Job Competition between the Unemployed and Non-Participants

Frank A.G. den Butter[‡], Egbert L.W. Jongen[†] and Udo Kock[§]

April 2000

Abstract

This paper considers labour supply and demand shocks in a simple flow model of the labour market. We consider the propagation of these shocks in a matching model with competition between various groups of job seekers. By way of simulations we explore the extent of labour market hysteresis arising from competition between unemployed job seekers and job seekers outside the labour force. The simulation model is based on an estimated aggregate matching function. We find that the extent of hysteresis depends very much on the way labour demand reacts to labour supply. Competition from non-participants in the search for jobs softens the impact of demand shocks upon the unemployed.

JEL codes: J64, J65, J68, E24, E27

Keywords: labour market flows, matching models, search efficiency and unemployment persistence.

[‡] Scientific Council for Government Policy, Tinbergen Institute and Free University, Applied Labor Economics Research Team (ALERT), Department of Economics: De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, email: fbutter@econ.vu.nl.

[†] Tinbergen Institute and Free University, Applied Labor Economics Research Team (ALERT), Department of Economics: De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, email: jongen@tinbergen.nl.

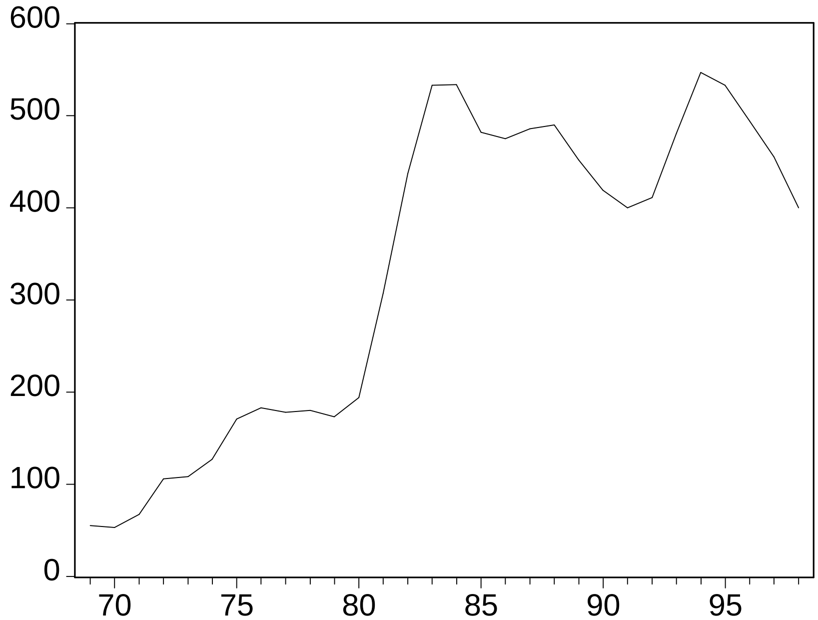
[§] Corresponding author: Tinbergen Institute and Free University, Applied Labor Economics Research Team (ALERT), Department of Economics: De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, email: kock@tinbergen.nl., phone: 0031-20-4446156, fax: 0031-20-4446005.

1. Introduction

During the 1970s and 1980s The Netherlands, like most other European countries, witnessed a dramatic rise in the unemployment rate (see Figure 1 below). This rise was characterised by a number of upward jumps; steady state unemployment seemed to move to a higher level after each cyclical downturn (see e.g. Bean (1994)). This pattern in unemployment rates suggests unemployment persistence in the Netherlands (see e.g. Hartog and Theeuwes (1993), Graafland (1988)).

Figure 1 — Unemployment in The Netherlands

(x 1000 persons)



Source: CPB Netherlands Bureau for Economic Policy Analysis.

Due to shocks to labour supply and demand, unemployment may deviate from its long-rum equilibrium. Several factors may prevent a quick return to its long-run equilibrium: adjustment costs, wage-price staggering effects, insider-outsider effects, hazardous welfare state dynamics and a loss of skills in unemployment (see e.g. Bean (1994), Lindbeck (1995), Snower (1997)). Broersma, Koeman and Teulings (2000) find that for the Netherlands the most realistic scenario is that a combination of hazardous welfare state dynamics and oil price shocks in the 1970s caused high and persistent unemployment throughout the 1980s.

This paper examines increased competition for jobs as a possible cause of unemployment persistence, which seems particularly relevant for The Netherlands since the mid 1980s. In particular we investigate the labour market dynamics after a labour supply or demand shock when two types of unemployed workers, receiving unemployment insurance benefits or welfare, must compete for jobs with job seekers outside the labour force. We label these job seekers outside the labour force ‘non-participants’.

The increased supply of non-participants might be due to a shift in social patterns, which induced more women to seek employment on the regular labour market. An other important factor is related to the “entitlement effect of social security”. In the seventies the social security system in The Netherlands became increasingly generous. As a result more persons from the working age population learned how to become eligible for social security provisions. Estimation of the entitlement effect as a residual trend in social security provisions which can not be explained by demand (see Den Butter (1993)) shows that it may have led to an autonomous increase in social security provisions of about 300 000 labour years.

In this paper we consider how increased competition from non-participants affects a stylised model of the Dutch labour market. Specifically, we consider the persistence of unemployment deviations from its long-run equilibrium in a simple empirical equilibrium flow model of the labour market. We estimate the technology parameters of the matching function and consider whether increased competition for jobs arising form non-participants is a plausible explanation for unemployment persistence in the Netherlands.

The paper has the following outline. In section 2 we discuss related literature. In section 3 we present the estimation results for the matching function with different types of job seekers. Section 4 gives the model structure and its calibration. Section 5 contains the results of the various simulation analyses and section 6 concludes.

2. Related literature

For the individual who is engaged in job search the matching probability depends on two sets of factors (Layard *et al.* (1991)). The first set consists of individual factors, like the reservation wage. Furthermore, there are a number of personal characteristics that determine the matching probability, such as the skill level and the individual search effort. The second set of factors that affect the individual matching probability is the number of vacancies and the degree of competition for these vacancies from other job seekers.

Layard *et al.* (1991) only consider competition from other unemployed job seekers. All else equal, a higher unemployment rate reduces the matching probability for the individual. But obviously job competition for the unemployed can arise from any other groups in the labour market: employed, (partially) disabled and workers outside the labour force, such as school-leavers or women re-entering the labour market.

Burgess (1993) explores empirically the competition between unemployed and employed workers. In his model the number of employed workers that engage in job search is endogenously determined and positively related to the hiring rate. If more jobs become available, on-the-job search increases and employed job seekers crowd out unemployed job seekers. He finds that competition between employed and unemployed job seekers is a crucial determinant for the overall outflow rate in the British labour market. Broersma (1997) replicates Burgess' study for the Dutch labour market and also finds that job competition between employed and unemployed job seekers is an important phenomenon. Van Ours (1995) adds to these findings that this competition is introduced by employers who use different recruitment channels for the same vacancy. Most of the vacancies are posted through multiple channels.

Den Butter and Gorter (1999) introduce competition between employed and unemployed workers in a stock-flow model. Their model is an empirical implementation of Pissarides' (1994) equilibrium search model with on-the-job search, which analyses labour market policies with heterogeneous jobs and endogenous job creation. Employed job seekers with bad jobs compete with long-term and short-term unemployed workers for filling the vacancies for good jobs.

It is important to take into account also non-unemployed job seekers not only for (policy) analysis in simulation models of the labour market, but also for estimation of the parameters in aggregate matching functions. Broersma and Van Ours (1999) show that the estimated matching elasticity with respect to the number of job seekers in the aggregate matching function is biased downward if only unemployed job seekers are taken into account. They use a single, rough approximation of all non-unemployed job seekers and estimate an aggregate matching function. Furthermore they stress that it is important to specify a matching function in which the measure of job matches corresponds to the measure of job seekers. This is confirmed by Lindeboom and

Van Ours (1993) who find different matching technologies for labour markets disaggregated by education, occupation and region. They conclude that ‘changes in the aggregate level may reflect changes in the composition of the labour market instead of changes in the matching technology.’.

Blanchard and Diamond (1990) estimate a matching function relating a measure of hires to the total stock of job seekers and vacancies. The total stock of job seekers includes unemployed, non-participants and workers searching on-the-job. Blanchard and Diamond use an inconsistent stock-flow measure because they have no data on the stock of job seekers from non-participation and employment. However, they are able to provide some evidence that ranking of unemployed over non-participants is present.

Mumford and Smith (1999) go one step further and present estimates of outflow equations for employed, unemployed and job seekers outside the labour force. Contrary to Blanchard and Diamond (1990) they have a data set where stocks and flows correspond to the same group of job seekers. They reject the hypothesis that the three groups are perfect substitutes in the matching process, i.e. that there is random hiring, instead their analysis provides evidence of competition among the three groups of job seekers. Because the results differ among the three outflow equations, Mumford and Smith are not able to draw strong conclusions on the relative matching efficiency, or, in their interpretation, the order of ranking of job seekers by employers.

3. The model

Our model extends the literature in two directions. First we present a small stock-flow model of the Dutch labour market in which we introduce competition for jobs between different types of job seekers. We use estimated values of a matching function to calibrate the base-line simulations for the model. This matching function forms the supply side of our model. It constitutes the second innovation as we go one step further in differentiating the matching function (cf. Mumford and Smith (1999)). We estimate an aggregate matching function including three groups of job seekers in the labour market: unemployed receiving unemployment insurance benefits, unemployed receiving welfare benefits and a stock of non-participants that actively search for a job. On the demand side of the model we have firms that post vacancies. The speed at which demand and supply come together is determined by an aggregate matching function. The rate at which job-worker matches dissolve is fixed. Jobs in the labour market can be either filled and producing (*E*) or vacant and searching (*V*). The distribution of workers and jobs over the different states depends on the flows between them. The three flow rates into employment are determined endogenously by the matching function, all other flow rates are exogenous in the model.

Figure 2 — Stocks and flows in the labour market

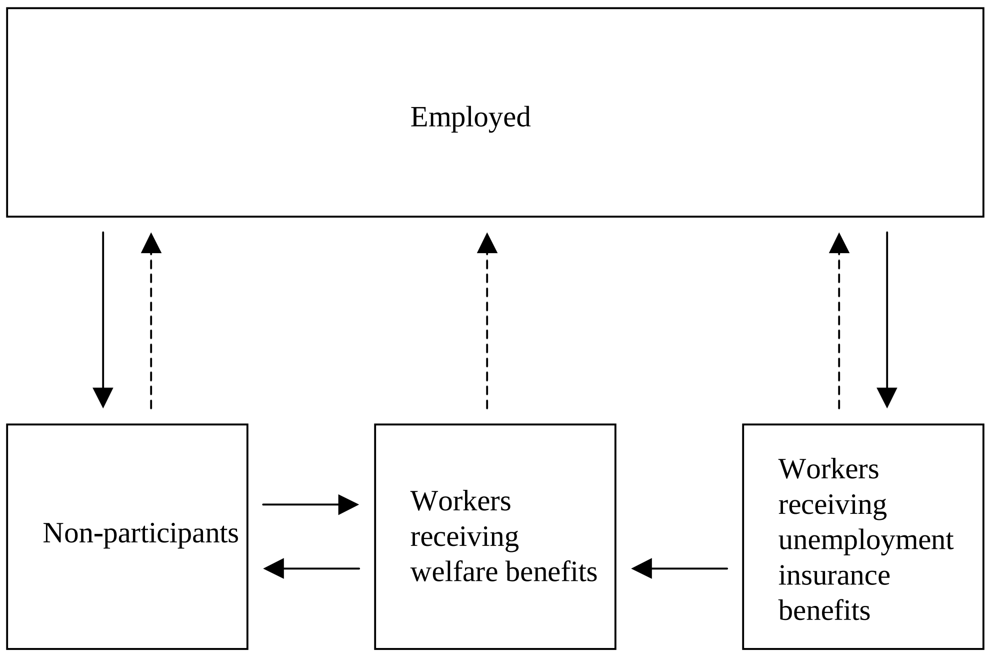


Figure 2 shows the stocks and flows in the model. The dashed lines represent the endogenous flows, the solid lines represent the exogenous flows. In the next section we use this model to analyse job competition between long-term and short-term unemployed and job seekers from outside the labour market and we analyse the impact of competition on labour market dynamics due to labour demand and supply shocks.

Individuals in the working age population can be in one of four states on the labour market: employment (*E*) unemployment and receiving insurance benefits (*UI*), unemployment and receiving welfare benefits (*WB*) and non-participation (*N*). Unemployed workers entitled to unemployment benefits (i.e. unemployment insurance) are unemployed workers with a recent history of labour force attachment and can be considered short-term unemployed. After six to forty-eight months, depending on the individual's job history, entitlement to unemployment benefits expires. Subsequently, unemployed workers receive welfare benefits. Therefore welfare recipients can be considered long-term unemployed.

The aggregate number of matches is given by a Cobb-Douglas matching function. The matching function can be viewed as a neo-classical production function that relates the number of matches (output) to the number of effective job-seekers and vacancies (inputs). We impose constant-returns-to-scale, which is typically not rejected in empirical work on the Dutch labour market (see e.g. Broersma and Van Ours (1999)). The standard matching function reads

$$[1] \qquad M = cV^{\alpha}(S)^{(1-\alpha)},$$

where M is the total number of job matches consisting of matches form the three groups, so $M = M_{ui} + M_{wb} + M_n$. V is the total stock of vacancies, c denotes the efficiency of the matching process and α denotes the impact of vacancies in the matching process. S is the total number of effective search units, with $S = \theta_{ui}UI + \theta_{wb}WB + \theta_n N$, where θ represents the effective number of search units of unemployed receiving unemployment benefits or welfare, and non-participants. Typically one would want to estimate different values of search efficiency of each of the three groups, but this would not be identified. Therefore we can not distinguish between the effective number of search units and the matching efficiency the three groups of job seekers. Therefore we assume that all three types of job seekers have the same matching efficiency c. If we normalise the effective number of search units for unemployed receiving unemployment benefits seeking for a job to one, we can estimate

$$[2] \qquad M = c \cdot V^{\alpha} \cdot \left(UI + \exp(\theta_{wb}) \cdot WB + \exp(\theta_n) \cdot N\right)^{1-\alpha} + \varepsilon_i .$$

We estimate this relationship using annual data. Job matching from unemployed workers receiving unemployment benefits is obtained from administrative data sources from the Dutch National Institute for Social Security (LISV). Time series of matching from short-term unemployment, disability and out of the labour force are constructed using a national accounting method which is described in Kock (1998) and based on Broersma, Den Butter and Kock (2000). The appendix provides further details. In the estimation procedure we correct for first order auto-regression. The estimation results are given in Table 1.

Table 1 — Estimation results of an aggregate matching function with unemployed workers receiving unemployment benefits or welfare and non-participants

	c	α	θ_{wb}	θ_n	$AR(I)$
Coefficient	1.94	0.23	-1.10	-2.98	0.57
	(4.78)	(4.54)	(-2.31)	(-8.41)	(2.80)
# observations: 27		R^2: 0.96		Durbin-Watson: 1.84	

Estimation method: non-linear iterative estimation

Hence the estimated matching function can be written as

$$[3] \qquad M = 1.94 \cdot V^{0.23} \left(UI + 0.33 \cdot WB + 0.05 \cdot N\right)^{0.77} .$$

Having discussed the endogenous flows in our model of the labour market we complete the model by considering the relation between the stocks and flows. The stock of workers receiving unemployment insurance benefits evolves according to the law of motion

$$[4] \qquad UI_t = UI_{t-1} + \pi_{E \to UI} \cdot E_{t-1} - \pi_{UI \to WB} \cdot UI_{t-1} - c \cdot \left(\frac{V_{t-1}}{S_{t-1}} \right)^{\alpha} \cdot UI_{t-1}$$

where the latter part represents the endogenously determined number of matches of workers receiving unemployment insurance benefits. The matches are determined by the efficiency parameter of the matching process *c*, labour market tightness *V/S*, the elasticity of matching α and the umber of unemployed job seekers receiving unemployment insurance benefits. $\pi_{E \to UI}$ is the flow rate form employment into unemployment and $\pi_{UI \to WB}$ is the outflow rate from the stock of workers receiving unemployment insurance benefits (i.e. short term unemployed) to the stock of workers receiving welfare benefits (i.e. long term unemployed).

Long-term unemployment evolves according to the law of motion

$$[5] \qquad WB_t = WB_{t-1} + \pi_{UI \to WB} \cdot UI_{t-1} + \pi_{N \to WB} \cdot N_{t-1} - \pi_{WB \to N} \cdot WB_{t-1} - c \cdot \left(\frac{V_{t-1}}{S_{t-1}} \right)^{\alpha} \cdot \theta_{wb} WB_{t-1}$$

where the latter part represents the endogenously determined number of matches of workers receiving welfare benefits. θ_{wb} represents the share of unemployed workers receiving welfare benefits that searchers for a job, so $\theta_{wb}WB$ is the effective number of search units in the stock of welfare benefit recipients. $\pi_{N \to WB}$ and $\pi_{UI \to WB}$ are the flow rates form non-participation and unemployed workers receiving insurance benefits into the stock of unemployed receiving welfare benefits, respectively. $\pi_{WB \to N}$ is the outflow rate from the stock of workers receiving welfare benefits to the stock of non-participation.

Employment evolves according to the law of motion

$$[6] \qquad E_t = E_{t-1} - \pi_{E \to UI} \cdot E_{t-1} - \pi_{E \to N} \cdot E_{t-1} + c \cdot \left(\frac{V_{t-1}}{S_{t-1}} \right)^{\alpha} \cdot S_{t-1}$$

where S is the total number of effective search units, $S = \theta_{ui} UI + \theta_{wb} WB + \theta_n N$. $\pi_{E \to N}$ and $\pi_{E \to UI}$ are the flow rates from employment into the stock of non-participants and the stock of workers receiving unemployment insurance benefits.

Non-participation evolves according to the law of motion

$$[7] \qquad N_t = N_{t-1} + \pi_{E \to N} \cdot E_{t-1} + \pi_{WB \to N} \cdot WB_{t-1} - \pi_{N \to WB} \cdot N_{t-1} - c \cdot \left(\frac{V_{t-1}}{S_{t-1}} \right)^{\alpha} \cdot \theta_n N_{t-1}$$

where the latter part represents the endogenously determined number of matches of workers receiving welfare benefits. θ_n represents the share of non-participants that searchers for a job, so $\theta_n N$ is the effective number of search units in the stock of non-participants. $\pi_{E \to N}$ and $\pi_{WB \to N}$ are the flow rates form employed workers and workers welfare benefits into the stock of non-participants, respectively. $\pi_{N \to WB}$ is the outflow rate from the stock of non-participants to the stock of workers receiving welfare benefits.

We impose a steady state on the model. This implies some restrictions on the parameters. The efficiency parameter c in the matching function and the elasticity of matching α were set in accordance with the estimation results obtained in the previous paragraph, so $c = 1.94$ and $\alpha = 0.33$. We set the search efficiency of individuals in welfare benefits and non-participants in accordance with the estimation results, $\theta_{wb} = 0.33$ and $\theta_n = 0.05$. Given these parameters and the average values of the stocks, we have the flows into employment. Given the data on the flow from the stock of unemployed workers receiving insurance benefits (*UI*) to the stock of unemployed workers receiving welfare benefits (*WB*), we derive the flow rate from employment to *UI* ($\pi_{E\rightarrow UI}$) using the steady state condition for the latter stock. Given this flow rate we can determine the flow rate form employment to non-participation (*N*) from the steady state condition for employment. Finally, using data for the flow rate form non-participation ($\pi_{N\rightarrow WB}$) we can derive the flow rate from to the stock of workers receiving welfare benefits to non-participation ($\pi_{WB\rightarrow N}$) from the steady state condition of either *N* or *WB* (the system is linearly dependent).

4. Simulation analysis

In this section we consider how the stock of unemployed workers (receiving unemployment insurance benefits or welfare benefits), the stock of employed workers and the stock of workers outside the labour force evolve after a shock to labour supply and demand.

We examine two types of labour supply shocks. One where we shock labour supply by assuming that more (positive shock) or less (negative shock) workers outside the labour force start searching for a job and that they register as unemployed. In another simulation we assume that non-participants who do not find a job do not register as unemployed but stay outside the labour force. This simulation illustrates an increase in job competition for unemployed workers arising form increased labour supply form workers outside the labour force, arising from a the shift in social pattern mentioned in the introduction, that induced women to seek employment on the regular labour market. The 'entitlement effect of social security' is illustrated by simulations where unmatched job seekers form non-participation register as unemployed and become entitled to welfare benefits.

In both sets of supply simulations we distinguish two types of labour market regimes. In the first type we assume that the number of job slots is fixed ('lump-of-labour-fallacy'), i.e. the change in labour supply does not induce a response in labour demand. Specifically, we assume that inflow of vacancies is independent of the number of effective job-seekers (V^*). We model this as a fixed inflow in the number of vacancies which is set equal to the exogenous outflow from employment (i.e. a world with a fixed number of job slots). In the second labour market regime we assume that the ratio of vacancies over the number of effective job seekers remains unchanged after a labour supply shock (in line with search theory, see e.g. Pissarides (1990, Chapter 3)). In response to a positive (negative) shock to labour supply vacancies jump above (below) their steady-state level. In these simulations we assume that the number of vacancies in the market is given by

$$V_t = V^* + \xi\left(UI_t + \theta_{wb}WB_t + \theta_n N_t - UI^* - \theta_{wb}WB^* - \theta_n N^*\right)$$

where V^*, UI^*, $\theta_{wb}WB^*$ and $\theta_n N^*$ denote the number of vacancies, the number of unemployed receiving insurance benefits, the effective number of unemployed receiving welfare benefits and the effective number of non-participants searching for a job in the steady-state equilibrium, respectively. ξ denotes a positive parameter, and set at the ratio between vacancies and the effective supply of labour in the steady-state.

When we perform simulations with a labour demand shock we distinguish a labour market where non-participants are searching for a job and one where only unemployed who receive welfare benefits or insurance benefits are engaged in job search, in order to see how competition form new entrants affects the impulse response functions. All adjustment paths are presented as deviations form the steady state base-line simulation.

Figure 3 and 4 present the results of shocks to labour supply where the shock is modelled as a temporary change in the flow from non-participation to the stock of unemployed workers receiving welfare benefits, $\pi_{N \to WB}$, for the 'lump-of-labour' fallacy regime and the labour market with vacancy adjustment, respectively. We impose a 10 percent shock (equals 18.17 thousand persons) in the first 12 months of the simulation. When the labour supply shock is modelled as a change in $\pi_{N \to WB}$ unmatched additional labour supply joins the unemployment pool.

Figure 3a — Effect of a positive change in the flow from non-participation to welfare with a 'lump-of-labour' fallacy

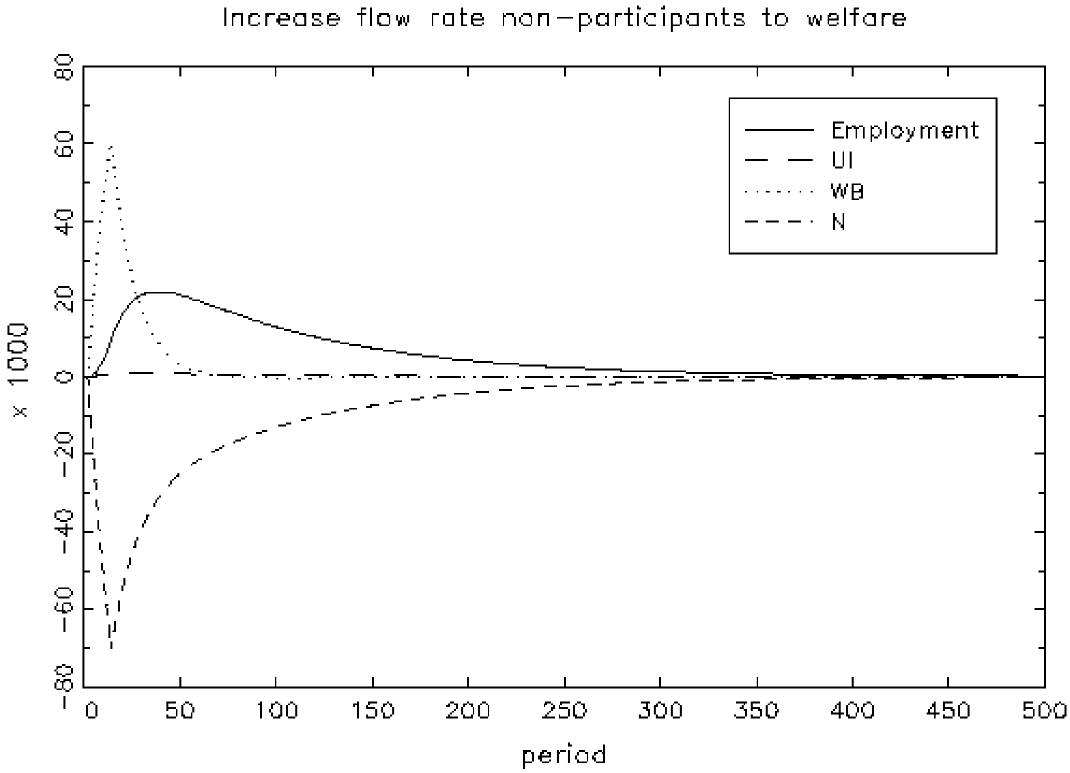


Figure 3b — Effect of a positive change in the flow from non-participation to welfare with vacancy adjustment

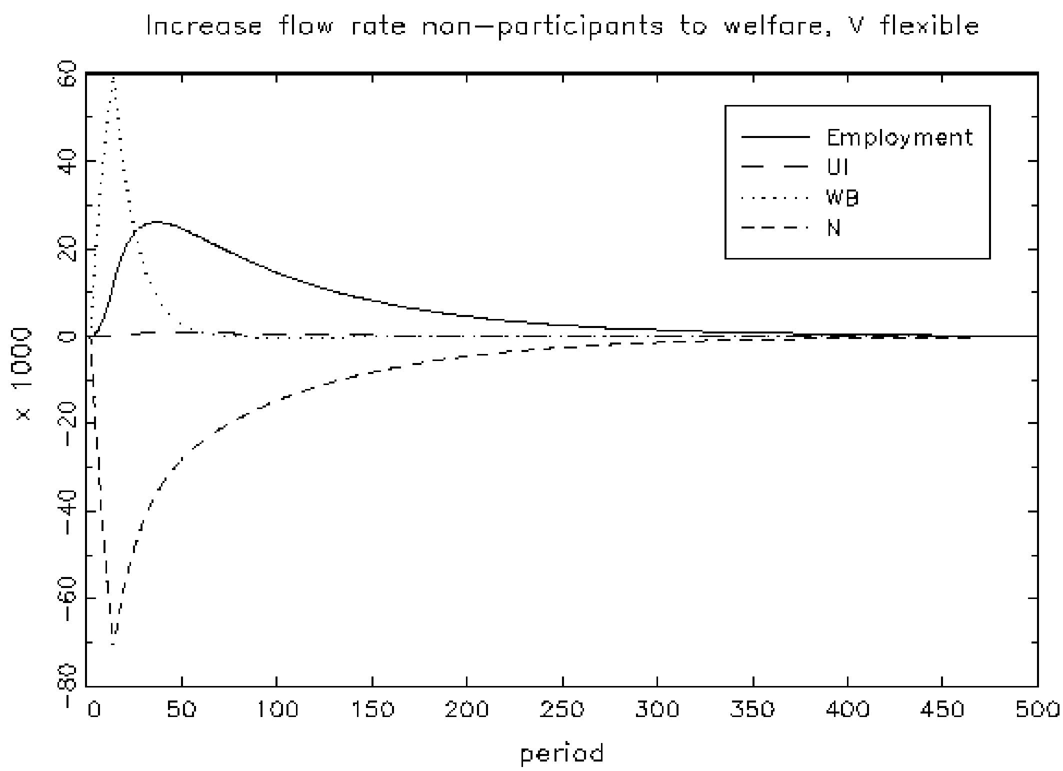


Figure 4a — Effect of a negative change in the flow from non-participation to welfare under a 'lump-of-labour' fallacy

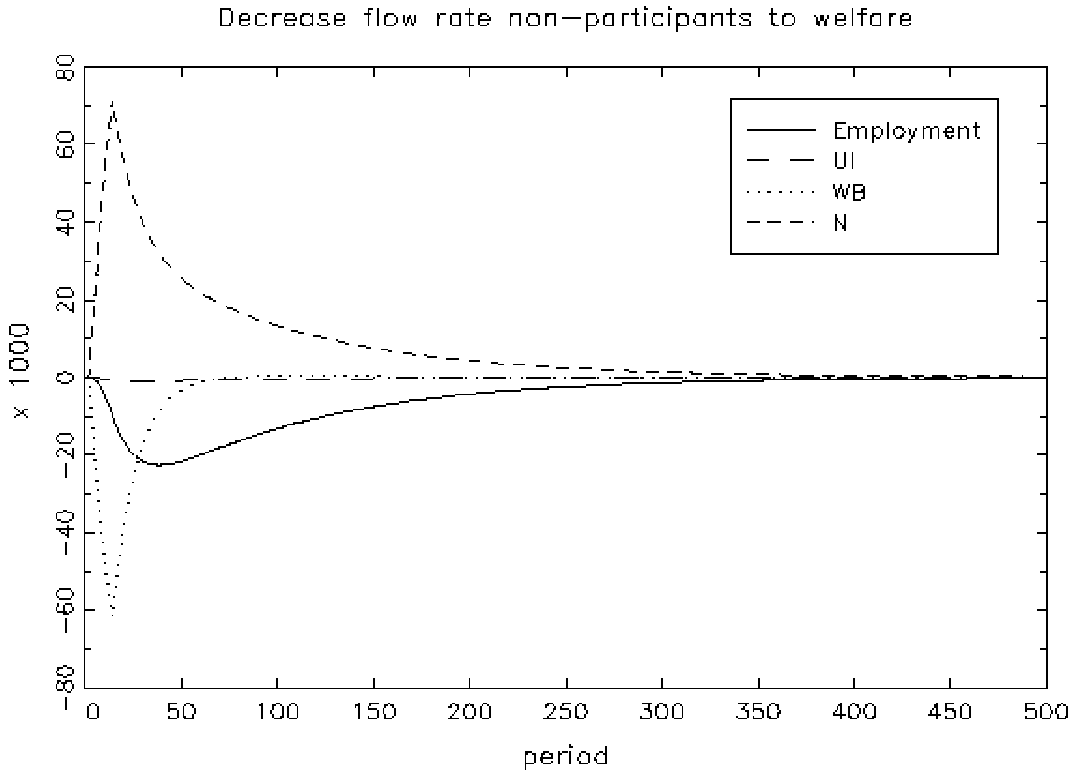
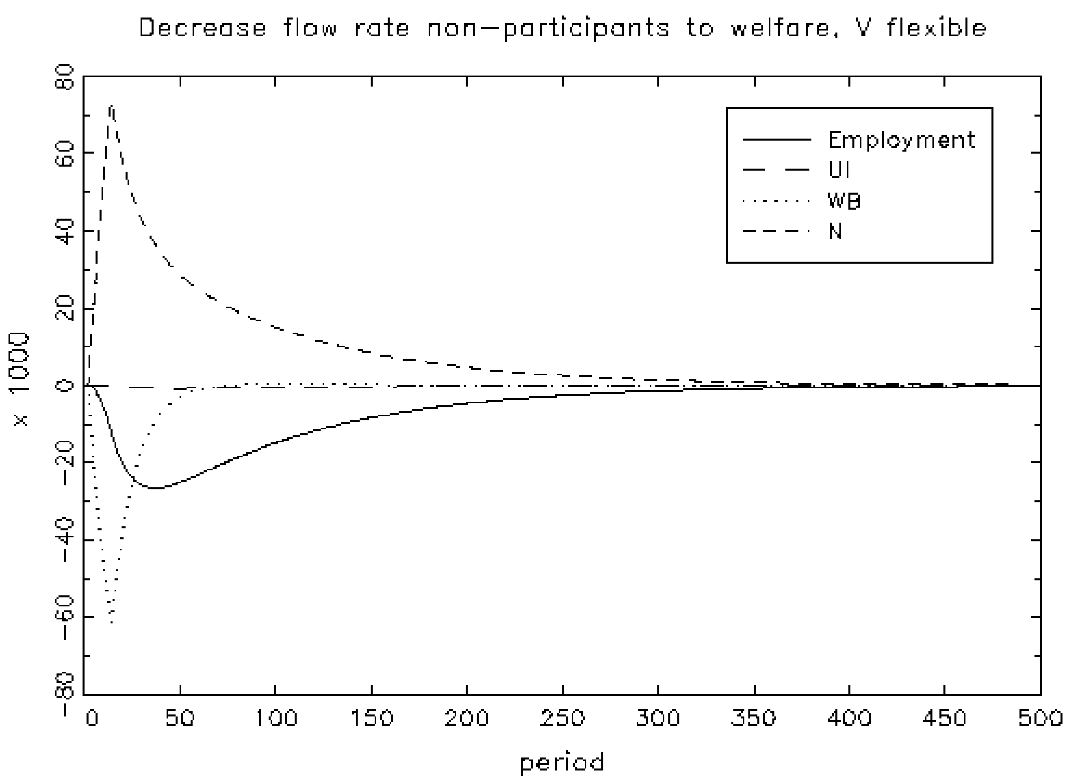


Figure 4b — Effect of a negative change in the flow from non-participation to welfare with vacancy adjustment



The first thing to note from Figure 3 and 4 is that unemployment changes in response to the increased inflow. Indeed, in the case of a constant ratio *V/S* (Figure 3b), even though vacancies rise in proportion with the increase in the number of effective job seekers, unemployment stays above its equilibrium level for quite some time. The matching technology accommodates only part of the shock in a given period. The increased inflow pushes unemployment above its equilibrium level. Consequently, the share of long-term unemployed individuals increases, reducing the effective supply of labour at given unemployment. This hampers the ability of the matching process to equilibrate the market.

Note form Figure 3 and 4 that the impact of a positive and negative shock to the inflow into unemployment on unemployment is symmetric in both labour market regimes..

In the case of a fixed number of job slots, the ‘lump-of-labour’ fallacy, the simulation with a positive shock may represent the entitlement effect of social security where the increase in labour supply does not alter the costs of opening a vacancy and therefore does not affect labour demand. This would be the case if the positive effect of the increased generosity of social security on wages and the negative effect of increased labour supply on the search costs for employers cancel out. Once again we note that unemployment changes in response to the change in the inflow into unemployment.

In the second set of simulations we examine a shock to the number of non-participants that offer their labour, where unmatched non-participants do not flow into unemployment but remain in the state of non-participation. When the labour supply shock is modelled as a change in $\theta_n N$ unmatched additional labour supply remains in the state of non-participation. Simulation results are given in Figure 5 (positive shock) and 6 (negative shock).

Figure 5a — Effect of a positive change in the share of non-participants that engage in job search with a 'lump-of-labour' fallacy

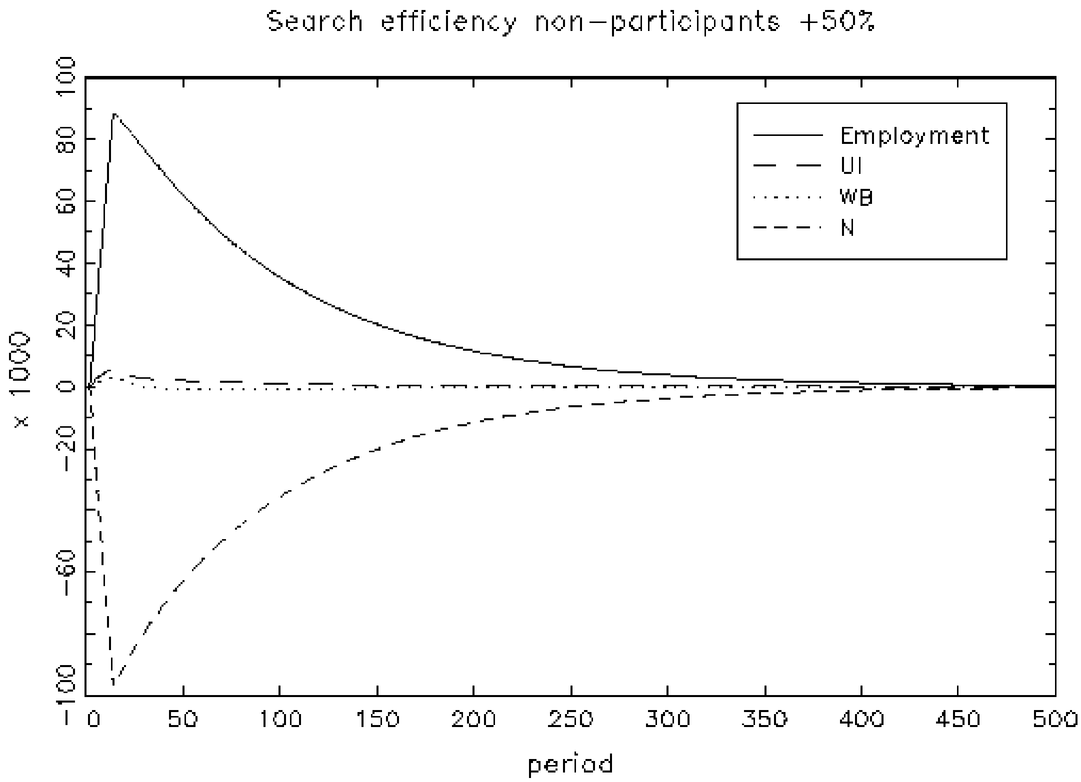


Figure 5b — Effect of a positive change in the share of non-participants that engage in job search with vacancy adjustment

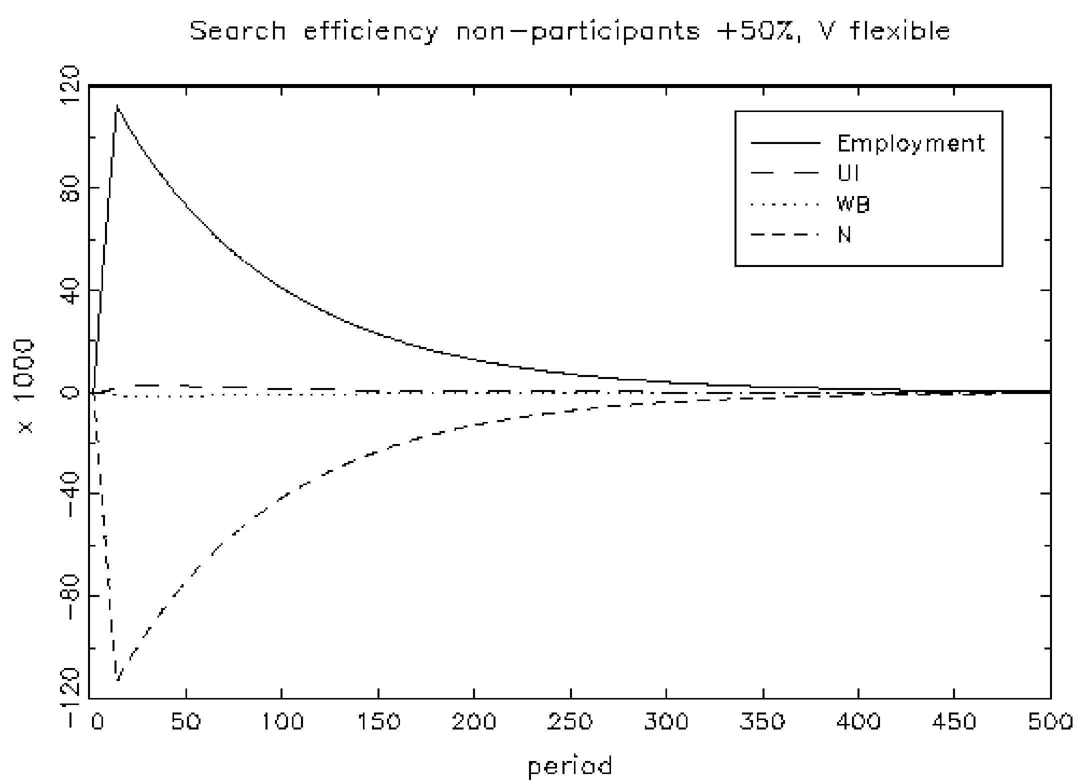


Figure 6a — Effect of a negative change in the share of non-participants that engage in job search with a 'lump-of-labour' fallacy

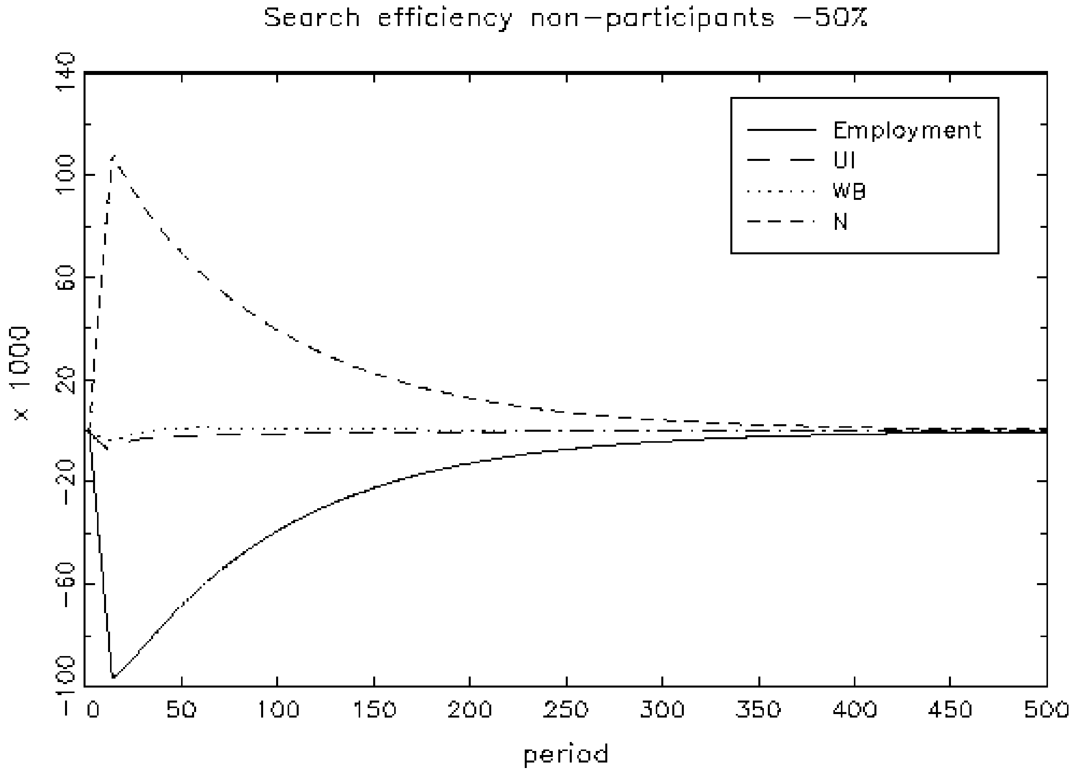
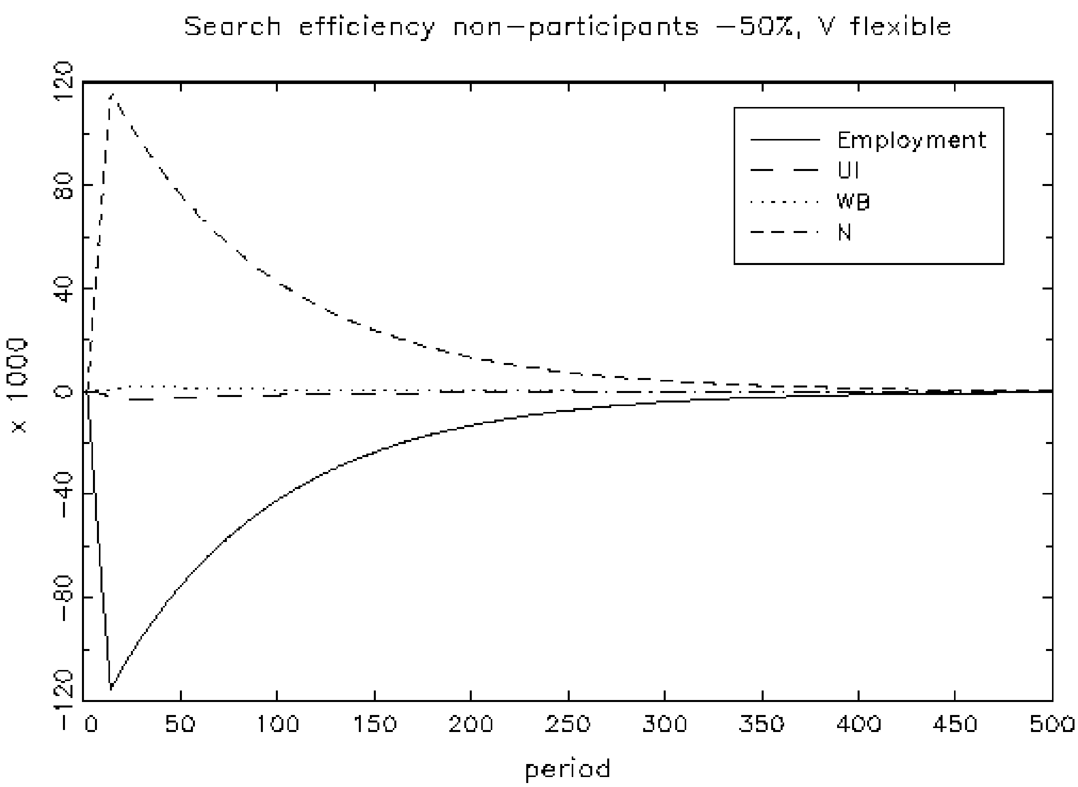


Figure 6b — Effect of a negative change in the share of non-participants that engage in job search with vacancy adjustment



Changes in the number of non-participants that offer their labour do affect unemployment when the stock of vacancies, is fixed (Figure 5a and 6a). Indeed, an unchanged stock of jobs has to be divided among more candidates, in case of a positive shock. Unemployment eventually returns to its equilibrium level. After the shock the number of matches is above its equilibrium level as long as the inputs (unemployment) in the matching function are above their equilibrium level, pushing unemployment down. The unemployed temporarily face more competition from non-participants, whereas the inflow of vacancies is fixed.

If labour demand does adjust (Figure 5b), the stock of vacancies will be below its equilibrium level after the shock has ended, pushing unemployment further away from its equilibrium level. However, there is a steady inflow of new vacancies. Hence, the stock of vacancies eventually recovers after the initial shock, and so does the outflow from unemployment (in our model there is only one equilibrium level of unemployment). When labour demand adjusts after a shock, the number of matches deviates more from its steady state equilibrium than when the lump-of-labour fallacy applies. However, adjustment after the shock is faster.

Furthermore, note that impact of either shock on unemployment is limited when unmatched non-participants do not join the unemployment pool. Hence, if a labour supply shock is to have a large effect on unemployment, the additional labour supply has to be counted as unemployed. Finally, note that the impact of positive and negative shocks on unemployment is virtually identical.

From the supply shock simulations we conclude that the impact of labour supply shocks depends negatively on the flexibility of labour demand, in a sense that adjustment is takes place faster. The impact on unemployment is most pronounced when the unabsorbed change in labour supply joins the unemployment pool.

Finally, we consider the effect of labour demand shocks on competition between unemployed and non-participants. We implement labour demand shocks as a temporary change in the stock of vacancies in the market. Specifically, the number of vacancies increases (decreases) by 50 per cent during the first year of the simulation. Simulation results are given in Figure 7 and 8 respectively. We consider the impact of changes in the number of vacancies on unemployment in the presence (Figure 7a and 8a) and absence (Figure 7b and 8b) of competition from non-participants.

Figure 7a — Effect of a positive change in labour demand when there is competition for jobs between unemployed and non-participants

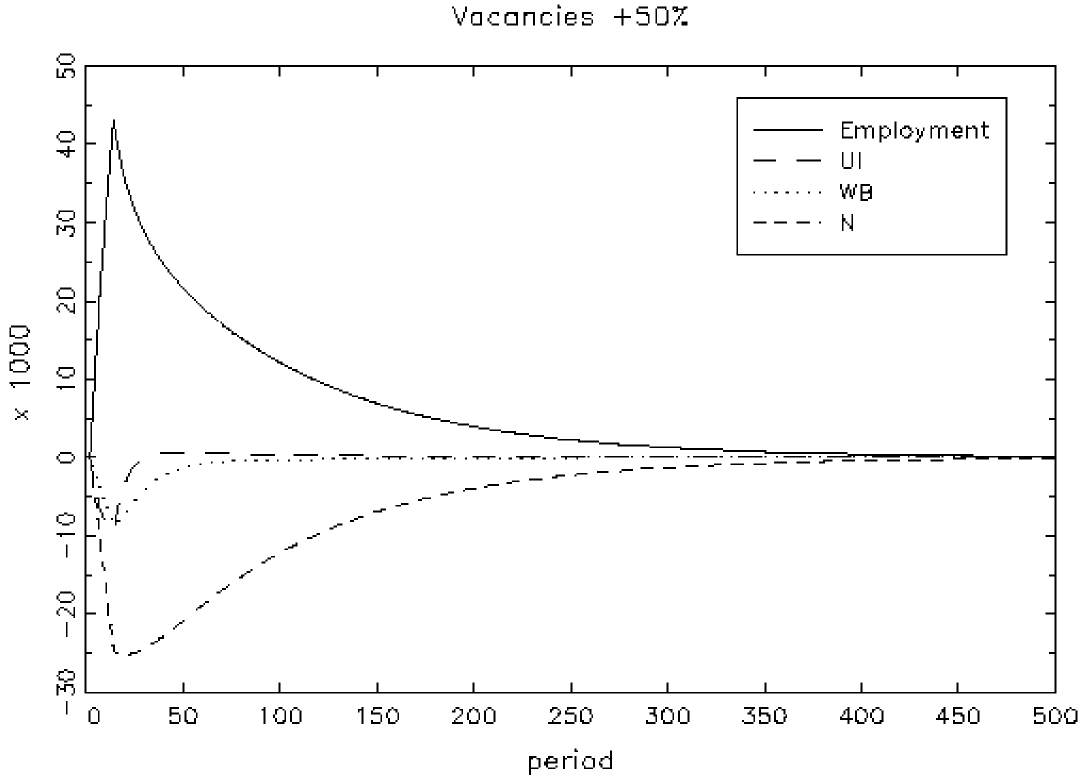


Figure 7b — Effect of a positive change in labour demand when only unemployed search for jobs

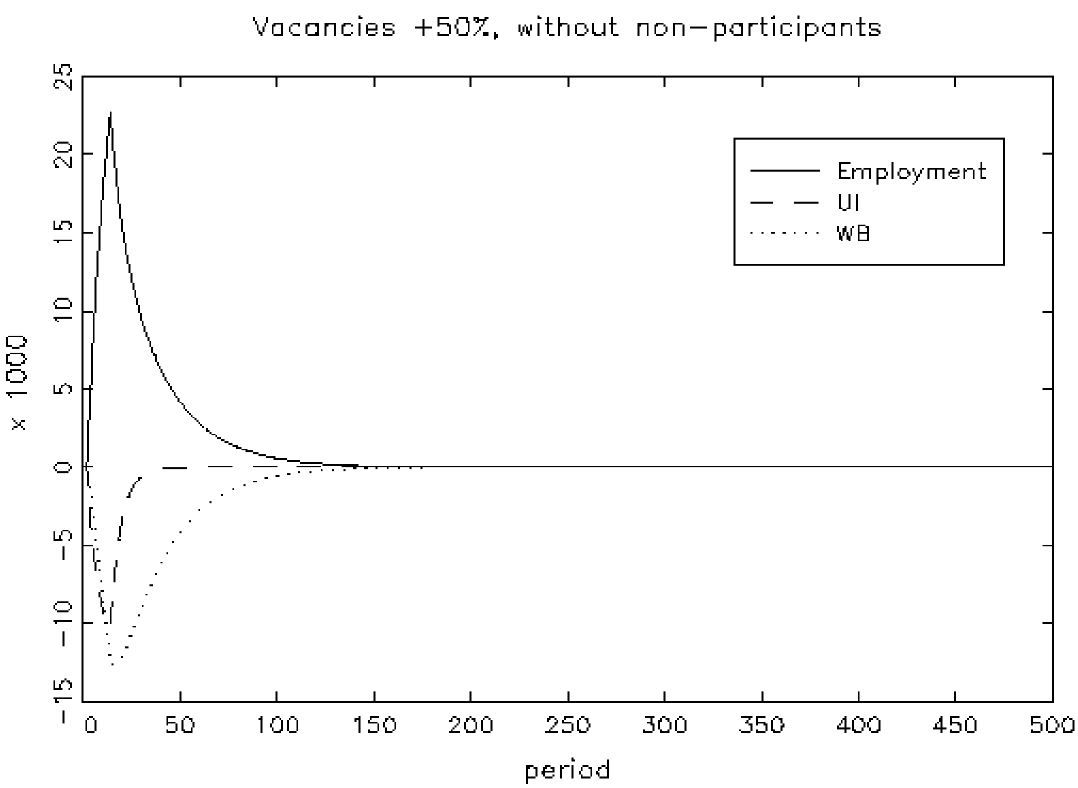


Figure 8a — Effect of a negative change in labour demand when there is competition for jobs between unemployed and non-participants

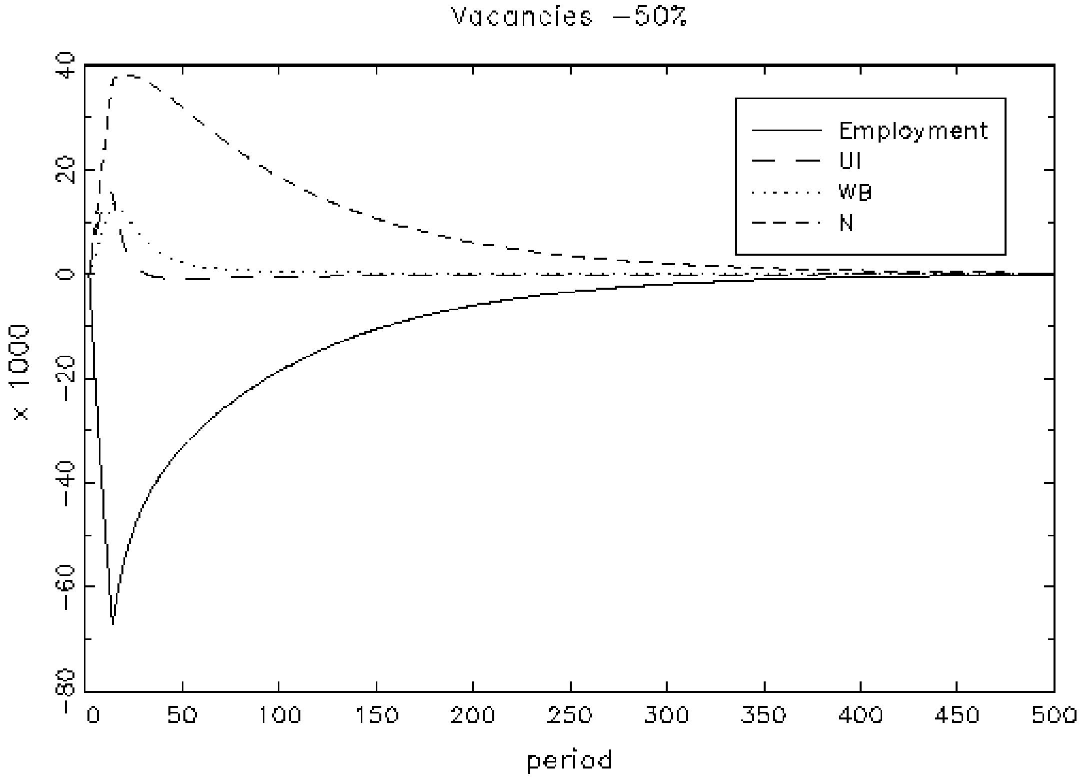
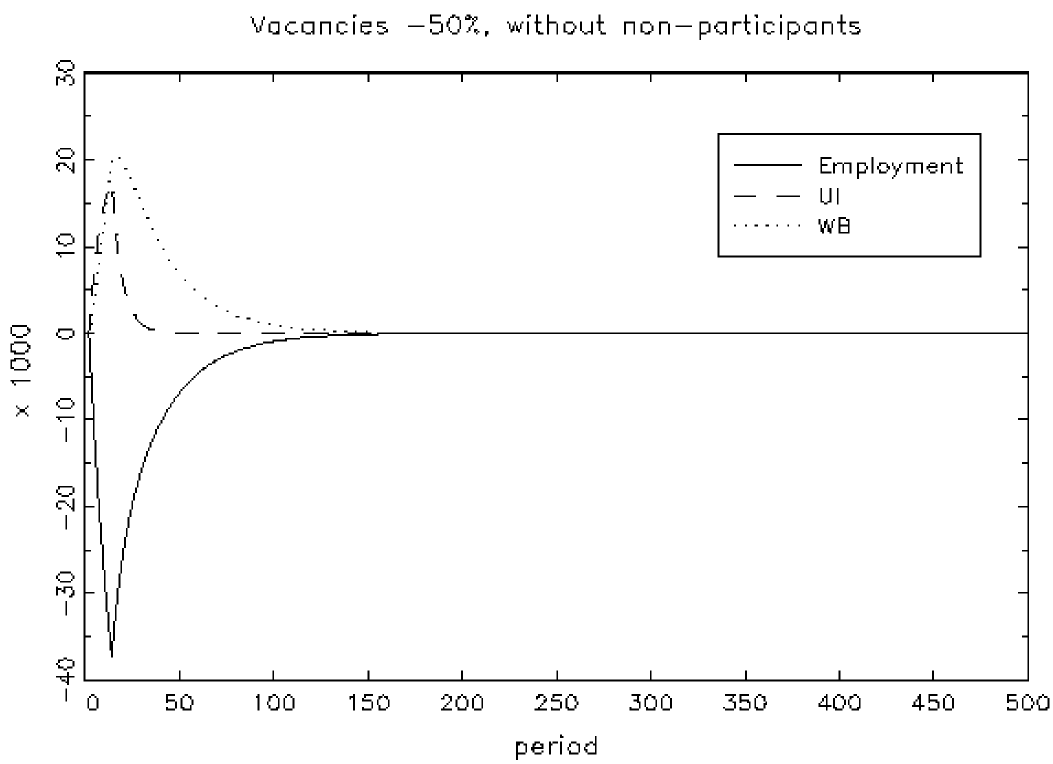


Figure 8b — Effect of a negative change in labour demand when only unemployed search for jobs



From Figure 7 and 8 we observe that the presence of competing non-participants reduces the responsiveness of unemployment to shocks to labour demand, i.e. changes in vacancies. Positive shocks to labour demand are partly absorbed by non-participants, reducing the number of additional job slots available for unemployed job seekers. Negative shocks to labour demand are partly absorbed by non-participants, once again softening the impact on unemployment.
Furthermore, we observe that the impact of demand shocks on unemployment is asymmetric. Negative shocks raise unemployment by more than positive negative shocks reduce it (due to the diminishing returns to the inputs in the aggregate matching function).

5. Conclusions

In this paper we consider labour supply and demand shocks in a simple reduced-form flow model of the labour market. We estimate an empirical matching function including different groups of job seekers and developed an equilibrium flow model of the Dutch labour market. The model simulations investigate the extent of labour market hysteresis which can be attributed to competition between unemployed and non-participants in the labour market.

Since the beginning of the 1980 the Dutch labour market faces persistent unemployment. A number of explanations have been suggested for this, but a combination of hazardous welfare state dynamics and oil price shocks in the 1970s seems a valid explanation (Broersma et al. (2000).

In our simulations we find that competition from non-participants in search for jobs softens the impact of demand and supply shocks upon unemployment, although it takes longer before the economy returns to its long run equilibrium. When we model the shock of labour supply as a change in the number of non-participants, i.e. they are not registered as unemployed and therefore do not flow into unemployment, the effect on unemployment is limited. Indeed, when the ratio between vacancies and the effective supply of labour does not change in response to the shock, the effect on unemployment is virtually zero.

Another important issue is whether or net labour demand adjusts to changes in the supply of labour, i.e. does the ‘lump-of-labour’ fallacy apply? In simulations of the Dutch Central Planning Bureau a 1 percent increase in the supply of labour after 10 years generates an increase in employment of about 0.4 percent. Broersma et al. (1997) reject this ‘lump-of-labour’ proposition and estimate a VAR model for the Dutch labour market to prove their point. They find that a 1 percent increase in the supply of labour is almost fully absorbed by employment after 10 years (0.94 percent increase).

Our results indicate that adjustment is even quicker, as we find that the impact on unemployment of a 10 percent shock to labour supply, i.e. the number of non-participants that searches for a job, has almost completely vanished after 5 years. In our simulation analysis we find that the impact on unemployment is larger if the number of vacancies does not respond to the change in the supply of labour.

Data Sources and Description

All numbers x 1000.

UI	Stock of unemployed receiving insurance benefits, excluding civil-servants and self-employed. About 70 percent of the working population is covered by unemployment insurance (WW). Source: CTSV (1998, Table 6.6 and 6.2) and own calculations.
WB	Stock of unemployed receiving welfare benefits. Source: CTSV (1998, Table 2.1) and Kock (1998).
E	Employed workers (employees and self-employed) with a regular job of 12 hours a week or more. Source: CPB.
N	Non-participants (above age 14). Source: CBS, Bevolkingsstatistiek.
V	Vacancies. Source: CBS, Sociaal Economische Maandstatistiek and Muysken et al. (1991).
$\pi_{UI \rightarrow WB}$	Flow from *UI* to *WB*. We use data that represent unemployed receiving unemployment insurance benefits 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: LISV (1998, Table 6.2).
$\pi_{N \rightarrow WB}$	Flow from non-participation to unemployed receiving welfare benefits. Source: Kock (1998).
M_{UI}	Job matching from the stock of unemployed receiving insurance benefits. Source: LISV (1998).

M_{U_l}	Job matching from the stock of unemployed receiving welfare benefits. Sources: Kock (1998).
M_N	Job matching of workers from outside the labour force. Source: Kock (1998).

References

BEAN, C.R. (1994), 'European unemployment: a survey', *Journal of Economic Literature*, **32**, 573-619.

BLANCHARD, O.J. AND P. DIAMOND (1990), 'The cyclical behaviour of gross flows of U.S. workers', *Brookings Papers on Economic Activity*, **2**, 85-143.

BROERSMA, L., J. KOEMAN AND C. TEULINGS (1997), 'Labour supply and employment' (in Dutch), *Economisch Statistische Berichten*, 836-839.

BROERSMA, L., J. KOEMAN AND C. TEULINGS (2000), 'Labour supply, the natural rate and the welfare state in the Netherlands: the wrong institutions at the wrong point in time', *Oxford Economic Papers*, **52 (1)**, 96-118.

BROERSMA, L., F.A.G. DEN BUTTER AND U. KOCK (2000), 'A national accounting system for worker flows', *Economics Letters*, **67 (3)**, 331-336.

BROERSMA, L. AND J.C. VAN OURS (1999), 'Job searchers, job matches and the elasticity of matching', *Labour Economics*, **6**, 77-93.

BUTTER, F.A.G. DEN (1993), "Supply of social security as a cause of low labour participation in The Netherlands; a cliometric analysis", Free University Research Memorandum, 1993-56.

BUTTER, F.A.G. DEN, AND M. VAN DIJK (1998), 'The pace of job creation and destruction, cyclical shocks and employment dynamics', *LABOUR*, **12**, 613-631.

BUTTER, F.A.G. DEN AND C. GORTER (1999), 'Modelling labour market dynamics with on-the-job search', *Economic Modelling*, **16**, 545-567.

CENTRAL BUREAU OF STATISTICS (CBS) (several years), *Enquête Beroeps Bevolking* (*EBB*), Voorburg.

CENTRAL PLANNING BUREAU (CPB) (several years), *Lange Reeksen*, Den Haag.

GRAAFLAND, J.J. (1988), 'Hysteresis in unemployment in the Netherlands', *De Economist*, **136 (4)**, 508-523.

HARTOG, J. AND J. THEEUWES (1993), 'Post-war unemployment in The Netherlands', *European Journal of Political Economy*, **9**, 73-112.

KOCK, U. (1998), 'Constructing labour market flows for The Netherlands using macro data from social security provisions; 1970-1995', Free University research memorandum, 1998-40.

LAYARD, R., NICKELL, S. AND R. JACKMAN (1991), '*Unemployment*', Oxford; Oxford University Press.

LINDBECK, A. (1995), 'Hazardous welfare state dynamics', *American Economic Review*, **85 (2)**, Papers and Proceedings, 9-15.

LINDEBOOM, M. AND J.C. VAN OURS (1993), 'Macro matching and micro search durations looking inside the black bocks of job formation', in: H. Bunzel, P. Jensen and N. Westergård-Nielsen (eds.), *Panel data and labour market analysis*, Amsterdam: Elsevier Science Publishers.

LJUNGQVIST, L. AND T.J. SARGENT (1998), 'The European Unemployment Dilemma', *Journal of Political Economy*, **106 (3)**, 514-550.

LANDELIJK INSTITUUT VOOR DE SOCIALE VERZEKERINGEN (LISV) (1998), *Kroniek van de Sociale Zekerheid*, Amsterdam.

MUMFORD, K. AND P.N. SMITH (1999), 'The hiring function reconsidered: on closing the circle', *Oxford Bulletin of Economics and Statistics*, **61 (3)**, 343-364.

MUYSKEN, J. , H. BIERINGS AND E. DE REGT (1991), 'Structural unemployment in The Netherlands' (in Dutch), OSA Working Paper, W82.

OECD (1997), *Labour force statistics*, Paris.

PISSARIDES, C.A (1994), 'Search unemployment with on-the-job search', *Review of Economic Studies*, **61**, 457-475.

PISSARIDES, C.A. (1990), *Unemployment Equilibrium Theory*, Oxford: Basic Blackwell.

SNOWER, D.J., 1997, ‘Evaluating unemployment policies: what do underlying theories tell us?’, in D.J. Snower en G. de la Dehesa (red.), *Unemployment policy: Government options for the labour market*, CEPR, Cambridge University Press.

VAN OURS, J.C. (1995), ‘An empirical note on employed and unemployed job search’, *Economics Letters*, 49, 447-452.