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Do labor market flows affect labor-force participation?*

Kerstin Johansson†

Abstract

This study examines if the flow rate from open unemployment to labor market programs affect the labor-force participation rate. This question is relevant because Swedish labor-force participation is expected to decline due to the age distribution in the population. A new dataset, with monthly data for Swedish municipalities between 1991:08 and 2002:10, has been constructed. The results show that increased probability of moving from open unemployment to labor market programs has positive effects on the labor-force participation rate. Positive effects are found for different age groups. The estimated effect of the flow rate from open unemployement into labor market programs is countercyclical. The participation rate is procyclical, and counter-cyclical labor market programs could be used to prevent discouraged workers from leaving labor force. The effects of flow rates from programs to open unemployment, and from the job destruction rate are negative, as expected. Income and labor market tightness have positive effects, except for older participants. This is because is a spurios negative correlation in data for the older participants. In general, the long run levels are achieved after about nine years, and most of the adjustment takes place during the first four years.

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1 Introduction

Few studies try to answer the question of whether labor market programs affect labor-force participation. This question is important in Sweden because the labor force is expected to decline due to the age distribution in the population. Today, there is a considerable focus on ways of attracting groups outside the labor force into it, for example recipients of social benefits, immigrants, and young people who have weak links with the labor market. Ways of retaining older workers in the labor force and attracting people who have left labor force for some reason have also been discussed. Labor market programs could be a factor in attracting new entrants and preventing participants from leaving the labor force.

Normally, studies of the effects of labor market programs use micro-data, and analyze the effects on the participants' future income or their probability of getting a job, see the overview by Calmfors, Forslund, and Hemström (2002). Studies using macro-data are more rare, and results for Sweden indicate that the displacement effect or direct crowding out could be relatively large, see for example Dahlberg and Forslund (1999). Results from reduced-form estimations indicate that programs reduce regular employment, see for example Calmfors and Skedinger (1995).

Here, the focus is on labor-force participation. It is important for the overall performance of the labor market that movements in and out of the labor force involve as little frictions as possible. In Sweden, labor-force participation is pro-cyclical, so people tend to leave labor force when it is difficult to find a job and to enter labor force when it is easy to find a job. In other words, the discouraged worker effect is present. It is not a problem if participants move in and out of labor force when the business cycle changes. During the long period with extremely high unemployment rates in the early years of the 1990s, there was some fear that long-term unemployed might be so discouraged that they dropped out of the labor force permanently. Programs could be used to counteract the business-cycle variation in labor-force participation, and perhaps to prevent people from leaving labor force permanently.

Results in earlier studies indicate that labor market programs may have positive effects on labor-force participation in Sweden. This question has not been studied so much internationally. Essay I in Johansson (2006) finds a relatively large and positive effect of labor market programs on labor-force participation. If the number of participants in programs

is increased by 100 the number of participants in labor force is increased by 70 persons. The positive effect in Dahlberg and Forslund (1999) is obtained indirectly from their estimations of the displacement effects of labor market programs. These two studies use panel data for the Swedish municipalities. Positive effects are also found in studies using Swedish time-series data, (Wadensjö (1993) and Johansson and Markowski (1995)). These studies estimate the effect on labor-force participation from an increased stock of participants in labor market programs.

In this paper, I have constructed a new dataset, with monthly data for the Swedish municipalities from August 1991 to October 2002. The relatively large number of observations in the time-dimension makes it possible to estimate both the long run effect and the short run dynamics. Data for monthly employment and income at the municipality level are constructed in a new way. Existing data measure employment in November only, and the measure of income refers to the yearly income for those employed in November. Other papers study whether the number of participants in labor market programs increases the number of participants in labor force. This paper instead asks if an increased flow of persons from open unemployment into labor market programs increases labor-force participation.

The flow rate from open unemployment to labor market programs is a more interesting policy-variable, because it can be controlled more directly by policy makers, than the stock of program participants. Stocks can only be controlled indirectly, by changing the inflow or the average program duration. A typical policy question like "What happens to labor-force participation if we move people from open unemployment into program participation?" can be answered when the empirical model is formulated in flow terms. The policy experiment in the present paper is different from that in Essay I in Johansson (2006), who study the effect on labor-force participation of an increased number of participants in labor market programs. In this paper, the question is how labor-force participation is affected by increased flow rates between open unemployment and labor market programs.

2 Theoretical model

This section presents a theoretical model for labor force determination. The model is used to determine which variables should be included in the

estimation and to determine their expected effects on labor-force participation. An individual will participate if the value of participating in labor force is larger than the value of non-participation. Participants in labor force could be employed, open unemployed or participate in a labor market program. Non-participants are for example students, part-time pensioner, or people that for other reasons chose to stay outside the labor force.

2.1 The model

The theoretical model is a search model with endogenously determined labor-force participation, based on Calmfors and Lang (1995), Holmlund and Lindén (1993), and Pissarides (1990). The same model is used in Essay I in Johansson (2006). In the model, the labor-force participation decision is based on a comparison between the value of participation and non-participation. Labor force participants can flow between three different labor market states. The factors determining the flows between the states are described, and the discounted values of being in each state are calculated. The parameter restrictions needed to ensure that regular employment is preferred to other states are presented before the effects on the labor-force participation rate are calculated. The theoretical model is slightly reformulated to correspond to the empirical measures available.

2.1.1 The states and flows in the labor market

Figure 1 describes states and flows in the labor market. The number of persons in each state is expressed in terms of the working-age population, and the population is assumed to be fixed. Labor force participants may be employed, e, openly unemployed, u, or participating in labor market programs, r, and $e + u + r = 1$. The states and the flows for participants are the same as in Holmlund and Lindén (1993). Non-participants flow in and out from the labor force via open unemployment. The instantaneous flow rates in and out from non-participation depend on the realization of η and they are denoted ψ and ξ, respectively. It is assumed that all non-participants who want to participate in labor force have to be openly unemployed job seekers before moving to employment. This assumption is relaxed in the empirical analysis.

The job separation rate is denoted ϕ and represents exogenously given negative shocks to firms that result in reduced regular employment. A fraction $(1 - \mu)$ of the number of persons that are separated from a job

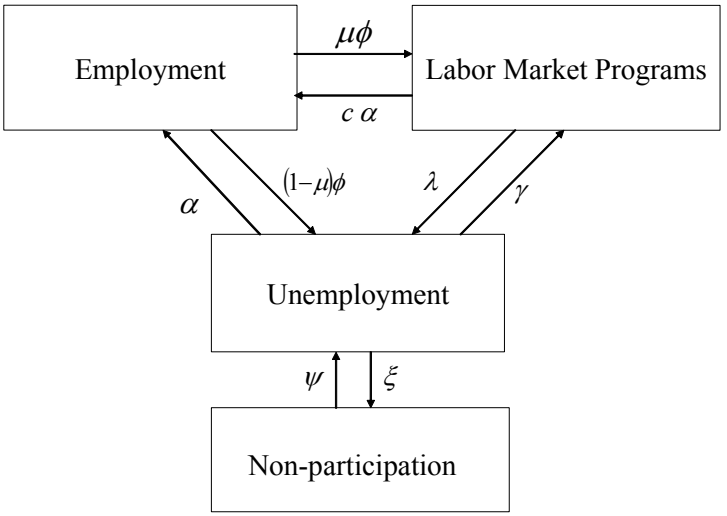

Figure 1: The states and flows in the labor market

become unemployed, and a fraction μ is placed in a program. The probability of entering a program if openly unemployed is γ, and the probability of becoming unemployed after program participation is λ.

The firms are creating vacancies, and the openly unemployed and participants in labor market programs search for vacant jobs.[1] The number of matches depends on the number of vacancies and on the number of searchers, that is, the number of openly unemployed and participants in labor market programs. Increased labor market tightness, θ, (the number of vacancies divided by the number of searchers) increases the probability of getting a job offer, $\alpha(\theta)$.[2]

The probability of getting a job differs between the unemployed and the participants in labor market programs; the c parameter captures this difference. If c is greater than one, labor market programs have positive effects on the job-offer probability for the program participants compared to the openly unemployed. If c is less than one, program participants have smaller chances of getting a job offer than the openly unemployed. One reason could be that program participants search less than openly unemployed.

2.1.2 The labor-force participation decision

People in the working-age population choose to participate in the labor force if the value of participating is greater than the value of non-participation. More people will participate in the labor force if the value of participation is increased. When out of labor force, non-participants benefit from for example the value of leisure, the value of education or the value of other activities they are engaged in. Working hours are assumed to be fixed, so only full-time jobs are considered.[3]

[1] There is no on-the-job search in the model.

[2] To see this, assume that the number of hirings is determined by $h = h(s, v) = h(cr + u, v)$. The number of effective searchers, $s = cr + u$, and the number of vacancies, v, increase the matching function. Assume that all hirings come from the stock of searchers, $h = \alpha s = \alpha(cr + u)$. Then, the job offer arrival rate is $\alpha = h/s = h(s, v)/s$. If constant returns to scale are assumed for the h-function, we can express the job offer probability α as a function of labor market tightness, $\theta = v/s$. With constant returns to scale $\alpha = h(s, v)/s = h(1, v/s) = h(1, \theta) = \alpha(\theta)$, where $\theta = v/s$ is the labor market tightness. The job-offer probability α is increasing with labor market tightness θ.

[3] The reason for not allowing labor force participants to vary their labor supply is that data on the number of hours worked are not available in the dataset, so we cannot empirically distinguish between full-time and part-time workers.

The value of non-participation, $\delta\Lambda_{np,i}$, consists of two parts: (1) $f(z)$, that describes the impacts of variables outside the theoretical model, for example age, number of children and the supply of day-care services; (2) and η_i, a stochastic shock to preferences, which is uniformly distributed between $\eta_{\min}$ and $\eta_{\max}$. δ is the discount factor. The value of non-participation for an individual is

$$\delta\Lambda_{np,i} = f(z) + \eta_i. \tag{1}$$

η_i is the realization of the individual-specific shock. The labor force participant who is indifferent between labor-force participation and non-participation has $\delta\Lambda_{np,i} = \delta\Lambda_u$, where Λ_u is the value of being an unemployed job searcher and δ the discount factor. In the theoretical model, it is assumed that all non-participants who want to participate in labor force have to be openly unemployed job seekers before moving to employment.[4] The cut-off value, η_*, for the marginal participant is given by

$$\eta_* = \delta\Lambda_u - f(z). \tag{2}$$

The participation rate is the integral of the density function for η up to the cutoff value, which takes the following expression when η_i is uniformly distributed:

$$\int_{-\infty}^{\eta_*} \frac{1}{\eta_{\max} - \eta_{\min}} d\eta = \frac{\eta_* - \eta_{\min}}{\eta_{\max} - \eta_{\min}} \tag{3}$$

The participation rate is the proportion of the working age population that has a value of η_i up to η_*. Substitute the expression for η_* in equation (1) in equation (3) to express the participation rate as a function of the variables in the model:

$$\frac{lf}{pop} = \frac{\delta\Lambda_u - f(z) - \eta_{\min}}{\eta_{\max} - \eta_{\min}}. \tag{4}$$

The participation rate depends positively on the discounted value of being a job seeker, $\delta\Lambda_u$. The effect of $f(z)$ on the participation rate is assumed to be negative[5]. To summarize, the model predicts that the

[4] This assumption is relaxed in the empirical analysis.

[5] If Λ_u and $f(z)$ contain the same variables, it is assumed that the positive effect of variables in Λ_u is small in relation to the negative effect of $f(z)$. In a model with an endogenously determined value of leisure, the value of leisure depends on parameters in the utility function. The value of leisure will be an increase in wealth; a variable that

participation rate increases in the same variables that increase the value of being an unemployed job seeker, Λ_u.

2.1.3 The value of the states for labor force participants

The discounted value of the different states (employment, $\delta\Lambda_e$, open unemployment, $\delta\Lambda_u$, and program participation, $\delta\Lambda_r$) is computed as the discounted income in each state - accounting for the probability of changing state and the income in the new state.

$$\delta\Lambda_e = [w + (1-\mu)\,\phi\,(\Lambda_u - \Lambda_e) + \mu\phi\,(\Lambda_r - \Lambda_e)] \tag{5}$$

$$\delta\Lambda_r = [\rho_r w + c\alpha\,(\Lambda_e - \Lambda_r) + \lambda\,(\Lambda_u - \Lambda_r)] \tag{6}$$

$$\delta\Lambda_u = [\rho_u w + \alpha\,(\Lambda_e - \Lambda_u) + \gamma\,(\Lambda_r - \Lambda_u)] \tag{7}$$

Employed workers earn w and the conditional probabilities of open unemployment or participation in a program are $(1-\mu)\,\phi$ and $\mu\phi$. Participants in labor market programs earn $\rho_r w$ and they become employed or openly unemployed with probabilities $c\alpha$ and λ. Openly unemployed earn $\rho_u w$, and they become employed or placed in a labor market program with probabilities α and γ. Equations (5)-(7) are used to calculate the value of the states for labor force participants.[6]

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could be affected by the same variables as Λ_u. It is assumed that possible effects of wealth are small.

[6]The expression for the values of the states are the following:

$$\begin{aligned}
\Lambda_e &= w\,(\delta\Delta)^{-1}\,\{[\phi\,((1-\mu)\,(\delta + c\alpha) + \lambda)]\,\rho_u + [\phi\,(\mu\,(\alpha+\delta) + \gamma)]\,\rho_r + \\
&\quad + \delta\,[\delta + \alpha\,(c+1) + \gamma + \lambda] + \alpha\,[\lambda + c\,(\gamma + \alpha)]\} \\
\Lambda_r &= w\,(\delta\Delta)^{-1}\,\{[\delta(\gamma + \delta + \alpha + \phi) + \phi(\gamma + \mu\alpha)]\rho_r + \\
&\quad + [\phi(\lambda + c\alpha(1-\mu)) + \delta\lambda]\rho_u + \alpha[c(\alpha + \delta + \gamma) + \lambda]\} \\
\Lambda_u &= w\,(\delta\Delta)^{-1}\,\{[(\delta + \phi + \lambda + c\alpha)\,\delta + \phi(c(1-\mu)\alpha + \lambda)]\rho_u + \\
&\quad + [\phi(\gamma + \mu\alpha) + \delta\gamma]\rho_r + [\delta + c(\gamma + \alpha) + \lambda]\alpha\} \\
\text{where } \Delta &= (\delta + c\alpha + \lambda)\,(\delta + \phi + \alpha) + \gamma\,(\delta + \phi + c\alpha) + (1-c)\,\alpha\mu\phi.
\end{aligned}$$

An unemployed person accept job offers if the value of employment is greater than or equal to the value of being unemployed, $\Lambda_e \geqslant \Lambda_u$. The condition is:

$$\mu\phi\left(\rho_r - \rho_u\right) \leqslant \gamma\left(1 - \rho_r\right) + \left(\delta + \lambda + c\alpha\right)\left(1 - \rho_u\right) \tag{8}$$

This condition is likely to be satisfied for normal parameter values, where $\rho_u \leqslant \rho_r \leqslant 1$, because $\mu\phi$, the flow rate from employment to labor market programs, is small compared to the other rates in the expression. Furthermore, the difference $(\rho_r - \rho_u)$ is presumably smaller than $(1 - \rho_r)$ and $(1 - \rho_u)$. If the levels of the replacement rates are restricted, so that the replacement rate is the same for program participants and openly unemployed, $\rho_r = \rho_u = \rho$, the condition in (8) is satisfied if $\rho \leqslant 1$.

Program participants accept a job offer if the value of employment is greater than the value of participating in a program, $\Lambda_e \geqslant \Lambda_r$. The condition is:

$$\phi\left(1 - \mu\right)\left(\rho_r - \rho_u\right) \leqslant \left(\alpha + \gamma + \delta\right)\left(1 - \rho_r\right) + \lambda\left(1 - \rho_u\right) \tag{9}$$

This condition is likely to be satisfied for realistic values of the replacement rates, $\rho_u \leqslant \rho_r \leqslant 1$, because the flow rate from employment to open unemployment, $\phi\left(1 - \mu\right)$, has to be smaller than the sum of the flow from open unemployment to employment, α, the flows rates between unemployment and program participation, γ and λ, and the discount factor, δ. The condition could be violated if the difference between the replacement rates is large enough. For the special case when $\rho_r = \rho_u = \rho$, the condition in (9) is satisfied if $\rho \leqslant 1$.If $\rho_u < \rho_r = 1$, the condition in (9) is satisfied if $\phi\left(1 - \mu\right) \leqslant \lambda$, so the flow from employment into unemployment must be smaller than or equal to the flow from programs into unemployment.

An unemployed person accepts a place in a program if the value of participation in a program is greater than the value of being openly unemployed, $\Lambda_r \geqslant \Lambda_u$. The condition is:

$$\left(\phi + \delta\right)\left(\rho_r - \rho_u\right) \geqslant \alpha\left(\left(1 - \rho_r\right) - c\left(1 - \rho_u\right)\right) \tag{10}$$

When $\rho_r = \rho_u < 1$, the condition in (10) is satisfied if $c \geqslant 1$. The parameter c captures all differences in the probability of getting a job-offer between program participants and openly unemployed. The job-offer probability for program participants has to be at least as large as for openly unemployed, because the replacement rates, and therefore income,

are the same. On the other hand, if $c < 1$, program participants have to be compensated for the reduced probability of getting a job, so $\rho_r > \rho_u$. Involuntary flows from unemployment to programs could be observed, because unemployed people could be forced to participate in programs in order to retain their benefits. In such cases, the self-selection constraint in (10) is not fulfilled. Note that if programs are used to qualify the unemployed for new periods of unemployment benefits, it would increase the value of Λ_r, and relax the constraint in (10). This effect of programs is not included in the model. Taken together, the self-selection constraints imply that $\Lambda_e \geqslant \Lambda_r \geqslant \Lambda_u$. Restrictions on the policy parameters, $\lambda, \gamma, \mu, \rho_r$, and ρ_u are needed to satisfy the selection constraints.

2.1.4 Reformulation of the model to correspond to empirical measures

The labor-force participation rate depends positively on the value of being a job seeker, Λ_u, see equation (4), implying that new participants enter open unemployment. Empirically, we observe flows between non-participation and all three states of labor-force participation. Unfortunately, data do not cover all job seekers, only unemployed persons who are registered at an employment office are covered.

The theoretical model could be slightly reformulated to correspond to the empirical measures. Let the cutoff value, in (2), be $\eta_* = \delta\Lambda_e - f(z)$, then the participant who is indifferent between participation and non-participation has $\delta\Lambda_{np} = \delta\Lambda_e$, - in other words the value of non-participation is equal to the value of employment. The new entrants could then enter regular employment. For the purposes of of the model in this paper, it does not matter which state non-participants enter, because the values of the different states react in the same direction to the same shock, see Table *1.*

2.2 The effects on the labor-force participation rate

The way in which the values of the states in the labor market and the participation rate are affected by changes in the model's parameter is displayed in Table 1. Λ_e, Λ_r, Λ_e are the discounted values of the expected income in the different states for labor force participants, employment, labor market programs, and open unemployment.

Table 1: Effects on the values of the different states and on the labor-force participation rate

Increase in	**Effect on**				
	Λ_u	Λ_r	Λ_e	partic. rate	
w, wage	+	+	+	+	
ρ_r, ρ_u, replacement rates	+	+	+	+	
γ, rate u to r	+	+	+	+	if $\Lambda_r - \Lambda_u \geqslant 0$
λ, rate r to u	-	-	-	-	if $\Lambda_r - \Lambda_u \geqslant 0$
μ, share from e to r	+	+	+	+	if $\Lambda_r - \Lambda_u \geqslant 0$
c, relative eff of program	+	+	+	+	if $\Lambda_e - \Lambda_r \geqslant 0$
ϕ, rate from e to u and r	-	-	-	-	if $\rho_r, \rho_u \leqslant 1$
$\alpha(\theta)$, rate from u and r to e	+	+	+	+	

An increase in wages, w, increases the value of participation and thus increases labor-force participation. ρ_r and ρ_u are the replacement rates (income as a fraction of earnings) during program participation or unemployment. Higher replacement rates increase the value of labor-force participation in the same way as higher wages.

Increased inflows into programs, γ, and increased shares of laid-off workers who enter directly into labor market program, μ, have positive effects on labor-force participation if the value of participating in a program is larger than being openly unemployed, that is, if $\Lambda_r - \Lambda_u \geqslant 0$. And increased outflow rates from programs into unemployment, λ, have negative effects if $\Lambda_r - \Lambda_u \geqslant 0$.

The self-selection constraint, $\Lambda_r - \Lambda_u \geqslant 0$, in (10) is fulfilled if the income for program participants is larger than for openly unemployed. This has been the case for some programs. Often, participants in job-creation programs are paid more than the unemployment benefit, while participants in training programs receive the unemployment benefit. If the income for unemployed and program participants is the same, labor-force participation is increased if $c \geqslant 1$, so that program participants have a greater probability of getting a job then open unemployed persons.[7] The parameter c could decrease during participation in some programs. It is,

[7]Remember that c captures all differences in job-offer probabilities between openly unemployed, and participants in labor market programs.

for example, natural to terminate a training program before searching for a new job. Naturally, the time left for job search is less when participating in full-time programs. If $c < 1$, the program's participants have to be compensated by a larger income compared with the openly unemployed.[8] Furthermore, if programs are used to qualify for new periods of unemployment benefits, the value of programs relative to open unemployment increases, and the restriction, $\Lambda_r - \Lambda_u \geqslant 0$, is eased. The selection constraint $\Lambda_r - \Lambda_u \geqslant 0$ has to be fulfilled in order to determine the sign of the effect on labor-force participation from increased probabilities of moving between open unemployment and labor market programs, γ and λ. If laid-off workers have an increased probability of participating in a program instead of becoming openly unemployed - an increase in the parameter μ in the model - the labor-force participation rate will increase if $\Lambda_r - \Lambda_u \geqslant 0$.

In the model, an increase in the relative effectiveness of programs, c, directly increases the probability of moving from programs to employment. If c increases, the participation rate is expected to increase, if $\Lambda_e - \Lambda_r \geqslant 0$ because the probability of finding a job and receiving a higher income has increased. The condition, $\Lambda_e - \Lambda_r \geqslant 0$, is likely to be fulfilled for normal parameter values, see the discussion of equation (9).

Labor market tightness, $\theta = (v/(u + cr))$, the number of vacancies divided by the number of effective job-searchers, affects the flow rates from unemployment and labor market programs into regular employment. An increased number of vacancies, v, increases the probability of finding a job and is expected to have a positive effect on labor-force participation. Increased numbers of openly unemployed persons, u, or program participants, r, increase the number of persons searching for jobs and, for a given number of vacancies and a given relative effectiveness of programs, c, it is now more difficult to find a job. The job-offer probability, $\alpha(\theta)$, depends on labor market tightness, (θ), which gives rise to the discouraged-worker effect in the model because labor market tightness is pro-cyclical.

An increased job separation rate, which is a negative employment shock, ϕ, increases the probability of being openly unemployed. This is expected to have a negative effect on the labor-force participation rate because the probability of recieving a reduced income has increased since unemployment benefits are lower than wages.

[8] Of course, the compensation could be a combination of higher expected probability of getting a job offer and an anticipated higher wage after the program.

To summarize, we expect the following variables to affect labor-force participation rate: the wage, w, the replacement rates, ρ_r and ρ_u, the flow rates from open unemployment to programs, γ, and from programs to open unemployment, λ, the share of negative employment shocks to program, μ, the relative effectiveness of programs, c, the flow rates from employment to open unemployment, $(1-\mu)\,\phi$, and from employment to program, $\mu\phi$, and the flow rate from open unemployment to employment, $\alpha(\theta)$.

3 Data

The data are a panel of monthly observations between August 1991 and October 2002 for Swedish municipalities. The number of observations is $284 \times 135 = 38\ 340$. Data on income and employment are new and compiled on a monthly basis. The alternative is the existing data in Rams[9]. Unfortunately, Rams measures employment in November only, and income for those employed in November is their yearly income and not their income in November.

The Händel database from the National Labour Board, available at IFAU, contains information on all individuals who are registered at an employment office as job searchers. Händel is used to calculate the gross flows between unemployment and labor market programs, and to compute the stock of the number of persons who are openly unemployed or participating in labor market programs.

3.1 The new data

Data on individual employment and income are calculated from a register of the tax authorities' statement of income[10]. Data on income from different employers are available, for every individual. Income and the first and the last month the income is paid out are recorded, for every employer. Monthly data on income are calculated on the assumption that the income is evenly distributed on a monthly basis. For each individual, the total income is calculated as the sum of the monthly distributed income from

[9]The employment register at Statistics Sweden.

[10]The firms have to send a statement of income for each employee to the tax authorities. The statement contains the income and the initial and final month for the payment period, together with the identification number for the plant, the Cfar-number.

all income statements. To classify the individual as employed or not, a lower limit for the income is used. If the income is lower than the cutoff value, the individual is classified as non-employed.[11] The cut-off value that is used here is 75 % of the wage for a male cleaner employed in the municipality sector.[12] Self-employed persons with an income of more than SEK 100 per month are defined as employed. Statements of income for self-employed persons do not contain information on the starting and ending month, so the income for self-employed persons is distributed evenly over the whole year.

The cutoff here is relatively high, but still at the bottom of the income distribution range. The same cutoff value is used for employees of all ages. It turns out that using the same income cutoff works surprisingly well. I have calculated the number of employed persons in different age groups using the same implicit income cutoff as in Rams 1998 for all persons employed.[13] The correspondence between the numbers of persons in different age groups is very close to the number of persons employed according to Rams. This is surprising because a sophisticated model is used in Rams to determine the income cutoff value. The correspondence with Rams is less for older people. For example, when calculating employment for men and women separately, for the 55-59 and 60-64 age groups, the differences were relatively large compared with Rams. But if, instead, employment for men and women were calculated for the 55-64 age group, the number of employed persons comes very close to Rams.

There is seasonal variation in the employment data, with higher employment, for example, during the summer months. Both employment and income increase dramatically in January each year. The increase in January is due to a cohort effect, arising from the fact that age is measured yearly and the other variables are measured monthly. The cohort effect is largest for the 55-64 age group, and the seasonal variation is more pronounced for persons in the 18-64 age range.

The calculations of monthly employment and income are based on

[11] Non-employed persons could be openly unemployed, participating in a labor market program, or out of labor force.

[12] The cut-off in 2002 is SEK 11 477.

[13] The implicit cutoff value used in calculating November employment by Statistic Sweden is SEK 2 275 in November 1998. The employment definition used by Statistics Sweden should correspond to the labor force survey definition, i.e. those who have worked one hour every week are employed. The cutoff value that is used here for 1998 is SEK 6 600 per month.

the assumption that the starting and ending months in the statement of income are correct and that income should be equally distributed across the months. One disadvantage is that the computation of employment has to rely on a cutoff-value for income. The same person could be classified as both employed and unemployed or in a program, if the income for this person is above the cutoff value and if the individual is registered in Händel during the same period.

3.2 Variables in the estimation

The theoretical model in Section 2 suggests that the following variables should affect labor-force participation rate: the wage, w, the flow rates between the different states, γ, λ, ϕ, and $\alpha(\theta)$, the share of the job separation rate that goes to program, μ, the relative effectiveness of programs, c, and the replacement rates, ρ_r ρ_u. This section presents the empirical definition of the variables. The expected effects of the empirical variables are indicated in Table 2.

The labor force is calculated as the sum of employed, openly unemployed and participants in labor market programs. Employment is the sum of the number of persons classified as employed in each municipality. Non-participants are the working-age population in the age range 18-65, excluding people in the labor force. With this definition, all participants in labor market programs are in the labor force. The population in each municipality is measured in December. The labor-force participation rate, lf, is labor force divided by population in December of the previous year.

The wage is measured by the monthly labor income for those employed, *inc*. Increased income is expected to increase labor-force participation. The flow rates between open unemployment and labor market programs, $[u \to r]$ and $[r \to u]$, are measured by the gross flow between the states, divided by the lagged number of persons in the outflow stock. Inflow into programs is expected to increase participation and outflow from programs is expected to reduce labor-force participation.

In the theoretical model, the flow rate from open unemployment and labor market programs to employment α, should be a function of labor market tightness, $\theta = v/(u + cr)$, the number of vacant jobs divided by the number of effective job-seekers, the stock of openly unemployed persons, u, and the stock of program participants, r, multiplied by the effec-

tiveness parameter c.[14] It is assumed that there is no difference between unemployed persons and program participants as job-searchers, so $c = 1$ in the computation.

Increased labor market tightness, *teta*, is expected to increase labor-force participation. It is possible to compute the number of persons who leave Händel for employment, which could be an alternative measure. Unemployment in the theoretical model refers to unemployed people who are looking for jobs. Unemployment in Händel is people who have registered at an employment office. In reality, we see flows from outside labor force to employment, and this flow will not be captured if Händel data are used to measure the inflow to employment. Labor market tightness is used instead. The flow from employment, job separations, is measured by the job destruction rate, *jdr*. The number of destroyed jobs is defined as the absolute sum of negative employment changes in each employment unit.[15] The job destruction rate is calculated by dividing job destruction with lagged employment at each employment unit. The job destruction rate is expected to have a negative effect on the labor-force participation rate.

Data on replacement rates, which should affect labor-force participation, are not available at the municipality level. The stocks are measured at the end of each month and the flow is measured during the month. Table 2 summarizes the discussion of the empirical variables and their expected effect on the labor-force participation rate. Summary statistics and plots of data are found in Appendix A.

3.3 The policy experiment

This paper focuses on the effect of labor market programs on labor-force participation, and the policy variable is the flow from open unemployment to labor market programs. Other possible measures of policies are the outflow from programs to open unemployment, the number of participants in programs, and replacement rates. These measures are not considered here, either because they cannot be directly controlled by the local labor market offices (which are responsible for the implementation of the policy)

[14] The formulation of the labor market tightness variable implicitly assumes that there is constant return to scale in the matching function. Results in Forslund and Johansson (2006) indicate that the point-estimates of the scale elasticity vary but are normally below one.

[15] Self-employed persons are excluded from the calculation. If a person has several statements of income, the Cfar-number for the one with the largest income is used.

Table 2: The empirical variables and the expected effect on the labor-force participation rate

Variable	**Definition**	**Effect**
lf	number of people in labor force$_t$/pop1865$_{t-1}$	
inc	w, real monthly income for employed$_t$	+
$[u \rightarrow r]$	γ, flow u to r_t/stock u_{t-1}	+
$[r \rightarrow u]$	λ, flow r to u_t/stock r_t	-
$teta$	θ, tightness $v/(u+r)$	+
jdr	ϕ, job destruction rate	-

or there are no good empirical measures for them. The flow from open unemployment into labor market programs can be controlled directly, because the labor market office decide which unemployed that should get an offer to participate in a labor market program. The outflow from programs into open unemployment is related to the duration of the programs and could only be controlled indirectly. Furthermore, voluntary quits and dropouts from programs occur. The disadvantage of using the number of program participants as policy variables is that the stock depends on the flows between programs and the other states.

The stock of participants in programs shows up indirectly in the estimation, as the denominator in the labor market tightness variable, *teta*, reflecting an indirect negative effect of labor market programs in the model. If, for a given number of vacancies, the number of job-searchers increases, the competition for vacant jobs increases, resulting in a negative effect on labor force. Only the results of tightness will be discussed, and not the separate effect of vacancies and the number of job-searchers.

In the policy experiment, where the flow from unemployment into programs is permanently increased, it is possible that the number of unemployed persons goes to zero, and the number of participants in labor market programs infinitely large. Therefore, the results of this experiment should be interpreted carefully, remembering that it only measures effects over the business cycle horizon. To carry out an experiment with results that are valid in the long run, steady state or stock flow equilibrium have to be imposed. Necessary data to impose such restrictions are not available.

4 Empirical results

A dynamic model is estimated. Both lagged effects of the explanatory variables and gradual adjustment in the dependent variables are allowed. A relatively large number of lags are probably needed when monthly data are used. All explanatory variables are assumed to be predetermined with respect to labor-force participation. That is, they could be correlated with contemporaneous and future values of the error term in the estimated equation, but not with lagged values of labor-force participation. This means that forecasts made today of future explanatory variables are not allowed to affect labor-force participation today.[16]. No attempt will be made to estimate the contemporaneous effects. Models are estimated for participants in the 18-64 age range, with separate models for men and women.

4.1 Estimation method

Panel data models are used, primarily because the number of observations is then sufficiently large to estimate both the short run adjustment and the long run effects. It is possible to estimate separate time-series models for each municipality, avoiding the panel-data restriction of equal coefficients for the variables. But, on the other hand, the number of observations in the individual time series model is too small to estimate the short run dynamics with sufficient accuracy.[17]

The commonly used estimators for panel data models, for example the within-group estimator, are not suitable when the variables are predetermined, because strict exogeneity is required, if an individual specific term is included.[18] If T becomes large, the within-group estimator is consistent for models with predetermined variables. Here it is assumed that the number of observations in the time dimensions is sufficiently large for consistent estimation. This assumption is probably valid because the average of the estimated long run effects is the same if separate models for each

[16]The assumption is probably not problematical because it will normally take more than a month for nonparticipants to adjust their behavior to changes in expectations of the future labor market situation, for example.

[17]The dataset contains 135 monthly observations for 284 municipalities.

[18]Predetermined variables have to be transformed into first differences or orthogonal deviation. Lagged levels of the variables are valid instruments for the transformed variables.

municipality are estimated, as when the within group estimator is used.

4.2 Estimation results

Panel data models with lags in all variables are estimated for the labor-force participation rate. Models are estimated for participants in the 18-64 age range, with separate models for men and women. The estimated results of models for participants in the 18-24, 25-39, 40-54, 55-64 and 25-54 age groups are reported in Appendix C. The estimated models have the error-correction form:

$$\begin{aligned}
\Delta lf_{age,i,t} \;=\; & \sum_{j=1}^{j=p-1} a_j \Delta lf_{age,i,t-j} + \sum_{j=1}^{j=p-1} b_{1j} \Delta inc_{age,i,t-j} + \\
& \sum_{j=1}^{j=p-1} b_{2j} \Delta \left[u \to r\right]_{age,i,t-j} + \sum_{j=1}^{j=p-1} b_{3j} \Delta \left[r \to u\right]_{age,i,t-j} lf \\
& + \sum_{j=1}^{j=p-1} b_{4j} \Delta teta_{age,i,t-j} + \sum_{j=1}^{j=p-1} b_{5j} \Delta jdr_{i,t-j} \\
& + a(1) lf_{age,i,t-1} + b_1(1) inc_{age,i,t-1} + b_2(1) \left[u \to r\right]_{age,i,t-1} \\
& + b_3(1) \left[r \to u\right]_{age,i,t-1} + b_4(1) teta_{age,i,t-1} + b_5(1) jdr_{i,t-1} \\
& + k_i + k_t + k_{seas,i} + \varepsilon_{i,t}
\end{aligned}$$

The coefficients on the lagged level of the variables are the sum of the coefficients for each lag polynomial in the model, in levels, and the coefficients for the difference terms are functions of the original coefficients in the model, in levels. Prior to estimating, all variables are seasonally adjusted using centered seasonal dummies. Separate seasonal models are estimated for each municipality. Common time-specific effects are removed by estimating panel data models with time dummies for each seasonally adjusted variable. Panel data models are then estimated using the within-group estimator. There are 284 municipalities in the dataset, and together with the 135 months between August 1991 and October 2002, the total number of observations is 38 340.

All variables are measured at the municipality level, with the exception of labor market tightness, *teta*, and the job destruction rate, *jdr*. Labor market tightness, *teta*, is related to the probability of finding a job, and the

job destruction rate, jdr, to the probability of losing a job. These variables are measured at the local labor market level[19], because local labor markets reflect where most inhabitants in each municipality work. Labor market programs are typically only offered in the home municipality, so the flows between open unemployment and labor market programs, $[u \to r]$, and $[r \to u]$ are measured at the municipality level. Income, inc, is measured as the average income for the employed person in each municipality, and it reflects the actual income for different jobs in the municipalities.

All models, including those for the separate age groups in Appendix C, have the same lag length in the estimations, $p = 7$. This is the number of lags where the tests, on average for the age groups, show less significant signs of correlation in the residuals. The estimated long run effects are not sensitive to how many lags are included in the models.

In general, the coefficients for the lagged labor-force participation are significant and small, around 0.05, see Table 7 in Appendix B, where the estimates of the coefficients in front of the lagged levels of the variables are presented. The models are estimated on the basis of monthly data, so the relatively slow adjustment to the long run refers to months. The R^2 values are low, around 0.05, probably reflecting the effects of removal of the common time dummies prior to estimation.

The estimated long run effects[20] are presented in Table 3. The point estimates of *income* are imprecisely, and not significantly different from zero. The point estimates are positive, as expected in the joint model and in the male model, but negative in the model for women. The point estimates of the effects of the flow rates into programs, $[u \to r]$, are positive, as expected. They are significant in the separate models for men and women, but insignificant in the joint model. The estimated effects of outflow, $[r \to u]$, from programs are negative, as expected, and significant in the joint and the female model but insignificant in the male model. The estimated effect of *teta*, labor market tightness, is positive and significant in all equations. The estimated effect of the job destruction rate, jdr, is negative, as expected, but only significant in the equation for female labor-force participation.

[19]The definition of local labor markets is based on commuting patterns. The number of local labor markets is 100 and the number of municipalities is 284.

[20]The long run effects are calculated from the coefficient at the lagged level of the variables, divided by the coefficient on the lagged level of the dependent variable with reversed sign.

Table 3: The estimated long run effect for the 18-64 age group

Variable	**Effect**	**p-val**	**p-val**	**p-val**
age group	**18-64**	**= 0**		
inc	0.00038	0.368	-	-
$[u \rightarrow r]$	0.09474	0.186	-	-
$[r \rightarrow u]$	-0.02369	0.003	-	-
teta	0.08506	0.000	-	-
jdr	-0.45098	0.265	-	-
men	**18-64**	**= 0**	**= 18-64**	**= women**
inc	0.00042	0.187	0.920	0.026
$[u \rightarrow r]$	0.05427	0.051	0.144	0.011
$[r \rightarrow u]$	-0.01818	0.187	0.689	0.011
teta	0.03767	0.000	0.000	0.549
jdr	-0.26575	0.458	0.603	0.166
women	**18-64**	**= 0**	**= 18-64**	**= men**
inc	-0.00043	0.467	0.170	0.149
$[u \rightarrow r]$	0.12468	0.000	0.317	0.019
$[r \rightarrow u]$	-0.05320	0.004	0.111	0.058
teta	0.04285	0.000	0.000	0.527
jdr	-0.76331	0.054	0.431	0.210

Note: Seasonally adjusted monthly data for 284 municipalities, estimation period 1992:7-2002:9, R2 = 0.051, the effects of common time dummies are removed prior to estimation. The within-group estimator is used. The column denoted "p-val = 0" shows the p-value for the test of a zero long run effect. The column denoted "p-val = 18-64" shows the p-value for a test of the hypothesis that the estimated long run effects are equal to the effects for all participants. The column denoted "p-val=women" and "p-val=men" shows the p-value for tests of the hypothesis that the estimated long run effects are equal to the effects for female and male participants, respectively. The p-values are calculated using the delta-method.

The effects in the male and the female models are not significantly different from the effects in the joint model, except for the effect of *teta*, labor market tightness. The point estimate of *teta* is larger in the joint model than in the separate models for men and women. The standard errors for the effects are low in all three equations. The estimated effect of *teta* for men and women is significantly different from the joint model

but they are not significantly different from each other. The effects of the flow rates to and from labor market programs, $[u \rightarrow r]$ and $[r \rightarrow u]$, are significantly different for men and women. The effect of income for males is significantly different from the insignificant and negative effect for women. The other effects are not significantly different between men and women.

To summarize the results so far, the long run effects of *income* are small and insignificant. The inflow rates into programs, $[u \rightarrow r]$, have the expected positive effects in all models, and the outflow rates, $[r \rightarrow u]$, have the expected negative effects. The estimated effects of the labor market tightness, *teta*, are positive, as expected. The estimated effects of the job destruction rate, *jdr*, are negative, as expected.

The point-estimate of *jdr* is relatively large, but not significant. The theoretical variable that is represented empirically by the job destruction rate is negative employment shocks, causing flows from employment to unemployment. The number of destroyed jobs measures the extent to which employment at the employment unit has decreased. The variable does not contain direct information about how many individuals that have left employment, which would have been a better measure here. Normally, the worker flows are larger than the job flows. The job destruction rate is an imperfect measure of negative employment shocks, and this is probably one reason for the imprecise estimate of the effects.

In order to examine whether the size of the estimated effect of the flow rate between open unemployment and labor market programs, $[u \rightarrow r]$, varies with the state of the business cycle, the long run effect of the flow rate, $[u \rightarrow r]$, is interacted with the long run effect of labor market tightness, θ. The estimation is carried out for all participants in the 18-64 age group. The coefficient for the interaction term is significant and negative. That is, the positive effect of inflow to labor market programs becomes lower when the business cycle improve, and θ increases. In other words, the size the estimated effect of the flow rate from open unemployment into labor market programs, $[u \rightarrow r]$, is countercyclical, and the expected effect is larger in downturns.

Variables measured at different local levels are used in the estimations. This could give rise to a so-called Moulton bias, which generates a downward bias in the estimated standard errors. To check for this possibility, the model is estimated with the robust and cluster option in the Stata software. Clustered standard errors are calculated both for the 100 local

labor markets and for the 25 counties. The differences in the significance levels are only marginal, so the standard errors are probably not affected by the Moulton bias.

Table 4: P-values for joint tests of long-run effects of programs and all long-run effects

	joint test $[u \rightarrow r]$ **and** $[r \rightarrow u]$		**joint test all long run effects**	
age groups	**eff = 0**	**eff = 18-64**	**eff=0**	**eff=18-64**
18-64	0.012	-	0.000	-
18-64 m	0.086	0.338	0.000	0.000
18-64 w	0.000	0.262	0.000	0.000

Table 4 presents the p-values from Wald tests of the hypothesis that the flow rates from unemployment to programs, $[u \rightarrow r]$ and from programs to unemployment, $[r \rightarrow u]$ are jointly significant. Tests of the joint significance of the long run effect of all variables are also presented, together with the results from tests of the hypothesis that the joint effects differ from the effects for all participants in the 18-64 age range. The joint effects of the flow rates into and out of labor market programs, $[u \rightarrow r]$, $[r - u]$, are significant. The effects for men and women are not significantly different from the effect for 18-64 years old. The long run effects of all variables are jointly significant and differ significantly for men and women from the effects for all participants.

Table 5 presents the long run results of an experiment where each variable is increased by one standard deviation. The standard deviations are largest for the job destruction rate (160%), and smallest for income (10%).[21] The standard deviations for the flows between labor market programs and open unemployment are relatively large, around 50% for all participants. Even if the changes in the explanatory variables are relatively large, the percentage effects on the variables are small, reflecting the small elasticities that are estimated. Still, the number of persons that could be affected is fairly large. According to the point estimate, around 18 000 persons enter the labor force when the inflow rate to programs increases

[21] Note that the job destruction rate, in contrast to the other variables, is expressed in terms of employed persons in the 18-64 age range, and not for men and women separately.

Table 5: Percentage effects on the labor-force participation rate and effects on the number of participants in labor force of changes in the explanatory variables by one standard deviation

Variable	**18-64**	**18-64 men**	**18-64 women**
inc $\Delta\%$	9.8	9.5	10.4
Δlfr %	(0.4)	(0.5)	(-0.4)
Δlf	(14 773)	(12 482)	(-11 722)
$[u \rightarrow r]$ $\Delta\%$	49.1	46.3	53.6
Δlfr %	(0.5)	0.3	0.8
Δlf	(18 184)	4 984	12 725
$[r \rightarrow u]$ $\Delta\%$	46.5	41.7	53.5
Δlfr %	-0.3	(-0.2)	-0.8
Δlf	-10 011	(-3 486)	-12 820
$teta$ $\Delta\%$	80.7	78.7	82.4
Δlfr %	0.5	0.4	0.7
Δlf	18 911	7 443	10 712
jdr $\Delta\%$	159.4	159.4	159.4
Δlfr %	(1.9)	(-1.0)	-3.6
Δlf	(-64 775)	(-19 376)	-53 981

Note: For each variable, the first row shows the percentage increase, the second row the percentage effect on the labor-force participation rate, and the third row the effect in terms of the number of persons in labor force, assuming that the population is constant, at the average level during the sample period. Note that this experiment does not use steady state restrictions, so it should not be allowed to go on forever.

by one standard deviation. Note, however, that the estimated effect is insignificant, and the result is not significantly different from zero.

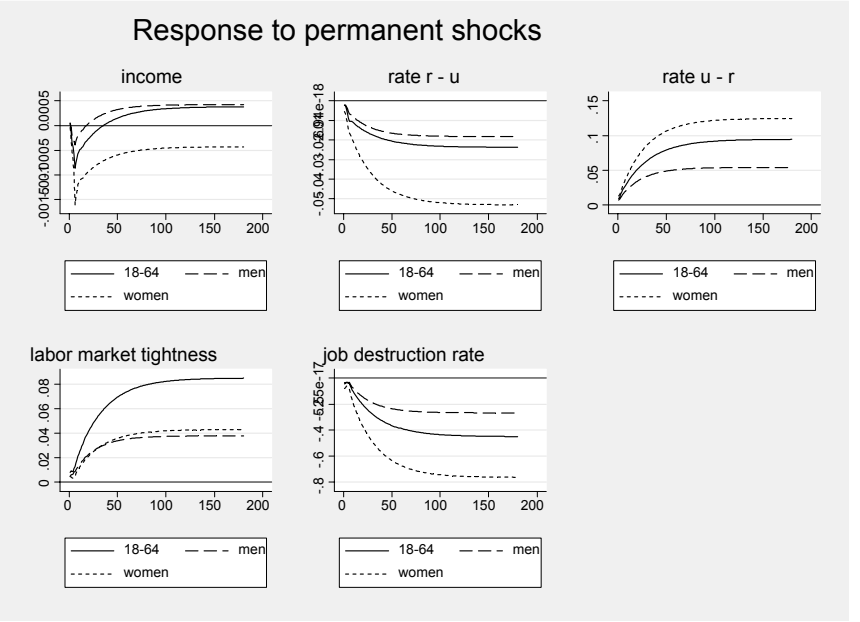

Figure 2: Response to permanent shocks, 18-64 age group

4.2.1 Short run dynamics

Figure 2 shows the graphs of the impulse-response functions for all participants in the 18-64 age range. The impulse-response functions are plots of the cumulative estimated effects, using the moving average form of the estimated models. The plots give a picture of the dynamic behavior in the models. The short run adjustment patterns are shown together with the adjustment time and the long run levels. The long run levels are the same as the long run effects in Table 3. The solid line is the response in the labor-force participation rate for men and women, the dashed line for men, and the dotted line for women.

First we can note that the long run levels are almost achieved after 110 months for all participants, so it takes around nine years to reach the long run. For all participants, most of the adjustment (75%) take place during the first 45 month or four years. Even if the estimated adjustment-coefficients are small, around 0.05, the use of monthly data means that the adjustment time is reasonable. Most of the responses to temporary shocks

take place during the first six months, because the independent variables are included with seven lags. Remember that the results of experiments in which the variables are increased permanently should be interpreted with care, because no stock flow equilibrium is imposed in the estimations. The main point here is to show that the adjustment is reasonable, despite the small adjustment coefficient.

4.2.2 Comparisons with other studies

The result in this paper indicate positive effect on labor-force participation for increased flow rate from open unemployment to labor market programs. Other studies based on Swedish data, for example Essay I in Johansson (2006), Dahlberg and Forslund (1999), Wadensjö (1993) and Johansson and Markowski (1995) have also found positive effects on labor-force participation of programs in Sweden. These studies use data on stocks, the number of participants in labor market programs and in open unemployment as explanatory variables and not the flows between the stocks.

The results from models based on flows, cannot readily be compared with the results from models estimated on stocks. To see this, consider the experiment we are analyzing in this paper: "What happens to labor-force participation if we move 100 persons from open unemployment into labor market programs?".[22] Exactly the same experiment could not be carried out in a model estimated on stocks, because it is unclear which of the underlying flow rates cause the changes in the stocks when we decrease the stock of openly unemployed persons by 100 and increase the stock of program participants by 100. To see this, note that there are nine flows in the theoretical model that affect unemployment and the number of participants in labor market programs, see Figure 1. It is impossible to check which flows generate the changes in the stocks, and therefore it is not possible to compare the estimation results. Likewise, the answer to the question "What happens to labor-force participation if we increase the number of participants in labor market programs?" is straightforward in models estimated on the basis of stocks, but problematic in models estimated on flows, because we do not know which flows lie behind the changes in the stocks.

The theoretical model shows how the stocks and flows are related to

[22]The flow in the experiment has to be converted into a rate. This could be done, for example by using the average size of the stock during the sample period.

each other. The expressions for the stocks are complicated functions of the flow rates[23], see Figure 1, and the other parameters in the theoretical model. Formally, this relationship could, for example, be used to determine how the stocks are affected by the change in one of the flows. To do this, values have to be assigned to the level of the flow rates and the other parameters in the expression for the change in the stocks. The average flow rates during the sample period could be used, together with assumptions about the size of other parameters involved. However, this could not be implemented because all flow rates data are not available[24]. So, even if we are prepared to accept the necessary approximations, it is not possible to calculate the effect implied on stocks using the theoretical model, because data that have to be used in the approximation are not available.

5 Summary and discussion

This study examine the question of whether the flow rate from open unemployment to labor market programs affects the labor-force participation rate. Models are estimated for participants in the 18-64 age range, and with separate models for men and women.[25] In general, the adjustment time is reasonable, it takes around nine years to reach the long run level, and most of the adjustment takes place within the first three years. Almost all long run effects have the expected signs.

The long run effect of income is positive, as expected, for all participants. The estimated long run effects of the flow rates to labor market programs from open unemployment are positive, as expected, and the effects of the flow rates from programs to open unemployment are negative, as expected. The estimated long run effect of teta, labor market tightness is positive, as expected, for all participants. The point estimates of the job destruction rate are negative, as expected, but imprecisely estimated. One reason could be that the job destruction rate is an imperfect measure

[23]Empirically, the number of flow rates is eleven, because in and outflow from employment and outflow from programs could take place.

[24]Data are missing on the two flows between the non-participation state and employment, and on the four flows from employment or non-participation to unemployment or program participation.

[25]Estimation results for participants in the 18-24, 25-39, 40-54, 55-64, and 25-54 age groups are found in Appendix C.

of negative employment shocks.

In general, the estimated effects and elasticities are small. But the estimates indicate that the number of persons who may have entered the labor force due to the increased flow rate to programs is not negligible.[26] The dominant reason for variation in the labor-force participation rate during the sample period is the job destruction rate. This effect is imprecisely estimated, however.

A "discouraged worker effect" occurs if labor force participants leave labor force when it is difficult to find a job, and return when it is easy to find work. Empirically, this effect is often estimated as a negative effect on labor-force participation due to increased open unemployment. Here, unemployment has an indirect impact due to labor market tightness - the number of vacant jobs divided by the total number of job-seekers.[27] The estimated positive effect of labor market tightness indicates that the participation rate is pro-cyclical. The negative effect of the discouraged worker effect can be counteracted by labor market programs. If programs are counter-cyclical, they reduce the business cycle variation in the labor force, and could perhaps prevent participants from leaving the labor force. The size of the estimated effect of the flow rate from open unemployment into labor market programs, $[u \rightarrow r]$, is countercyclical, so the expected effect is larger in downturns.

As may be recalled from the discussion in Section 3.3, an experiment in which the flow from open unemployment into labor market programs is increased permanently could result in a situation were all job-seekers end up as program participants. For practical purposes, the lack of steady-state restrictions in the policy experiment, which is considered here, involving changing the flow rate from open unemployment into labor market programs, is not problematic. The normal size of a policy change is probably less than one standard deviation, and the long run levels are reached after nine years. Care should be taken if the experiment involves extremely large changes in the flow rates that last for a very long time.

The estimation show that an increased probability of moving openly unemployed persons into labor market programs increases the labor-force

[26]The point estimates indicate that labor force could increase by 18 000 persons, if the flow rate from open unemployment into labor market programs is increased by one standard deviation, (50%).

[27]Both unemployed and participants in labor market programs are included in the total number of job-seekers.

participation rate. The point estimate for the older participants, is lower, but not significantly different from the effect for all participants. The results are robust over different age groups. All ten estimates, (including those presented in Appendix C), are positive, and two are insignificant. Moreover, the estimated effects of increased probability of entering a labor market program are similar for the different age groups. One should probably expect more differences when the different situations for participants in different age-groups are taken into account.[28]

The positive effects indicate that labor market programs could be used to attract more people to participate in the labor force, or alternatively to prevent people from leaving the labor force. It should be noted, that the results cannot be interpreted as a policy recommended to increase labor-force participation. This is so because the estimated effects are only partial, and no costs or indirect effects have been taken into account in the estimation.

As in Essay I in Johansson (2006), the effects on labor supply are probably over-estimated because labor market programs have been used for qualification for new periods of unemployment benefits. And, the effect is measured for the "nominal" labor force and not for the effective labor force because we do not know the search intensity for people who move in and out from labor force.

[28]The only expectation is younger participants, where the adjustment time is shorter, the effect of income is larger, the effect of the flow rates to and from labor market programs smaller, and the effect of labor market tightness smaller, compared to the other age groups.

References

Blanchard, O., and P. Diamond (1992): "The Flow Approach to Labor Markets," *American Economic Review*, 82(2), 354–359.

Burda, M., and C. Wyplosz (1994): "Gross Worker and Job Flows in Europe," *European Economic Review*, 38, 1287–1315.

Calmfors, L., A. Forslund, and M. Hemström (2002): "Does Active Labour Market Policy Works? Lessons from the Swedish Experiences," Institute for labour market policy evaluation, Working Paper 2002:4.

Calmfors, L., and H. Lang (1995): "Macroeconomic Effects of Active Labour Market Programmes in a Union Wage-Setting Model," *The Economic Journal*, 105, 601–619.

Calmfors, L., and P. Skedinger (1995): "Does Active Labour Market Policy Increase Employment? Theoretical Considerations and some Empirical Evidence from Sweden," *Oxford Review of Economic Policy*.

Dahlberg, M., and A. Forslund (1999): "Direct Displacement Effects of Labour Market Programmes: The Case of Sweden," Institute for labour market policy evaluation, Working Paper 1999:7.

Forslund, A., and K. Johansson (2006): "Random and Stock-Flow Models of Labour Market Matching - Swedish Evidence," *Unpublished manuscript*.

Holmlund, B., and J. Lindén (1993): "Job Matching, Temporary Public Employment, and Equilibrium Unemployment," *Journal of Public Economics*, 51, 329–343.

Holtz-Eakin, D., W. Newey, and H. Rosen (1988): "Estimating Vector Autoregressions with Panel Data," *Econometrica*, 56(6), 1371–1395.

Johansson, K. (2006): *Empirical Essays on Labor Force Participation, Matching, and Trade*, Economic Studies 97. Department of Economics, Uppsala University.

Johansson, K., and A. Markowski (1995): "Påverkar Arbetsmarknads-Politik Arbetskraftsdeltagandet?," Konjunkturläget, maj 1995.

Judson, R., and A. Owen (1999): "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists," *Economic Letters*, 65, 9–15.

Murphy, K., and R. Topel (1997): "Unemployment and Nonemployment," *AEA papers and proceedings*, pp. 295–300.

Pissarides, C. (1990): *Equilibrium Unemployment Theory*. Basil Blackwell Ltd.

Wadensjö, E. (1993): "Arbetsmarknadens Effekter På Löner Och Priser," *Politik mot arbetslöshet, SOU 1993:43*.

A Summary statistics and plots of data

Table 6 presents summary statistics for the variables in the estimations for the 18-64 age range. The total number of observations is 38 340, for 284 municipalities, and 135 monthly time periods, between 1991:08-2002:10. The variation within the municipalities, (the deviation of each municipality observation from the mean over time in each municipality), is larger than the variation between municipalities, (the deviation of the mean over time in each municipality from the total mean), for the flow rates between open unemployment and labor market programs, $[u \rightarrow r]$, and $[u \rightarrow r]$, and for labor market tightness, *teta*, implying that the time variation is more important than the variation between municipalities for these variables. The variation between and within are of about the same size for income, *inc*, and the job destruction rate, jdr. The labor-force participation rate, lf, is the only variable for which the "between" variation is larger than the "within" variation, that is the variation between the municipalities is larger than the variation over time.

The variables in the estimations are plotted in Figure 3-8. Box-Whiskers plots of the data, converted into annual frequency, are used to present both the time variation and the variation between the municipalities. The box contains data between the 25th to 75th percentiles, and the line represents the median.

Table 6: Summary statistics of the variables in the estimation, 18-64 age group

Variable		**Mean**	**Sd dev**	**Min**	**Max**
lf	Overall	0.6469417	0.0342102	0.5046371	0.7524384
	Between		0.0298625	0.5515411	0.7113511
	Within		0.0167835	0.5455315	0.7155822
inc	Overall	69.99863	9.06715	54.67853	170.6625
	Between		6.450023	63.27419	123.2307
	Within		6.384028	41.24669	117.4304
$[u \rightarrow r]$	Overall	.0858124	0.0593489	0	1.162162
	Between		0.0215451	0.0455565	0.1687584
	Within		0.0553147	-0.082946	1.12007
$[r \rightarrow u]$	Overall	0.1575314	0.1092936	0	1.391304
	Between		0.0182308	0.1100406	0.2295377
	Within		0.1077678	-0.0720063	1.395341
$teta$	Overall	0.051971	0.0753091	0	1.653846
	Between		0.0336615	0.0117152	0.227007
	Within		0.0673968	-0.1692889	1.518969
jdr	Overall	0.0167328	0.0269813	0	0.4909314
	Between		0.0028044	0.0101771	0.0364135
	Within		0.0268357	-0.0141905	0.4928846

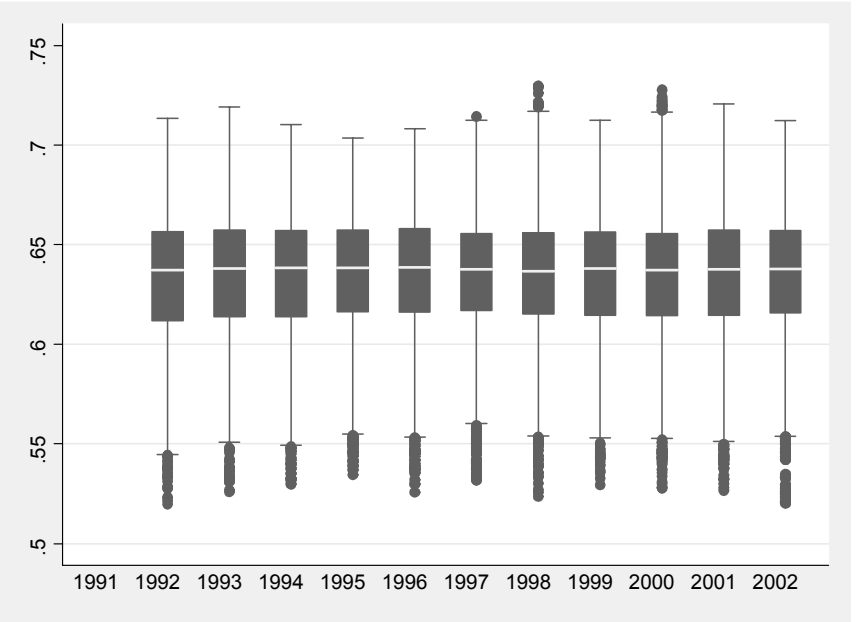

Figure 3: Labor force participation rate

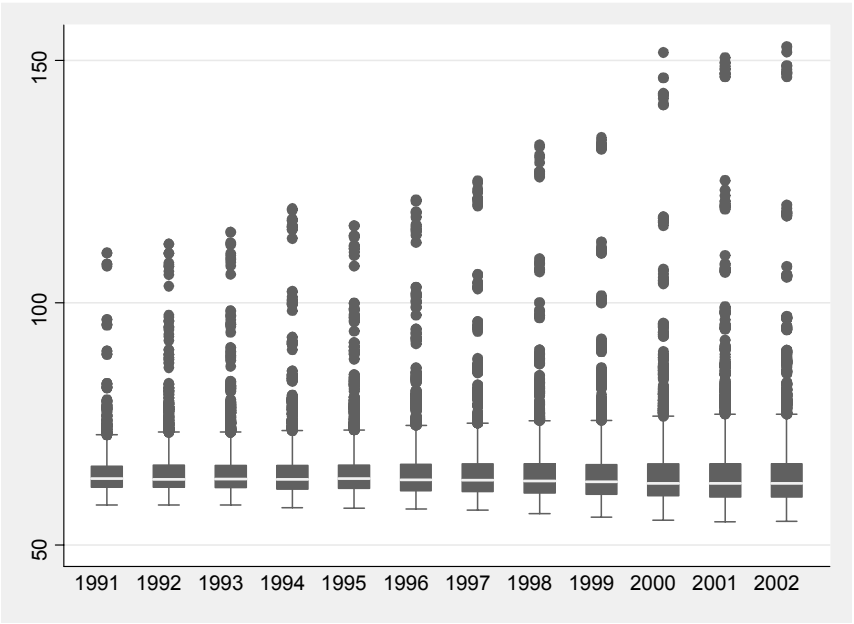

Figure 4: Income

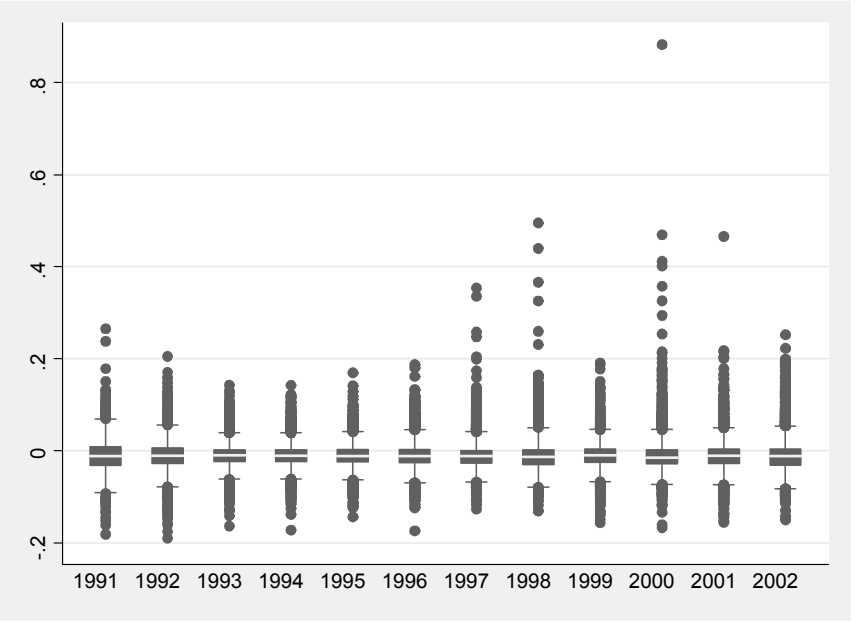

Figure 5: Flow rate open unemployment to labor market programs

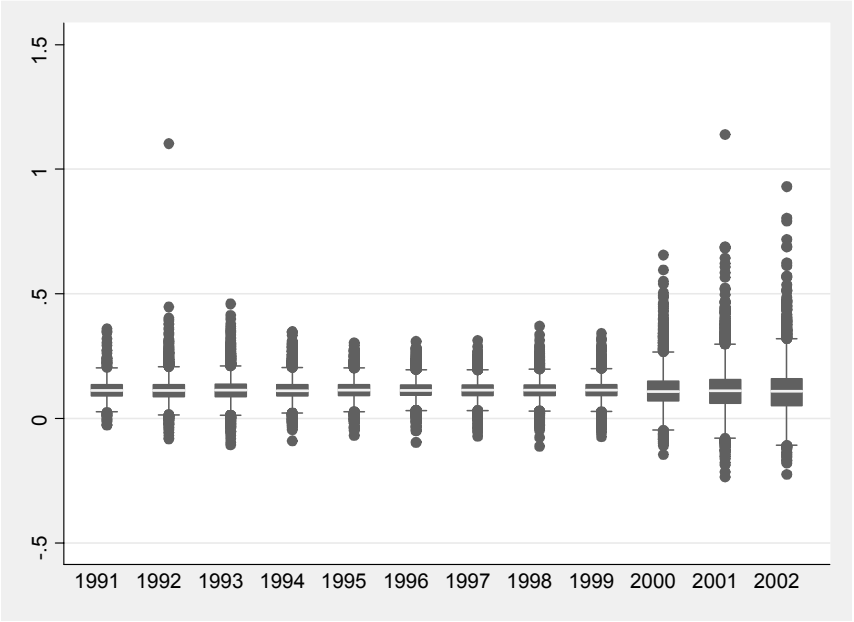

Figure 6: Flow rate labor market program to open unemployment

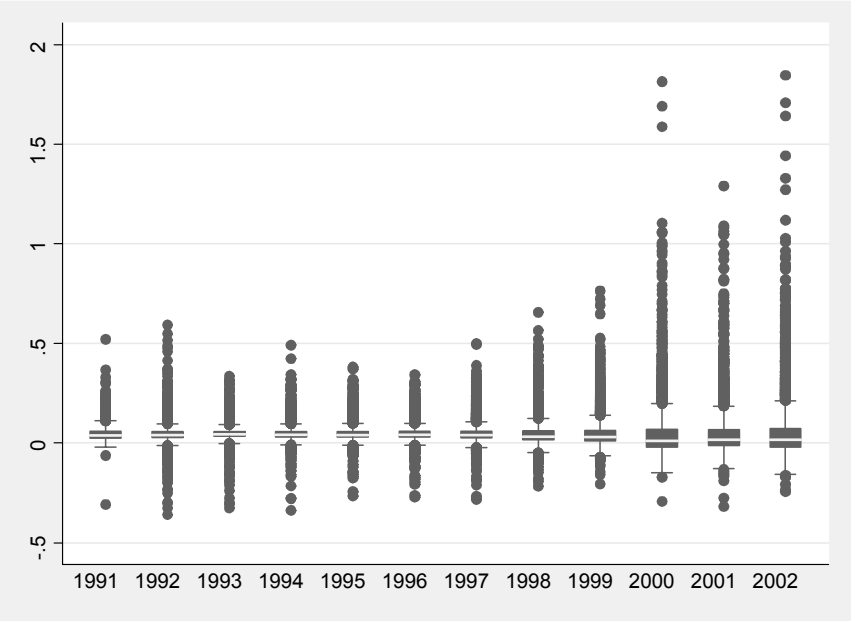

Figure 7: Labor market tightness

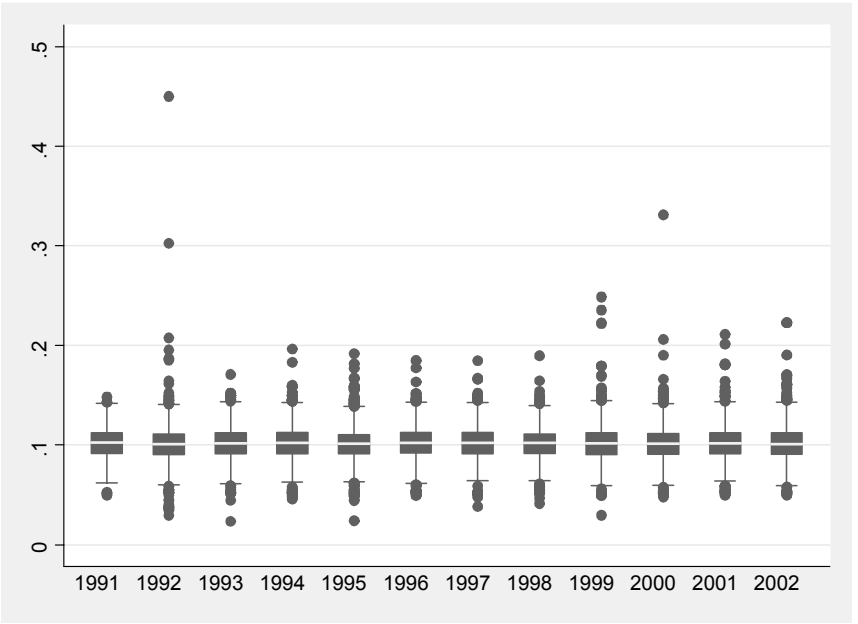

Figure 8: Job destruction rate

B Detailed estimation results

Table 7: Estimated sums of coefficients at lagged levels

Age group	**18-64**		**18-64 men**		**18-64 women**	
Variable	**Coeff**	**p-val**	**Coeff**	**p-val**	**Coeff**	**p-val**
lf	-0.04710	0.000	-0.06274	0.000	-0.05089	0.000
inc	0.00002	0.101	0.00003	0.270	-0.00002	0.467
$[u \rightarrow r]$	0.00446	0.003	0.00340	0.050	0.00634	0.000
$[r \rightarrow u]$	-0.00112	0.186	-0.00114	0.187	-0.00271	0.004
$teta$	0.00401	0.000	0.00236	0.000	0.00218	0.000
jdr	-0.02124	0.265	-0.01667	0.459	-0.03884	0.055
R^2		0.051		0.061		0.054
$AR(1)$		0.992		0.035		0.429
$AR(2)$		0.004		0.153		0.002
$AR(3)$		0.907		0.918		0.270
$AR(4)$		0.052		0.011		0.099
$AR(5)$		0.010		0.017		0.000

C Estimation results for the other age groups

In addition to the results for all labor force participants in the 18-64 age range presented in the main text, models are also estimated for participants in the 18-24, 25-39, 40-54, 55-64, 25-54, and 55-64 age groups. Separate models are estimated for the older men and women.

Table 8: Estimated sums of coefficients at lagged levels

Age group	**18-24**		**25-39**	
Variable	**Coeff**	**p-val**	**Coeff**	**p-val**
lf	-0.11062	0.000	-0.06382	0.000
inc	0.00029	0.002	0.00010	0.014
$[u \rightarrow r]$	0.00350	0.084	0.00932	0.000
$[r \rightarrow u]$	0.00600	0.571	-0.00391	0.001
$teta$	0.00106	0.000	0.00266	0.000
jdr	-0.04655	0.388	-0.02958	0.113
$AR(1)$		0.258		0.130
$AR(2)$		0.154		0.000
$AR(3)$		0.557		0.040
$AR(4)$		0.789		0.234
$AR(5)$		0.011		0.255

Tables 8-10 present the results for participants in the 18-24, 25-39, 40-54, 25-54, and 55-64 age groups. Adjustment to the long run level is faster for the youngest participants. The estimated sum of the coefficients for the lagged dependent variable for the youngest participants is 0.90, and 0.95 for the other age groups. The model for the older participants, in the 55-64 age range, has most significant coefficients for the lagged levels of the variables. There are some signs of correlations left in the residuals, particularly for the older participants.

Tables 11-12 present the long run estimated effects for the 18-24, 25-39, 40-54, 25-54, and 55-64 age groups, together with p-values for tests of the hypotheses that the estimated effects are equal to zero and that they are equal to the effects for all participants in the 18-64 age range. The estimated effects of *income* are positive for all age groups, as expected, and significant, except for participants in the 25-54 age group. The effect of *income* for the 45-54 and 25-54 age groups are not significantly different from the effect for the 18-64 age group. For participants between the ages

Table 9: Estimated sums of coefficients for lagged levels

Age group	**40-54**		**25-54**	
Variable	**Coeff**	**p-val**	**Coeff**	**p-val**
lf	-0.05643	0.000	-0.05525	0.000
inc	0.00003	0.066	0.00004	0.118
$[u \rightarrow r]$	0.00360	0.049	0.00812	0.000
$[r \rightarrow u]$	-0.00082	0.283	-0.00319	0.001
$teta$	0.00147	0.000	0.00410	0.000
jdr	-0.01163	0.552	-0.02239	0.182
$AR(1)$		0.124		0.675
$AR(2)$		0.223		0.006
$AR(3)$		0.005		0.910
$AR(4)$		0.858		0.194
$AR(5)$		0.471		0.334

Table 10: Estimated sums of coefficients for lagged levels

Age group	**55-64**		**55-64 men**		**55-64 women**	
Variable	**Coeff**	**p-val**	**Coeff**	**p-val**	**Coeff**	**p-val**
lf	-0.04095	0.000	-0.05541	0.000	-0.04544	0.000
inc	-0.00006	0.045	-0.00010	0.000	-0.00011	0.012
$[u \rightarrow r]$	0.00313	0.076	0.00288	0.240	0.00431	0.013
$[r \rightarrow u]$	-0.00104	0.080	-0.00010	0.897	-0.00082	0.112
$teta$	-0.00027	0.076	-0.00033	0.005	0.00006	0.333
jdr	-0.01141	0.549	-0.01242	0.551	-0.02245	0.313
R^2		0.029		0.036		0.030
$AR(1)$		0.158		0.701		0.214
$AR(2)$		0.008		0.027		0.183
$AR(3)$		0.002		0.000		0.007
$AR(4)$		0.006		0.004		0.058
$AR(5)$		0.018		0.024		0.000

of 18-24 and 25-39, the estimated effects of *income* are greater than in the other age groups, and significantly different from the effect for all participants in the 18-64 age range. The point estimates of *income* are negative and significant for the older participants. The expected effect is positive, and the point estimates are positive for the other age groups,

Table 11: The estimated long run effect for 18-24, 25-39, 40-54, and 25-54 age groups

Variable effect	**Effect 18–24**	**p-val = 0**	**p-val = 18-64**	**Effect 25–39**	**p-val = 0**	**p-val = 18-64**
inc	0.00265	0.002	0.007	0.00159	0.015	0.064
$[u \rightarrow r]$	0.03164	0.085	0.001	0.14609	0.000	0.183
$[r \rightarrow u]$	0.00542	0.572	0.002	-0.06121	0.001	0.043
teta	0.00956	0.000	0.000	0.04164	0.000	0.000
jdr	-0.42084	0.386	0.950	-0.46358	0.113	0.964
effect	**40–54**	**= 0**	**= 18-64**	**25–54**	**= 0**	**= 18-64**
inc	0.00049	0.065	0.699	0.00069	0.117	0.484
$[u \rightarrow r]$	0.06387	0.049	0.340	0.14698	0.000	0.173
$[r \rightarrow u]$	-0.01446	0.284	0.493	-0.05779	0.001	0.058
teta	0.02611	0.000	0.000	0.07416	0.000	0.427
jdr	-0.20606	0.554	0.480	-0.40530	0.182	0.888

except for female participants age range 18-64. Appendix D indicates that low-income earners are over-represented among those who leave the labor force. Moreover, the fraction leaving the labor force in this age-group is non-trivial. This behavior introduces a negative correlation between average income and the labor-force participation rate for older persons, which shows up in the estimation results.

The estimated effects of the flow rate into labor-market programs, $[u \rightarrow r]$, are positive as expected and significantly different from zero. The effects of inflow rates, $[u \rightarrow r]$, are lower for the younger participants of age 18-24, compared to the other age groups, and significantly different compared to all participants of age 18-64. The largest point estimates are found for participants in the 25-39 and 25-54 age groups. The estimated effects of flow rates from labor market programs into open unemployment, $[r \rightarrow u]$, are negative as expected in all age groups, except for the younger participants of the 16-24 age group. The effect is not significant for participants between the 16-24 and 40-54 age groups. The effects for participants who are 25-39 and 25-54 years old are more negative and significantly different from the effects for all participants in the 18-64 age range. The effects from inflow are also larger for these age groups, indicating that they are most sensitive to changes in the flow rates in and out of labor-

Table 12: The estimated long run effect for the 55-64 age groups

Variable effect	**Effect 55-64**	**p-val = 0**	**p-val = 18-64**	**p-val**	**p-val**
inc	-0.00137	0.045	0.010		
$[u \rightarrow r]$	0.07641	0.076	0.671		
$[r \rightarrow u]$	-0.02548	0.080	0.888		
teta	-0.00646	0.076	0.000		
jdr	-0.27857	0.549	0.708		
men	**55-64m**	**= 0**	**= 18-64**	**= 55-64**	**= women**
inc	-0.00182	0.000	0.000	0.340	0.262
$[u \rightarrow r]$	0.05203	0.240	0.334	0.584	0.332
$[r \rightarrow u]$	-0.00174	0.888	0.102	0.077	0.225
teta	-0.00587	0.005	0.000	0.777	0.029
jdr	-0.22419	0.549	0.549	0.886	0.471
women	**55-64w**	**= 0**	**= 18-64**	**= 55-64**	**= men**
inc	-0.00235	0.012	0.003	0.292	0.572
$[u \rightarrow r]$	0.09489	0.013	1.000	0.632	0.264
$[r \rightarrow u]$	-0.01804	0.112	0.617	0.512	0.150
teta	0.00130	0.332	0.000	0.000	0.000
jdr	-0.49412	0.313	0.920	0.663	0.584

market programs. For the older participants, the estimated effects of the flow rates to and from labor market programs, $[u \rightarrow r]$ and $[r \rightarrow u]$, have the expected positive and negative signs, respectively, and they are not significantly different from the estimated effects for all participants.

The estimated effects of *teta*, labor market tightness are positive, as expected, and significantly different from zero. The estimated effects of *teta* are, except for the 25-54 age group, significantly different from the effects for all participants in the 18-64 age range. Labor-market tightness is measured as the total number of vacancies divided by the number of job-searchers in each age group, so the estimated coefficient measures the effect of competition for the vacant jobs within the same age group. For the older participants, the estimated effects of *teta* are significantly negative for men, and for men and women together. The point estimate for women is positive as expected, but not significant. A negative effect of labor market tightness, *teta*, implies that more people will leave labor force

when it is easy to find a job. Factors underlying this estimation results are discussed in Appendix D. It turns out that it is the same factor as for the effect of income - that older participants tend to leave labor force to a larger extend than other participants.

The effects of the job destruction rate, jdr, are negative as expected. These effects are not significantly different from zero or from the effect for all participants in the 18-64 age range. As discussed in Section 4.2, the job destruction rate is an imperfect measure of negative employment shocks, which could be a reason for the imprecise estimates. For the older participants the estimated effects of the job destruction rate, jdr, are negative and not significantly different from zero. They are not significantly different from the estimated effect on all participants in the 18-64 age range.

Table 13: P-values for joint tests of long-run effects of programs and all long-run effects

	Joint test $[u \to r]$ **and** $[r \to u]$		**Joint test All long run effects**	
Age groups	**eff = 0**	**eff = 18-64**	**eff=0**	**eff=18-64**
18-24	0.198	0.000	0.000	0.000
25-39	0.000	0.090	0.000	0.000
40-54	0.114	0.563	0.000	0.000
25-54	0.000	0.116	0.000	0.413
55-64	0.078	0.891	0.003	0.000
55-64 m	0.497	0.220	0.000	0.000
55-64 w	0.023	0.878	0.011	0.000

Table 13 presents the p-values from Wald tests of the hypothesis that the flow rates from unemployment to programs, $[u \to r]$ and from programs to unemployment, $[u \to r]$ are jointly significant. Tests of the joint significance of the long run effect of all variables are also presented, together with the results of tests of the hypothesis that the joint effects differ from the effects for all participants in the 18-64 age range.

The joint effect of the flow rates into and out of labor market programs, $[u \to r]$, $[r - u]$, are significant for the groups in the 25-39 and 25-54 age range, and insignificant for the 18-24 and 40-54 age groups. The effects for the 40-54 and 25-54 age groups are not significantly different from

the effect for the 18-64 age range. The long run effects of each variable are jointly significant and significantly different from the effects for all participants, except for participants in the 25-54 age range. For the male older participants, the point estimates are not significantly different from the joint estimates, except for the smaller effect of the outflow rate from programs, $[r \rightarrow u]$. The estimated effects for men and women are not significantly different from each other except for the effect of *teta*, labor market tightness, as discussed above.

To summarize, in general, the effects for the youngest participants are different from the estimated effects for the other age groups. The adjustment time is shorter, the effect of income larger, with smaller effects of flow rates to and from labor market programs, and the effect of labor market tightness is smaller. The labor-force participation decision is probably very different for participants in the different age-groups. Among the younger participants in the 18-24 age group, the main alternative to labor-force participation is probably to be a student. Other important factors, specifically for the 18-24 and 25-39 age-groups, are establishing a family and childbirth. Still, the overall impression is that the estimation results are much more similar than might be expected when the different situations for participants in different age-groups are taken into account.

The main reason underlying the strange effects of income and labor market tightness for older participants is that they tend to leave labor force to a larger extent than participants in the other age-groups. This is true both for employed and unemployed, see the discussion in Appendix D.

D Discussion of the estimation results for the older participants

Some of the results for the older participants in the 55-64 age group, are odd - the parameters are precisely estimated, but the sign is the opposite of the expected. Adverse effects are found for income and labor market tightness. Tightness is the number of vacancies divided by the number of searchers, a measure that should indicate whether it is difficult or easy to find a job. Both variables are expected to have positive effects on the labor-force participation rate, but the estimated effects are often negative and significant. This section attempts to discuss possible explanations

of the adverse estimation results for older participants. The aim is to informally look for indications of what factors that might underlie the estimation results.

D.1 Income

The estimated effects of income are negative and significant for all older participants, and for men and women separately. A large positive income effect relative to negative substitution effects as in an ordinary labor supply model cannot not explain the results, because here, labor-force participation is measured in terms of the number of persons and not in hours. Income is measured as average income for employed persons, and the participation rate is the number of employed, unemployed and participants in programs, divided by the number of older persons in the population. A spurious negative correlation could be introduced if average income increases due to reduced employment, and if those leaving employment also leave the labor force. The effect will be more pronounced if people who leave labor force have a smaller income than average. To be a candidate for an explanation, the effects have to be more important for the older participants than for participants in other age groups.

Table 14: Share of individuals employed for at least one month in year, t=0 and not employed for at least one month year, t=1

year	**1990-91**	**1991-92**	**1995-96**
age group	%	%	%
40-54	6.3	6.9	4.9
55-64	11.8	14.2	8.1

Table 15: Share of the individuals above registered as job-seekers in year t=0 or t=1

year	**1990-91**	**1991-92**	**1995-96**
age group	%	%	%
40-54	27.8	40.9	48.0
55-64	12.5	17.4	25.3

Individuals who are 40-54 and 55-64 years old, and employed for at least one month in $t = 0$, in the years 1990, 1991 or 1995 and not employed

at least one month in $t = 1$, 1991, 1992 or 1996, respectively, were picked out from the new database, described in Section 3.1. The average income in these groups is lower than the average income for all employed persons in the same age group.[29] The share of employed persons in these groups is larger among the older participants - between 8-14 percent, compared with 5-7 percent among participants in the 40-54 age group, see Table 10. The results indicate that the income for those who leave employment is lower than average and older participants tend to leave employment more frequently than the 40-54 age group.

If individuals in these groups (who leave employment) also leave the labor force, they should not be registered as unemployed or as participants in a labor market program in the Händel-register. The proportion of individuals in the investigated groups that are registered in Händel in any of the two years, is 13 to 25 percent for the older category, and 30 to 48 percent for the middle aged, see Table 15. In other word, the share of individuals in the investigated groups that have probably left labor force is around 75 to 87 percent for the older category, and 52 to 70 percent for the middle aged.

Data indicates that older participants who leave employment tend to leave the labor force to a larger extent than middle-aged participants. Employed persons with below-average income that tend to leave employment. The fact that older participants leave labor force to a larger extent than the middle aged could be behind the negative correlations between income and the labor-force participation rate.

D.2 Labor market tightness

The estimated effects of *teta,* labor market tightness, are significantly negative for men, and for men and women in combination. The point estimate for women is positive, as expected, but insignificant. A negative effect of labor market tightness implies that more people will leave the labor force when it is easy to find a job. Labor market tightness is measured as the number of vacancies divided by the number of job-searchers in the age

[29]The average income in 1990, 1991 or 1995 for older persons in this group was 10 998, 12 223, and 15 659. On average, the income for older employed was in 1990, 1991 or 1995 14 193, 15 213, and 18 205. The average income for 40-54 years old was 11 178, 12 547, and 15430, for the group who have left employment for at least one month in $t + 1$. For those employed in $t = 0$, the average income was 14 984, 16 076, and 18 805, respectively.

group. The estimated coefficient measures the effect of competition for the vacant jobs that take place within the same age group.

One explanation for the contra-intuitive results could be the same mechanism as for the effect of income. If older people who are registered as job-searchers in Händel leave the labor force, labor market tightness will increase and the labor-force participation rate will decrease, introducing a negative correlation between tightness and the labor-force participation rate.

Other candidates for explanations are probably not so important. Increased mortality reduces the number of searchers, and increases labor market tightness. The way in which the participation rate is affected depends on the relative effect of mortality on participants and nonparticipants in the labor force. The use of labor market programs whose purpose is to make it easier for older people to leave the labor force, might be an explanation of the pattern observed in data, especially if they are used when it is relatively easy to find a job. Two such programs[30] were introduced around 1998, after a period of extremely high unemployment rates. The effect of these programs during the sample period is, however, offset by the introduction of programs whose purpose is the opposite, to increase the possibility of getting a job among older job-searchers.[31] Programs directed at older participant are therefore not one of the main factors behind the adverse estimation results.

Table 16: Share of persons registered as job-seekers in t=0, and not in t=1, who have a statement of income in t=0 or t=1

year	**1992**	**1993**	**1995**	**1996**	**1998**	**1999**	**average**	
age group	$t=0$	$t=1$	$t=0$	$t=1$	$t=0$	$t=1$	$t=0$	$t=1$
45-54	89	79	79	74	77	75	82	76
55-64	85	61	70	54	69	55	75	57

Job-seekers in the 55-64 and 40-54 age groups, and registered in Händel

[30] "Generationsväxlingen" where employed persons that are older than 63 years old, can if the employer permits it, retire. The vacant job should be replaced by a long-term unemployed in the 20-34 age group. Applications were allowed between January and August 1998. "Tillfällig avgångsersättning", between 1997-07 to 1998-12, permits older unemployed persons registered at an employment office to leave labor force.

[31] Public temporary work (OTA, Offentliga tillfälliga arbeten) between 1997-2001 and Special recruitment incentive (Särskilt anställningsstöd) from November 2000.

Table 17: Share of persons registered as job-seekers in t=0, and not in t=1, who are registered as employed for at least one month in t=0 or t=1

year	**1992**	**1993**	**1995**	**1996**	**1998**	**1999**	**average**	
age group	$t=0$	$t=1$	$t=0$	$t=1$	$t=0$	$t=1$	$t=0$	$t=1$
45-54	57	48	47	48	48	52	51	49
55-64	51	26	34	25	39	28	41	26

during 1992, 1995 or 1998, were picked out from Händel for furher investigation if older job-seekers leave labor force to a greater extent than other job-seekers. If they do, this could result in a negative correlation between tightness and the labor-force participation rate. The job-seekers should be registered in Händel during 1992, 1995 or 1998, $t = 0$, and they are not allowed to be registered in Händel the following year, 1993, 1996 or 1999, $t = 0$. On average, 63% of the older, and 49% of the middle-aged job-seekers in $t = 0$ are not registered as job-seekers in $t = 1$.

If those who leave Händel could not be found in the employment register, it is an indication that they have left labor force. On average, 75% of the older and 82% of the middle-aged job seekers have a statement of income in the same year as they are recorded as job-seekers. The year after, on average 57% of the older and 76% of the middle-aged job seekers have a statement of income, see Table 12. The share of job-seekers with no statement of income in either of the two years is 34% for the older group and 21% for persons in the 40-54 age group. If, instead, we look at employment, the share of job-seekers registered as employed for at least one month is larger for the 40-54 age group compared to the 55-64 age group. The proportion decline between the first and the second year for the older age group, and is approximately the same for job-seekers in the 40-54 age group, indicating that older participants tend to leave labor force to a greater extent than the middle-aged.

To summarize, older job-seekers seem to leave labor force to a greater extent than job-seekers that are 40-54 years old. This could explain the negative correlation between tightness and labor-force participation rate in the estimation.

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