flow out of occupational disability due to retirement. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 5.17.

$F_{N_O N_D}$ Flow from non-participation to occupational disability. We use data representing the inflow into occupational disability of early disabled and some minor groups of occupational disabled. Before 1976 this data was not observed, so we included a dummy to remove the peak in that year.
Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 5.13.

$F_{U_I E}$ Inflow into regular employment from unemployment insurance, excluding civil servants and self-employed. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 6.2.

$F_{U_I N_O}$ Flow from unemployment insurance to non-participation, excluding civil servants and self-employed. We use data that represent the flow out of unemployment insurance due to reasons other than outflow due to maximum term and reemployment. We assume that this entire outflow goes to non-participation, although a small sample of these people will flow to employment, for example because they started their own business. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 6.2.

F_{EU_I} Outflow out of employment to unemployment insurance, excluding civil servants and self employed. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 6.2.

F_{EN_O} Flow from employment to non-participation. $F_{EN_O} = F_{EAOW} + F_{EVUT}$, representing the Bow into retirement and into early retirement respectively.

F_{EAOW} Inflow into retirement of workers. Following BDB, this flow is calculated as the change in the number of old-age benefit receivers plus the number of deaths in the cohort with age over 65 (the outflow out if retirement), multiplied by the participation rate of persons in the age of 60-64. These calculations are made for male and female separately and added to get F_{EAOW}. Source: Participation rate in OECD (1995), Labour Force Statistics, other data in CBS, Statistical Yearbook.

F_{EVUT} Inflow into early retirement of workers. Source: CBS, Statistical Yearbook,

F_{EN_D} Flow from employment to occupational disability. For this we use data representing the inflow into occupational disability of workers, civil servants and self-employed. Before 1976 this flow includes only workers. In that year also self employed and civil servant became eligible for occupational disability benefits. Fur these two groups we included a dummy for 1976 to remove the peak in the series. From 1994 on a 10 % upward correction was applied to correct for changes in the registration, as indicated in the source. Source: CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 5.13.

F_{EM} Number of workers who die, calculated as 0.5 % of total number of workers, based on Hartog, Mekkelhort and Van Ophem (1988). Source: CBS.

$N_{O(\text{schoolout})}$ Number of students who leave school, college or university. Source: CBS, Onderwijsstatistieken on the Internet at *www. cbs. nl*.

$N_{D(\text{recovery})}$ Flow out of occupational disability due to recovery. From 1994 on a 10 % upward correction was applied to correct for changes in the registration method, as indicated in the source. Source, CTSV (1996a), Kroniek van de Sociale Zekerheid, Table 5.1 7.

VI Inflow of vacancies. Source: CBS, Sociaal Economische Maandstatistiek and van Ours (1991).

Appendix III

Elaboration on the Accounting System

The accounting system that is used in this paper to construct a consistent set of labour market flow data was developed by Broersma and Den Butter (BDB, 1994). We extended and improved their accounting system in a number of ways. First, we included the total inflow into unemployment, i.e. inflow into unemployment insurance and inflow into welfare. BDB only take account of the inflow into unemployment insurance. As to the stock of unemployed, they use unemployment data based on the annual Labour Market Survey, where we use administrative data with respect to the number of welfare and unemployment insurance recipients. Introducing welfare into the system generates additional flows between unemployment and employment and between unemployment and non-participation. The treatment of these flows in the two papers is very different. BDB assume that each year 50 % of the long term unemployed (> 1 year), plus 5 % of the total number of unemployed stop searching for a job and go to non-participation. This causes a peak in the flow from unemployment tot non-participation in the recession years 1980-1983 and hence a slightly negative correlation with the cyclical indicator. We find no correlation between the business cycle and the flow from unemployment to nun-participation. The number of workers entitled to unemployment insurance that retires (non-participation) is available from primary sources and we use an assumption [A-4] to calculate the flow from welfare to non-participation.

The second important improvement is that we take occupational disability into account separately. BDB do not observe occupational disabled directly but include them implicitly in the residual stock of non-participants. The flow from non-participants to unemployment is assumed to be half of the annual number of school leavers. In our system we use the same assumption, but in addition we make assumptions on the number of recovered occupational disabled that becomes unemployed.

A third difference is the treatment of mortality. BDB include mortality in the flow from unemployment to non-participation. In our specification workers who die flow out of the system and do nut become part of the group of non-participants. Mortality of workers is

relevant because some of the jobs of these workers wiil not be destroyed and a vacancy will be created.

Due to these changes we have 6 stocks and 27 flows in our system instead of 4 and 18 respectively. Because of the inclusion of welfare recipients, for which no macro-flow data are available, we had to make more assumptions to construct the worker flows than in the paper by BDB (12 and 9 assumptions respectively). With respect to the job flows we made identical assumptions.

The changes partly make the system Eess sensitive to changes in the assumptions. In particular our specification is Eess sensitive to changes in the assumptions that relate to the flows between unemployment and non-participation. For example, alternative 2 in Table 3 ($F_{N_O U_W} = N_{O(\text{schoolour})}$) caused a 44 % increase in the flow from unemployment to employment in the old specification, while this was only 24 % in our new specification. On the other hand, our specification is more sensitive to changes in assumptions that directly or indirectly determine the inflow and outflow of vacancies. Especially there is need for more information on the extent to which a vacancy arises in case of separations to unemployment, nun-participation, occupational disability or a different job, or complementary, more information on the degree of job destruction associated with these worker flows.

Appendix IV

Descriptive Statistics of Indicators of Labour Market Dynamics, Worker Flows and Job Flows

Table A-l Labour market dynamics
(x 1000)

	Mean	*Maximum*	*Minimum*	*Standard deviation*	*Correlation with cyclical indicator*
EI	513	825	337	149	0.10
EO	477	772	264	128	-0.19
UI	444	737	246	124	-0.16
$U_I I$	322	611	143	119	-0.17
$U_W I$	195	295	121	45	-0.25
UO	418	707	274	117	0.08
$U_I O$	308	592	179	110	-0.02
$U_W O$	183	231	117	34	0.00
NI	258	371	165	58	-0.04
$N_O I$	216	361	133	64	-0.00
$N_D I$	89	116	50	20	-0.23
NO	346	496	186	98	0.07
$N_O O$	325	463	X63	91	0.07
$N_D O$	68	117	28	26	-0.11
LT	2152	2755	1415	358	0.25
H	1107	1450	675	200	0.32
LO	322	611	143	119	-0.17
Q	723	961	405	144	0.32
S	1045	1311	740	161	0.16
JT	X366	1847	1016	263	0.23
JC	698	981	465	156	0.37
JD	668	905	541	116	0.02
E_{du} (years)	5	7	4	1	-0.29
U_{du} (weeks)	46	72	16	17	-0.04
V_{du} (weeks)	6	13	3	2	0.55
V_{ch} (index)	3	8	2	2	-0.17

Table A-2 Worker flows

(x 1000)

	Mean	*Maximum*	*Minimum*	*Standard deviation*	*Correlation with cyclical indicator*
F_{EE}	594	806	272	146	0.35
F_{EE}^{j}	241	484	57	117	0.13
F_{EE}^{v}	353	600	112	152	0.23
F_{UE}	290	468	184	70	0.11
F_{UE}^{j}	131	290	21	81	-0.02
F_{UE}^{v}	159	218	108	28	0.34
F_{U_IE}	180	345	99	60	0.13
F_{U_WE}	110	139	70	20	0.00
F_{NE}	224	371	59	91	0.07
F_{NE}^{j}	103	233	20	76	0.04
F_{NE}^{v}	123	245	25	43	0.07
F_{N_OE}	204	342	38	85	0.07
F_{N_DE}	22	33	0	9	-0.04
F_{EU}	322	611	143	119	-0.17
F_{EN}	130	155	96	18	-0.20
F_{EN_O}	44	54	35	5	0.07
F_{EN_D}	85	111	50	18	-0.23
F_{NU}	123	145	96	14	0.02
$F_{N_OU_W}$	117	139	94	13	0.06
$F_{N_DU_W}$	5	13	1	3	-0.14
$F_{U_IU_W}$	72	170	18	38	-0.31
F_{UN}	129	240	69	48	0.03
$F_{U_IN_O}$	55	158	21	40	0.04
$F_{U_WN_O}$	73	93	47	14	0.00
$F_{N_ON_D}$	4	12	0	3	-0.15
$F_{N_DN_O}$	43	74	18	16	-0.13

Table A-3 Job **flows**

(x 1000)

	Mean	*Maximum*	*Minimum*	*Standard deviation*	*Correlation with cyclical indicator*
VI	651	964	286	195	0.37
VI_j	223	528	7	153	0.27
VI_{EE}	386	524	177	95	0.35
VI_{EU}	3	6	1	1	-0.17
VI_{EN}	32	39	24	5	-0.20
VI_{EM}	7	7	6	0	0.01
VO	657	974	284	197	0.28
VO_s	25	71	6	15	0.53
VO_f	632	953	277	186	0.25
VO_{EE}	353	600	112	152	0.23
VO_{UE}	159	218	108	28	0.34
VO_{NE}	121	245	25	43	0.07

Appendix V

Flow and **Duration** Characteristics of the **Dutch** Labour Market, **1970-1995**

Figure A-l **Job** creation and job destruction rates

(percentage of total employment)

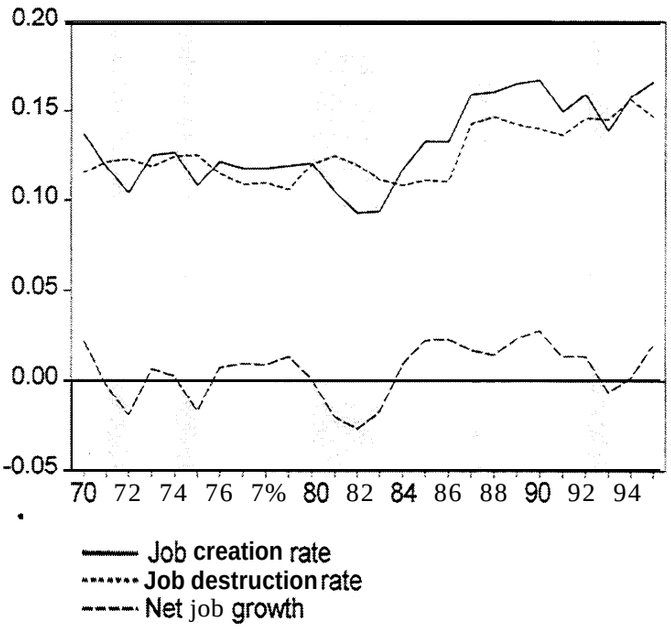

Figure A-2 Rates of labour turnover and job turnover

(percentage of total employment)

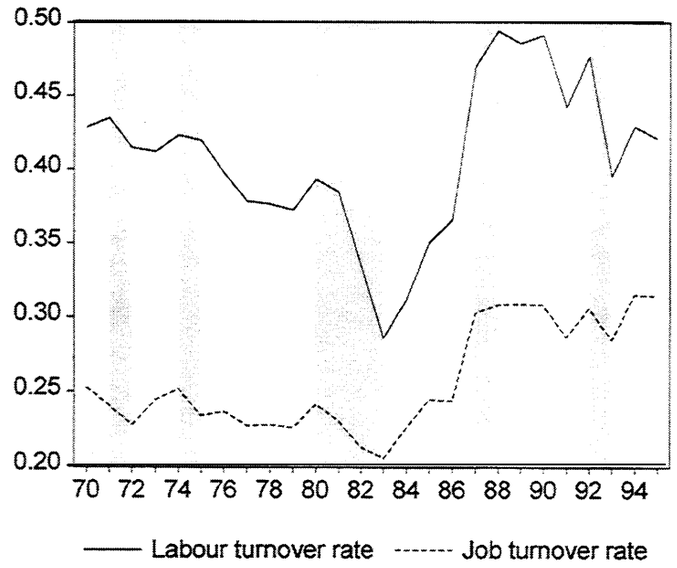

Figure A-3 Employment inflow, outflow and net employment change

(percentage of the labour force)

Figure A-4 Unemployment inflow, outflow and net employment change

(percentage of the labour force)

Figure A-5 Flow from unemployment to employment

(x 1000 workers)

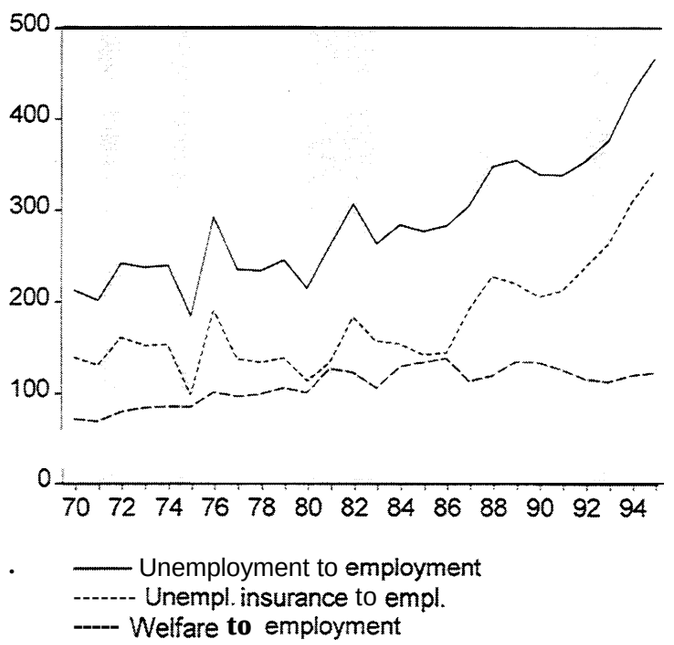

Figure A-6 Employment duration

(yeas)

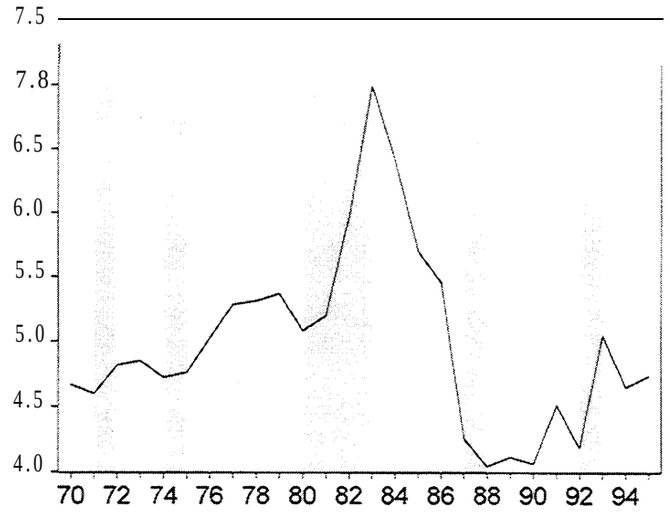

Figure A-7 Unemployment and vacancy duration

(weeks)

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