THE DANISH
NATIONAL INSTITUTE
OF SOCIAL RESEARCH

MARGINALISATION PROCESSES IN THE DANISH LABOUR MARKET

Ph.D. Thesis

LARS PICO GEERDSEN

03:24 LARS PICO GEERDSEN MARGINALISATION PROCESSES IN THE DANISH LABOUR MARKET

Preface

This collection of papers constitutes my Ph.D. thesis. It is such a joy to have finally finished it and handed it in. I began my Ph.D. studies 1 October 2000 at the Department of Economics, University of Copenhagen. My scholarship was financed partly by the National Institute of Social Research and partly by the Centre for Urban Policy, Urban Development and Welfare. During my studies I was located at the National Institute of Social Research apart from September 2000 to April 2001 where I visited University College London.

There are so many people I owe debts to for having helped me complete this thesis. I would like to thank my supervisor professor Martin Browning, Department of Economics, University of Copenhagen for very competent supervision. I would also like to thank professor Thomas Crossley, Department of Economics, McMaster University who has contributed with numerous ideas and inspiring discussions during the last year of my studies. My supervisor at the Danish National Institute of Social Research Niels Henning Bjørn has also been a great help and inspiration. I thank him for helping my to stay focused and believing that I could make it. Furthermore, there are numerous people, too many to mention, who have contributed to the thesis at different presentations at University of Copenhagen, Aarhus Business School as well as at different conferences. I thank them all.

Finally, I would like to thank my wife Maria Lukowski Geerdsen and my two sons Johan-Emil and Pelle. Without their patience and support it would not have possible to complete the Ph.D. thesis.

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1 Introduction

Since the beginning of the 1990's there has been an increasing focus on differences in labour market attachment in Denmark. This interest has been driven by several findings which indicate that large groups on the labour market are left with only a minor chance of finding employment, cf. among others Ingerslev and Pedersen (1996), Ministry of Finance (1996, 1997). The questions I seek to answer in this Ph.D. thesis all relate to these inequalities in labour market attachment.

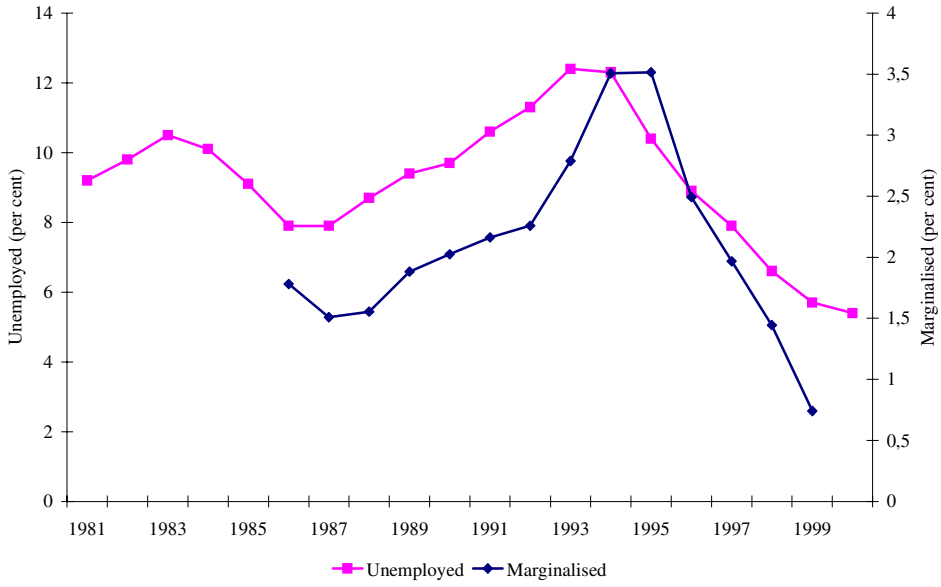
In the following I give a brief description of the distribution of labour market attachment in Denmark. After that I describe the structure of the Danish labour market and the unemployment insurance (UI) system in particular. Finally, I present the research topics of this Ph.D. thesis as well as the results.

2 The distribution of labour market attachment in Denmark

Since 1990, several studies have analysed the labour market attachment of individuals in Denmark, cf. references above. A common approach in most of these studies has been to focus on individuals with long periods of unemployment. The arguments for this method are twofold. First of all, the probability of long term unemployment will increase if a person only has limited access to good job offers relative to earnings as unemployed. Secondly, unemployment may have a deteriorating effect on individuals' skills and contact to the labour market which again may result in longer unemployment spells.

Most Danish empirical studies of labour market attachment use a state definition called "marginalised". The exact definition varies slightly but in most studies a person is defined as marginalised if he has been unemployed for more than 70 per cent during the last 3 years. In Figure 1 I have estimated the number of marginalised individuals in Denmark according to the defin-

Figure 1: Unemployed and marginalised in per cent of labour force.



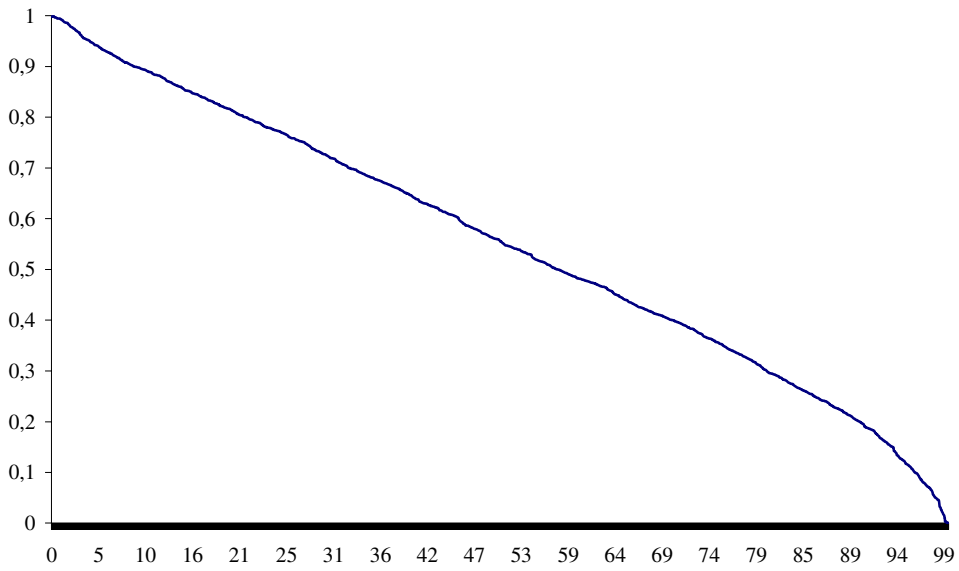
ition presented above.[1] Just before the end of the recession in 1994 there were more than 100.000 marginalised individuals or about 3.5 per cent of the labour force. Still, the Figure shows that the number of marginalised individuals clearly follows the cyclical movements of general unemployment. As a matter of fact, the marginalisation share decreases more rapidly than the general unemployment share from 1995 and onwards. Marginalisation as defined in Danish studies may therefore not indicate differences in labour market attachment in the long run but merely be a result of longer unemployment spells during recessions.

It is possible to examine whether the high marginalisation numbers during the beginning of the 1990's are in part a result of larger differences in labour market attachment over the life cycle. One method is to extend the analysed time span as far as data allows.[2] In Figure 2 I present the distribution of

[1] Here marginalisation is defined as everyone receiving either UI benefits or social benefits for at least 70 per cent of the last 3 years.

[2] Of course no further than a standard life cycle.

Figure 2: The distribution of employment over a 10 year period (1989-98) for individuals who were between 25 and 45 years of age in 1989 (my own estimations).



employment over a 10 year period.[3] The labour force seems to contain a large group with very strong labour market attachment (25 per cent of the population is employed more than 75 per cent of the 10 year period) and another equally large group with very limited labour market attachment (about 25 per cent of the population has employment less than 30 per cent of the 10 year period). This result remains when the panel window is extended to 15 years, cf. Ministry of Finance (1997). So, even though the non employment level is heavily influenced by cyclical changes of the economy (as indicated by Figure 1), the image remains that not all individuals participate equally on the labour market. Indeed, some individuals appear to be working almost their entire adult life and some appear to be almost not working at all.

[3] I have only used people who at the beginning of the panel were between 25 and 45 years of age.

3 The structure of the Danish labour market

The structure of the Danish labour market probably plays a major role in the employment inequalities. The Danish labour market is in its structure different from almost any other labour market. Firstly, rules regarding hiring and firing are very lax. The minimum notification period for firing is by law only two days. For individuals with higher education, the notification is often by contract 3 months at most. Secondly, Denmark has a very narrow wage distribution with a high minimum wage relative to most other (OECD) countries. Thirdly, Denmark has a very extensive voluntary unemployment insurance (UI) system which covers more than 82 per cent of the labour force. The replacement rate does not differ substantially from what is found in other countries but the duration of benefits is very long compared to most countries (between 4 and 7 years), cf. Geerdsen (2002).

During the 1990's the political focus has primarily been on the UI system. The UI system underwent large changes in 1994 as a reaction to the strong evidence of low labour market attachment among an increasing part of the labour force, cf. Figure 1. Before 1994, individuals who were eligible for UI could continue to receive benefits for 9 years as long as they followed certain criteria.[4] After 1994 the benefits period was limited to a finite period (7 years later shortened to 4 years). The focus of the UI system was shifted towards actively improving individuals' employment prospects. Large sums were used in order to offer individuals specific job training or education which could improve their human capital and facilitate their entrance to employment. This new line from 1994 was introduced by dividing the benefits period into two sub-periods. In the first (passive) period individuals can receive benefits without having to participate in labour market programmes. When this runs out,

[4] Indiviuals could receive benefits for $2\frac{1}{2}$ years. After this individuals had to participate in some sort of job training for $\frac{1}{2}$ a year which then made them eligible for another $2\frac{1}{2}$ years of benefits. This could go on as long as up to 9 years.

individuals enter the second (activation) period where they have to participate in labour market programmes in order to receive benefits, cf. Geerdsen (2002). Even though the passive period is of some duration, this new active labour market policy affects a large part of the labour force. This can be seen from the fact that more than 22 per cent of people who were unemployed between 1994 and 1998 at some point were less than 6 months from the activation period and hence less than 6 months away from compulsory participation in programmes.[5]

4 The research topics of this Ph.D. thesis

Now more than 8 years after the introduction of the reformed UI system a lot of questions arise that could form the basis of a Ph.D. thesis. The following 3 questions which I seek to answer in this thesis are all related to the uneven distribution of labour market attachment in Denmark:

Firstly, is it possible to find descriptions of individuals' labour market attachment which can supplement the Danish empirically based marginalisation definition? Even though the marginalisation term as defined in Denmark does give a clear indication of long term unemployment, it is in its construction retrospective and reveals nothing about individuals' attitude to the labour market or reason for the long period of unemployment. An alternative and supplementary approach could be to use survey data where individuals have been interviewed about their attitude to work as well as their search effort.

Secondly, is it possible to find evidence that the compulsory aspect of the activation period actually motivates individuals to leave the UI system? Most research done on the Danish UI system has focused on labour market effect on individuals after they have participated in a labour market programme. Another possible effect of the activation period is the motivation effect on

[5] My own estimations. For a description of data see Geerdsen (2002).

job search which the compulsory aspect of the activation period may have on individuals. The question whether this motivation effect exists in the Danish UI system has not been answered so far.

Finally, several studies have performed estimations of effects which seem similar to the motivation effect of compulsory programme participation as described above. In these studies, however, the motivating event is not a loss of leisure due to compulsory programme participation but instead an income drop due to the prospect of exhausting one's benefits period, cf. among others Meyer (1990), Rogers (1998). Different exclusion restrictions have been applied in order to identify the motivation effect. The question is whether the applied restrictions result in a biased estimate of the motivation effect. A comparative study of the different exclusion restrictions used in these empirical studies has not been done before.

Paper I: Are the marginalised truly marginalised? A Study of Labour Force Attachment in Denmark

In most economic models of the labour market, non employment is described with up to two distinct states: "unemployed" and "out of labour force". The question is whether these two states give an adequate account of the labour market. Jones and Riddell (1998) propose an additional state denoted "marginally attached". The state includes individuals who report that they wish to work but are not presently searching and is as such an alternative to the Danish marginalisation definition. In this paper I use data from the Danish Labour Force Survey 1995-1999 to examine whether there in Denmark exists a group of marginalised individuals according to the definition by Jones and Riddell. The questions used in the Danish survey is not exactly identical to the questions used by Jones and Riddell and it is therefore possible to examine the robustness of the marginalisation definition regarding

the questionnaire design.

First of all, I find that it is important for the definition of the marginally attached state that the questions used to pick out individuals are very precise and identical from study to study. Secondly, I do find a group of marginally attached individuals in Denmark with a lower employment probability than unemployed individuals but with a higher employment probability than individuals outside the labour market. I decompose the marginally attached state according to reason for marginalisation. I find that the state contains very heterogenous subgroups. Also, I compare the marginally attached state as defined by Jones and Riddell with the Danish marginalisation definition. It does not appear that the marginally attached individuals as defined by Jones and Riddell have a long history of unemployment. Rather a large of group of them appear to be on different permanent pension schemes (early retirement pension, disability pension etc.) which in Denmark contains individuals who conventionally are regarded as outside the labour force.

Paper II: Does labour market training motivate job search? A study of incentive effects of compulsory ALMP in the Danish UI system

Since 1993 Denmark has shown a remarkable fall in unemployment going from more than 10 per cent in 1993 to about 4 per cent in 2000. In this paper I argue that the improved performance by the Danish labour market may in part be due to the Danish unemployment insurance system (UI) which was reformed in 1994. The UI system consists of two finite periods, a passive period and an activation period. In the passive period individuals are generally not met with demands. When they enter the activation period, however, they have to participate in labour market training in order to receive benefits. The purpose of the activation period is twofold: 1) participation in a labour market programme may improve individuals' qualifications and reintroduce them

to the labour market, 2) the compulsory aspect may work as a motivating factor in the same way as a benefits reduction for individuals who are not interested in participating in a labour market programme .

In this paper I estimate the motivation effect of compulsory labour market programmes using legislative changes in duration of the passive period. I find that the activation period does result in a significant motivation effect which in size is comparable to effects found in studies of benefits systems where individuals are at risk of loosing their rights to benefits all together.

Paper III: The Identification of Incentive Effects of benefit exhaustion in Unemployment Insurance Systems

According to economic search theory a UI system with finite benefits duration may result in an increase in search for employment and/or reduction in reservation wage just prior to benefits exhaustion, cf. Mortensen (1977, 1986). This effect, which I will call the motivation effect, is created by the prospect of an income drop when benefits run out. The central econometric problem in empirical studies of this effect is how to identify the motivation effect. The variable describing time to benefits exhaustion will often be perfectly colinear with the unemployment duration variable. This colinearity makes it difficult to disentangle the motivation effect from any changes in individuals' employment chances which may occur as the unemployment spell progresses. Different assumptions have been used in order to circumvent this identification problem. Many of which can be questioned.

In this paper I go through the different exclusions restrictions used in the literature in order to identify the motivation effect. Using Danish labour market data from the period 1994-1998 I apply the different exclusion restrictions in order to compare their impact on the estimations of the motivation effect. The data I use makes it possible to identify the motivation effect with

very weak exclusion restrictions. It is therefore possible directly to compare the effect of the more strict exclusion restrictions used in the literature with estimation results using the weaker restrictions.

From the estimations I find that some of the most common exclusion restrictions used in almost all studies of motivation effects actually seem to bias the estimation results towards zero, thereby risking to dismiss motivation effects where they might exist.

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Are the Marginally Attached Truly Marginally Attached?
A Study of Labour Force Attachment in Denmark

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Abstract

In most economic models of the labour market non employment is described with at most two distinct states: "unemployed" and "out of labour force". The question is whether these two states give an adequate account of the labour market. Jones and Riddell (1998) propose an additional state denoted "marginally attached". The state includes individuals who report that they wish to work but are not presently searching and is as such an alternative to the Danish marginally attached definition. In this paper I use data from the Danish Labour Force Survey 1995-1999 to examine whether there in Denmark exists a group of marginally attached individuals according to the definition by Jones and Riddell. The questions used in the Danish survey is not exactly identical to the questions used by Jones and Riddell and it is therefore possible to examine the robustness of the marginally attached definition regarding the questionnaire design.

First of all, I find that it is important for the definition of the marginally attached state that the questions used to pick out individuals are very precise and identical from study to study. Secondly, I do find a group of marginally attached individuals in Denmark with a lower employment probability than unemployed individuals but higher employment probability than individuals outside the labour market. I decompose the marginally attached state according to reason for marginalisation. I find that the state contains very heterogenous subgroups. Also, I compare the marginally attached state as defined by Jones and Riddell with the Danish marginalisation definition. It does not appear that the marginally attached individuals as defined by Jones and Riddell have a long history of unemployment. Rather a large of group of them appear to be on different permanent pension schemes (early retirement pension, disability pension etc.) which in Denmark contains individuals who conventionally are regarded as outside the labour force.

1 Introduction

In most economic models of the labour market it is assumed that individuals' labour market behaviour can be described with up to 3 different labour market states: employment, unemployment and out of labour force. One example is search theory where unemployment is often modelled at an interior point with regard to the optimal amount of time spent on job search and out of labour force is likewise modelled as a corner solution resulting in no search, cf. Devine and Kiefer (1991). A thorough understanding of the labour market may, however, require a more diversified modelling of the labour market than just three states. This point has been brought forward by, among others, Atkinson and Micklewright (1991). In their survey article on unemployment compensation and labour market transitions they write:

> "A central theme of the paper is that it is necessary to distinguish several different labor market states, and not to consider only employment and unemployment." (pp. 1680)

Jones & Riddell (1995) propose a supplemental state containing individuals who wish to work but who are not searching for a job. This state is by Jones and Riddell called "marginally attached" in the meaning that these individuals are at "the margin of the labour force". This definition covers a broad selection of individuals who report different reasons for their present state. Individuals in this state will in most countries be counted as outside the labour force due to their lacking search effort. The fact that these individuals themselves report that they wish to find employment may indicate, however, that some of these individuals have not left the labour force altogether. As pointed out by Jones and Riddell (1998), if "waiting" for employment, as done by marginally attached individuals, proves to be productive with regard to employment, then the state may be important for analysis of job search.

This may lead to a different understanding of, for instance, unemployment periods which are divided by periods of non search.

Research in the different labour market states is, when compared to the relative interest it holds for most people, surprisingly limited. Since the beginning of the 1980s there has been some debate about whether the different proposed labour market states are really different when it comes to individuals' prospects of finding employment. Clark and Summers (1982) as well as Flinn and Heckman (1983) discuss whether it makes sense to divide non employed young people into the two states: unemployed and out of labour force. Flinn and Heckman propose a test for examining whether individuals display the identical movement between states. Jones and Riddell (1998) use this test to examine whether the marginalisation definition catches individuals who display labour market behaviour different from unemployed individuals as well as individuals out of labour force.

Using data from the Danish LFS for the period 1995 to 1999 I will examine whether a marginally attached group in Denmark with distinct labour market behaviour exists. I will use the data to construct four states: employed, unemployment, marginally attached and out of labour force. I will compare the transition probability between the different states in order to test whether marginally attached individuals display different labour market behaviour than individuals in other states. In my analysis of marginally attached individuals, I will decompose the group according to reasons for non search and examine the labour market behaviour of the different groups. The LFS as conducted in Denmark is a rolling panel which makes it possible to follow individuals' labour market behaviour both three months after the first interview and one year after second interview. It is therefore possible to compare both short term as well as long term labour market behaviour for the different labour market states. I will use the structure of the data to look for any

possible duration dependence, for instance indications on whether marginalisation is an absorbing state. Finally I will make some tentative comparisons of the marginalisation definition and the Danish labour market definitions. Since the mid 1990's marginalisation in Denmark has been defined as a form of long term unemployment (more than 60-80 per cent unemployment within a 3-year period). By comparing the Danish definitions with the international and preference based marginalisation definition it is possible to get a first view on whether marginalisation as defined by Jones and Riddell is a product of long periods of non employment.

In section 2 I go through the literature on the marginalisation definition. In section 3 I describe the statistical setup which I will use for the analysis of the labour market state. In section 4 I present the data which is used in the analysis and I give a brief description of the data values in section 5. In section 6 I present estimates of the average transition probabilities betweeen the labour market states and in section 7 I present estimation results and test values of the hypothesis that the marginally attached state is a distinct state. In section 8 I compare the marginally attached state with the Danish labour market definitions in order to derive some information about the labour market background for the individuals who end up in the marginally attached state. Finally I conclude in section 9.

2 Literature

The definition of marginal attachment which will be applied in this paper dates back to Jones and Riddell (1995). In an article on regional aspects of labour market flows in Canada they introduce this intermediate state on the labour market defined as individuals who wish to find employment but are not presently searching for a job. For the analysis they apply a special longitudinal data set, which is created by matching the Canadian cross-sectional Survey

of Job Opportunities (SJO), which measures search methods and reasons for non search, with the subsequent month of the Canadian Labour Force Survey (LFS). The matching utilises the fact that the LFS is constructed as a rolling panel where 1/6 of the interviewed individuals are replaced each month, which makes it possible to follow individuals for up to 6 months. Since the SJO, which supplies information about the marginally attached state, is only conducted once a year it is not possible to test marginally attached as both a departure and arrival state. For the analysis they use observations for the years 1980, 1995 and 1992. Jones and Riddell find that marginally attached people constitute between 6.6 per cent and 9.3 per cent of the non employed in Canada. Out of the marginally attached group approximately 35 per cent reported that they were waiting for a job and approximately 30 per cent reported discouragement as reason for not searching.

Jones and Riddell continue the study of the marginally attached state in their subsequent work. In an article from 1998 they extend the analysis of the state by comparing and testing the labour market behaviour of marginally attached individuals against individuals in other labour market states. In this article the focus is on exploration of the data as well as test results, where as the definition and testing method are carefully described in Jones and Riddell (1999). The test which they apply is inspired by Flinn and Heckman (1983). In response to an article by Clark and Summers (1982) on youth non employment, Flinn and Heckman propose that especially young people may have identical probability of finding employment independently of whether they search or not. In order to examine the hypothesis Flinn and Heckman develop a test which compares different labour market states on transition probabilities between the states. The test is further described in section 3. Just as in the 1995 article, Jones and Riddell use data from the Canadian LFS merged with the SJO. The data set has been extended to all years between

1979 and 1992. Due to the limited number of observations on marginalisation (one per year) Jones and Riddell do not test for duration dependency. The movement between different states is in other words assumed to follow a 4 state Markov model[1]. They perform the test of the marginally attached state for different demographic and geographic subgroups and test the state against both unemployment and out of labour force. For both youth and adults, men and women, the hypothesis that the marginally attached state can be merged with other states is rejected (with few exeptions for specific years). When the data set is divided out on regions, the rejection of the hypothesis that marginally attached is the same as unemployment weakens. For between 7 and 10 of the 13 years (dependent on region) the hypothesis is not rejected. The other hypothesis continues to be rejected. Jones and Riddell also use answers from the SJO to divide the marginalisation group into two subgroups, "waiting" and "non waiting". Waiting means that individuals give reasons for not searching which indicate that they are waiting for employment. Non waiting is the residual group of the marginally attached. Jones and Riddell generally find that both the waiting and non-waiting subgroup are distinct states compared to both unemployment and out of labour force. For the different regions they find that especially the hypothesis that the waiting subgroup is identical to unemployment is not rejected for 3 to 6 of the 13 observed years (varying over regions). The non waiting groups rejects strongly for almost all years.

The test has also been applied to US data by Jones and Riddell (2001). They use a set of panels constructed from the new Current Population Survey. The panel consists of four consecutive monthly observations of labour market status which makes it possible to analyse duration dependency for at least four months. The findings of Jones and Riddell indicate that a breakdown

[1] With the states, employed, unemployed, marginalised, out of labour force.

of the non-employed into the three states: unemployed, marginally attached, and out of labour force is a useful approach which is supported by data. Estimations of duration models indicate that neither seasonality nor duration dependency confound this evidence. Furthermore, estimation of a Markov model which the panel structure into account indicates that marginalisation may be an absorbing state[2].

3 Statistical framework

A central aspect of a labour market state is how individuals move to and from the state. If for instance unemployed individuals display employment behaviour similar to people outside the labour force, then dividing people into the two states may in some cases be irrelevant. Flinn and Heckman (1983) use this fact and propose that labour market states can be compared and tested on individuals' movement between states. In other words, in order for a labour market state to be regarded as distinct, individuals in the state have to display movement into other states which differs significantly from individuals' movements from other labour market states.

If we assume that there is no states dependency the movement between states can be described by a discreet Markov chain between the following states: employment (E), unemployment (U), marginalisation (M) and outside the labour force (O), cf. Ross (1989). P describes the one step transition probability of going from one of these states to another and can be described by the following matrix:

$$P = \begin{bmatrix} P_{EE} & P_{EU} & P_{EM} & P_{EO} \\ P_{UE} & P_{UU} & P_{UM} & P_{UO} \\ P_{ME} & P_{MU} & P_{MM} & P_{MO} \\ P_{OE} & P_{OU} & P_{OM} & P_{OO} \end{bmatrix}. \tag{1}$$

[2]By "absorbing state" I mean that the probability of staying marginalised increases the longer individuals have been marginalised.

Applying Flinn and Heckman's test to this setup would imply a comparison of the transition probabilities for different states. Heckman and Flinn show that a sufficient requirement for two states to be identical is that transition probabilities to other states from the two states are similar. If we, for example, want to test whether marginally attached is equal to outside the labour force, then a sufficient requirement is that[3]:

$$P_{ME} = P_{OE}$$

$$P_{MU} = P_{OU}.$$

If this is true the transition matrix (1) goes from 3 to 2 in rank and the model collapses to:

$$P = \begin{bmatrix} P_{EE} & P_{EU} & P_{EN} \\ P_{UE} & P_{UU} & P_{UN} \\ P_{NE} & P_{NU} & P_{NN} \end{bmatrix}$$

where the marginalisation state (M) and the outside labour force state (O) are included in the new state "not on the labour market" (N). Notice that it is not necessary to assume that the transition probabilites into to the two states are identical for the model to collapse. This seems intuitive if states are only characterised by transition probabilities since individuals once they enter of of the states face the same probability of leaving it again.

The Markov assumption is illustrative but not necessary for applying the test. Relaxing the assumption of no state dependency will merely imply that individuals in different states need to have identical hazards over the entire spell duration in order for the two states to be identical[4]. Since the Danish LFS contains three observations on each individual in the sample, it is possible to test the simple Markov model as described in matrix 1. Furthermore, if the Markov assumption is rejected, the data makes it possible to estimate a less restrictive model where transition rates between the labour market states

[3] See Flinn and Heckman (1983) for proof.

[4] See Flinn and Heckman (1983) for an application of the test to a duration analysis with flexible time dependence.

depend on all the information we have. Jones and Riddell (2001) propose an expanded Markov model to tentative examine for state dependency. The model can be applied to the Danish data. This gives a transition matrix as described in table 1. Notice that some of the states by definition have

Table 1: Transition paths using all three interviews.

From\To	E_1	E_2	E_3	U_1	U_2	U_3	M_1	M_2	M_3	O_1	O_2	O_3
E_1		ee-		eu-			em-			eo-		
				-eu			-em			-eo		
E_2			eee	eeu			eem			eeo		
U_1	ue-				uu-		um-			uo-		
	-ue				-uu		-um			-uo		
U_2	uue					uuu	uum			uuo		
M_1	me-			mu-				mm-		mo-		
	-me			-mu				-mm		-mo		
M_2	mme			mmu					mmm	mmo		
O_1	oe-			ou-			om-				oo-	
	-oe			-ou			-om				-oo	
O_2	ooe			oou			oom					ooo

zero probability. It is, for instance, not possible to go from two consecutive employment periods (E_2) to only one employment period (E_1). Since the time periods between the three observations are not identical (one quarter and one year), it is not possible to directly compare the transition probabilities between the three states. Still, with that in mind, some observations can be made from the data. For example, the Markov model, as described in table 1, makes it possible to examine whether the probability of staying marginally attached is different for individuals who have been marginally attached for one quarter (-mm) at the most compared to individuals who have experienced at least a year and a quarter (mmm) of marginalisation. This way we can examine whether there are indications of marginalisation as an absorbing state ($P_{-mm} < P_{mmm}$). Since we do not correct for heterogeneity, we have to be aware that results may also be driven by different transition probability

Table 2: Transition paths of Markov model applying all three observations.

From\To	E	U	M	O
EE	eee	eeu	eem	eeo
UE	uee	ueu	uem	ueo
ME	mee	etc.		
OE				
EU				
UU				
MU				
OU				
EM				
UM				
MM				
OM				
EO				
UO				
MO				
OO				

among different groups on the labour market.

Using all observations of the LFS it is also possible to construct a Markov model which takes all the movements between labour market states in the three interviews into account. This Markov model is presented in table 2. Notice that by lifting the Markov assumption the number of departure states are expanded from 4 to 16. In order for the Markov assumption to hold, the transition probabilities from one state should be independent from previously observed behaviour. For example, for individuals who are unemploymed, the movement into any labour market state must comply with:

$$P_{UUX} = P_{MUX} = P_{OUX} = P_{UX},$$

where X here describes movement into any labour market state from unemployment (U). I will test this assumption on the data.

If the Markov assumption is rejected by the data, it is still possible to test the marginal state against other states. Only, we then have to test the transi-

tion from the marginally attached state taking account of the observations we have on individuals' labour market history prior to the transition. This can be done by estimating the Markov model as described in table 2 and then test the marginally attached state in this setup. For instance, the hypothesis that the marginally attached state is identical to being outside the labour force will in this model imply that

$$\begin{aligned} P_{EME} &= P_{EOE} \\ P_{EMU} &= P_{EOU} \\ P_{UME} &= P_{UOE} \\ P_{UMU} &= P_{UOU} \\ P_{MME} &= P_{MOE} \\ P_{MME} &= P_{MOE} \\ P_{OME} &= P_{OOE} \\ P_{OMU} &= P_{OOU}. \end{aligned}$$

4 Data construction

Since 1994 the Danish LFS has been a continuing survey in which individuals are sampled on a quarterly basis. Each quarter, 15,600 individuals between 15-69 years are sampled and interviewed. The survey is used to describe the population's labour market attachment as defined by the international guidelines of Eurostat. The survey results are therefore comparable with surveys conducted in other EU countries and are published each year by Eurostat.

The sample used in this analysis covers second quarter 1995 to fourth quarter 1999. The reason for limiting the analysis to 1995 is that some of the questions regarding labour force attachment were changed in the first survey of 1995. Since the changed questions are used in construction of the labour market states for this paper, it has not been possible to construct labour market states that are identical both before and after 1995.

The survey is based on phone interviews. If the sampled individuals do

not answer the phone, a questionnaire is sent by mail. If the individuals do not return the questionnaire, a reminder is sent to them by mail. The survey is constructed as a rolling panel. This means that one third of the 15,600 individuals is replaced each quarter, one third is re-interviewed the following quarter, and one third is interviewed for the third time one year after the second interview. For example, one third of the sample in 1st quarter 1998 will be re-interviewed in 2nd quarter 1998 and again in 2nd quarter 1999. In table 3 the subsamples from 2nd quarter 1995 to 4th quarter 1999 are described. Notice how most subsamples appear three times in the data set.

Table 3: The Rolling Panel from 2nd quarter 1995 to 4th quarter 1999.

Year	Quarter	First interview	Second interview	Third interview
1995	2	F	E	A
	3	G	F	B
	4	H	G	C
1996	1	I	H	D
	2	J	I	E
	3	K	J	F
	4	L	K	G
1997	1	M	L	H
	2	N	M	I
	3	O	N	J
	4	P	O	K
1998	1	G	P	L
	2	R	Q	M
	3	S	R	N
	4	T	S	O
1999	1	U	T	P
	2	V	U	Q
	3	W	V	R
	4	X	W	S

In order to ensure a sufficient number of unemployed individuals, approx. one third (5,000 individuals) of the sample is picked from individuals who in the previous quarter were registered as unemployed by the Danish unemployment funds or municipalities. The remaining two thirds (10,600 individuals)

are picked among individuals who are not registered as unemployed in the previous quarter.

Within these two stratas everybody between the age of 15 to 69 has the same probability of participating. The fact that individuals do not fill out the questionnaire with the same probability, however, impose a source of bias to estimations performed on the data. In order to minimise the bias, Statistics Denmark has performed analyses of the response percentage in order to determine which factors have the most influence on responses. Based on the results Statistics Denmark has constructed weights for the survey observations. The weights have been constructed differently for the two strata. For the 5,000 individuals who were unemployed in the quarter prior to the interview, the weights have been constructed according to income, education, gender and age. For the remaining 10,600 individuals who were not unemployed in the quarter prior to the interview, the weights have been constructed according to income, employment sector, age and gender.

In order to obtain demographic information on individuals, the LFS has been merged with data from the Population database from Statistics Denmark. Since this database contains information on every person who at some point in time has resided in Denmark, it is possible to find demographic information about all of the individuals who have been interviewed in the LFS. The Population database is used to derive information about individuals' age and gender.

In the LFS, individuals are asked certain questions which are used to determine their labour market attachment. According to Eurostat guidelines individuals are divided into the following three categories:

- employed
- unemployed

- out of the labour force

The individuals in the sample have been categorised according to their answer to the questions reported in appendix A. In order to be regarded as employed, a person must have worked at least one hour during the week of the interview. In order to be regarded as unemployed, a person must either have found employment which commences at a specific later date or actively have searched for a job during the interview week. The exact search requirements are described in appendix A. The state "out of labour force" contains all remaining individuals.

The state "marginally attached" is not part of the Eurostat definitions. It has therefore been constructed by subsequently applying information from the LFS to the labour market states as defined by Eurostat. Jones and Riddell (1995) define marginally attached as individuals who wish to be employed but who are not searching for a job. In Jones and Riddell's studies, individuals are regarded as marginally attached if they answer that they would like to be employed in the week of the survey[5]. In the Danish LFS, non employed individuals are asked whether they

> "would ... like to have a job, now or later..."[6]

This question is somewhat weaker than the question used by Jones and Riddell, but it is the question which is closest to their definition. In the Danish LFS, individuals are also asked how quickly they can begin work if they were offered a job. Answers to this question will be used to analyse the marginalisation state and examine whether the difference between the questions used to define marginalisation from Canadian and Danish data, respectively, have an impact on the marginalisation state.

[5] The exact question in the Canadian SJO is "Did ... want a job last week?", cf. Survey of Job Opportunities, Form number 6, Statistics Canada.

[6] Quote from question number 52, Statistics Denmark (1999).

The marginalisation state as described above contains individuals in very different situations and therefore most likely with different labour market attachment. In the LFS, individuals are asked questions which can be used to further divide the marginally attached group according to self reported "labour market attachment". This is done by using replies to the following three questions, cf. Statistics Denmark (2001):

1. Have you within the last month done anything in order to find employment?

2. Why have you not done anything in order to find employment?

3. Why can you not commence employment within 2 weeks?

The replies to these questions have been used to divide marginally attached individuals into four different subgroups. The first group is called "waiting" and includes individuals who are not searching actively because they are waiting for employment either at a former or new employer. The second group is called "non waiting" and it contains almost any reported reason for being marginally attached. The third group is called "education" and it includes everyone who reports education as a reason for being in the marginal state. Jones and Riddell (1998) construct the two subgroups "waiting" and "non waiting" in their study on Canadian data. The reason why I have added a subgroup is because I suspect that a large share of especially younger individuals may end up in the marginalisation state while they undertake education. After all, most students would agree to wanting a job now or later and would at the same time not search for a job while studying. Finally, there is a fourth group of marginally attached individuals which I cannot classify due to lack of information. The questions used to construct the sub-groups are presented in appendix B.

Table 4: The sample of individuals used in the analysis divided according to labour market status, 1995-1999.

	Employed	Unemployed	marginally attached	Outside	Total
Male	78,040	7,030	4,282	11,931	101,285
15≤Age<30	37,921	4,472	6,174	5,069	53,636
30≤Age<40	41,434	4,036	3,037	2,357	50,864
40≤Age<50	37,283	3,483	1,572	2,494	44,832
50≤Age<60	30,716	3,955	1,323	6,870	42,864
60≤Age	6,396	704	336	14,567	22,003
Total	153,750	16,650	12,442	31,357	214,199

5 Descriptives

In table 4 the sample is described according to labour market status and gender. Due to the stratification it is not possible to derive estimation results directly from the sample. Still, the table shows that the sample consists of a large number of observations from all four labour market states. In the sample, before adjusting for stratification, the group of marginally attached individuals is almost as big as the unemployment group. Whether this is due to an over or under sampling of this group is not clear. Due to the extensive coverage of the unemployment insurance system in Denmark it is not unlikely that individuals can receive benefits and still be marginally attached. This would lead to an over sampling of the marginally attached[7].

The definition of the marginally attached also covers individuals who either receive alternative transfers or no transfers, for instance early retirement pension, disability pension, education support etc. If these groups are dominating in the marginally attached state, it would result in an under sampling

[7] See section 4 for a description of the sampling scheme.

Table 5: Estimated population using weights.

	Employed	Unemployed	marginally attached	Outside	Total
Male	1,445,104	78,148	74,765	238,720	1,836,737
15≤Age<30	709,319	65,284	114,813	99,810	989,226
30≤Age<40	676,953	38,936	40,973	39,918	796,779
40≤Age<50	635,021	32,822	21,289	57,485	746,617
50≤Age<60	523,384	32,059	14,772	133,097	703,312
60≤Age	113,262	5,339	3,897	271,899	394,398
Total	2,657,938	174,439	195,745	602,209	3,630,331

of the marginally attached. In table 5 the sample has been used to estimate the population by applying the weights constructed by Statistics Denmark. Notice that the unemployed are clearly over sampled where as the share of marginal individuals stays almost unchanged. This indicates that a large proportion of the marginally attached individuals did not receive unemployment insurance in the quarter prior to the survey. The marginally attached group constitutes more than 20 per cent of the non employed individuals and is according to the survey actually larger than the unemployment state. When it comes to the distribution over age, the young age groups seem to be over represented in all three non employment states. The two states: marginally attached and out of labour force display a heavy over representation of young individuals compared to the state unemployed. This may be due to individuals undertaking an education who may likely end up in these two labour market states. Individuals' choice of retirement age also has an impact on the distribution of the labour market states. It does appear that individuals leave the marginally attached group already at an age between 50 and 60 years whereas this age group is not to the same extend under represented in

Table 6: Estimated number of marginalised individuals in Denmark categorised according to age and labour market attachment (using weights).

	No response	Waiting	Non waiting	Education	Total
15≤Age<30	2,178	2,660	20,130	89,846	114,813
30≤Age<40	1,506	1,494	18,717	19,256	40,973
40≤Age<50	1,045	1,419	9,694	9,131	21,289
50≤Age<60	907	1,467	9,147	3,251	14,772
60≤Age	191	588	2,942	176	3,897
Total	5,827	7,629	60,630	121,660	195,745

the other labour market states. Again, this may be due to the fact that many of the possible contributing reasons for marginalisation disappear for this age group and up. Examples are education as well as child and family minding.

In table 6, the marginally attached group is divided into three different states (as well as a residual group). The dominating group is clearly "education" which contains everybody who gives education as a reason for being in the marginally attached state. Notice that the education subgroup is almost exclusively between 15 and 30 years of age. Actually, individuals between 15 and 30 years who report education as a reason for being marginally attached constitute almost half of all marginally attached individuals in Denmark. The "education" group is twice as big as the second largest group which consists of individuals who are not "waiting" for employment. In this group the reasons for marginalisation varies from sickness and handicaps, to family and child care, cf. appendix B for a full description. Especially individuals minding children and family may be the reason for the over representation of individuals between 15 and 40 years of age for this group. The last group is individuals who have ended up in the marginally attached state because they

Table 7: Estimated number of marginalised individuals divided on age and availability for employment (using weights).

	<1 week	<2 weeks	<1 month	Later	No reply	Total
15≤Age<30	11,946	1,067	5,499	95,970	507	114,989
30≤Age<40	5,049	286	2,887	32,191	420	40,833
40≤Age<50	4,592	221	1,854	14,204	357	21,229
50≤Age<60	5,857	201	1,088	7,247	383	14,776
60≤Age	2,540	63	215	1,042	57	3,918
Total	29,984	1,838	11,543	150,654	1,726	195,745

are "waiting" for employment. It constitutes less than 5 per cent of the total group of marginally attached individuals. Also in this group is there an over representation of young individuals compared to the population average.

In table 7, the estimated group of marginally attached individuals is categorised according to age and availability for employment. Only about 15 per cent of the marginally attached individuals report that they can undertake employment in the week they are asked. This does indicate that the difference between the question used for the marginalisation definition in the Danish LFS and the Canadian SJO, respectively, does have a substantial impact on the selection of individuals for the state. It is therefore important for a precise definition of marginalisation to ask exactly when individuals would like to work. It is striking that more than 75 per cent of the marginally attached individuals report that they need more than a month before they can undertake employment. For the individuals under thirty the share is almost 85 per cent. Still, the proportion of individuals who can commence work at an emminent date is not small for the state to be irrelevant. Individuals who can begin employment within a month count 5 per cent of all non em-

Table 8: Estimated number of marginalised individuals divided on reason for marginalisation and availability for employment (using weights).

	waiting	non waiting	education	No reply	Total
<1 week	5,480	12,418	9,092	2,993	29,984
<2 weeks	286	801	678	73	1,838
<1 month	358	5,676	5,020	488	11,543
Later	1,434	40,959	106,737	1,524	150,654
No reply	70	775	132	749	1,726
Total	7,629	60,630	121,660	5,827	195,745

ployed individuals (more than 43,000 people) and is about a quarter the size of the unemployed group. For individuals who can begin within a week the proportion of all non employed individuals is approximately 3 per cent and approximately one fifth the size of the unemployed group.

In table 8, the estimated group of marginally attached individuals is divided according to reasons for marginalisation and availability for work. Almost 90 per cent of individuals giving education as a reason for marginalisation need more than one month before they are available for work. This does indicate that the questions in the Danish LFS includes a large number of students who are waiting to finish their degree before they apply for jobs. Individuals who can commence employment within a week are spread over all categories. One third give education as a reason or marginalisation. 40 per cent report they are not waiting for employment and 20 per cent say they are waiting for employment. Especially the "waiting" subgroup reports high availability. More than 70 per cent of this group report that they can commence employment within a week.

6 Transition probabilities

In order to get a view of the movements between labour market states, I will present average transition proportions after a quarter. The proportions can be interpreted as rough estimates of the transition probabilities between states. In figure 1 to 4, the estimated transition probabilities after a quarter from the three non employment states are presented for each year between 1995 and 1999. The dotted lines are 95 per cent confidence bands. Generally the figures indicate that marginally attached individuals behave significantly different from both unemployed individuals and individuals outside the labour force. marginally attached individuals have a higher probability of entering employment than individuals out of labour force but a lower probability than unemployed individuals. The same goes for the probability of unemployment. When it comes to the probability of leaving the labour force, marginally attached individuals have a lower probability than individuals already out of the labour force but higher than unemployed individuals. It is interesting to note that the general boom in the Danish economy from 1993 and onwards seems to have an effect predominantly on unemployed individuals whereas the transition probabilities for the marginally attached individuals and individuals out of labour force seem to be almost unaffected. This seems especially clear for the movement into employment and unemployment where individuals who are marginally attached or out of labour force have an almost constant transition probability over the sample period. This result is surprising since other studies which focus on individuals with marginal attachment to the labour market find that especially the size of the group is negatively correlated with the business cycle, cf. OECD (1987), Ministry of Finance (1997). The reason for this result may be found in the large group of students who are included in this marginalisation definition, cf. section above.

In figure 5 to 8, the transition probabilities from marginalisation are di-

Figure 1: Transition probabilites to employment.

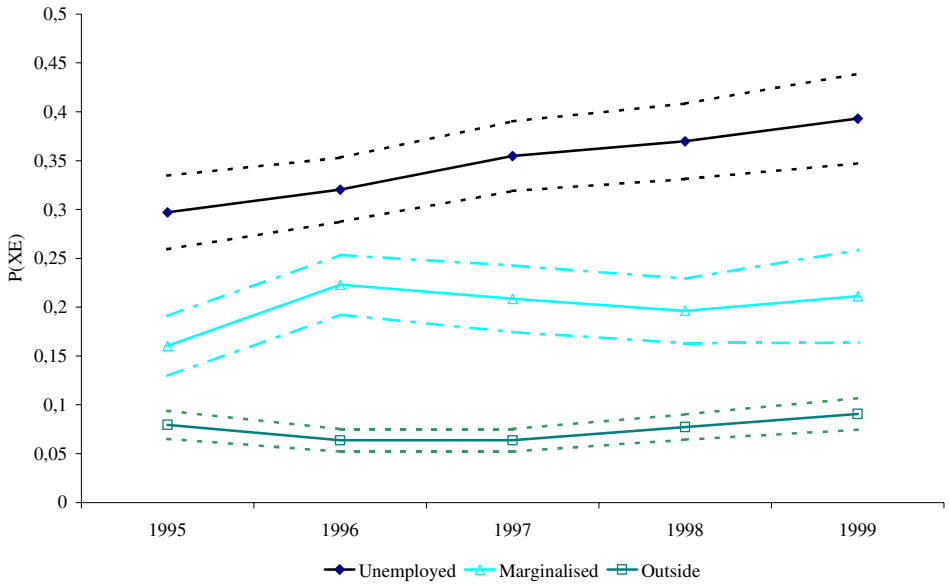


Figure 2: Transition probabilites to unemployment.

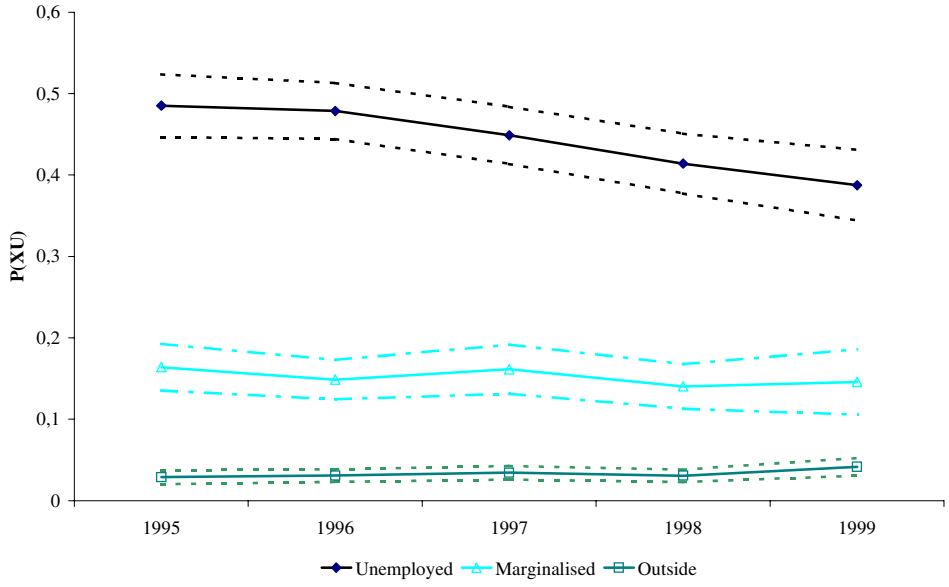


Figure 3: Transition probabilites to marginalisation.

Figure 4: Transition probabilites out of the labour force

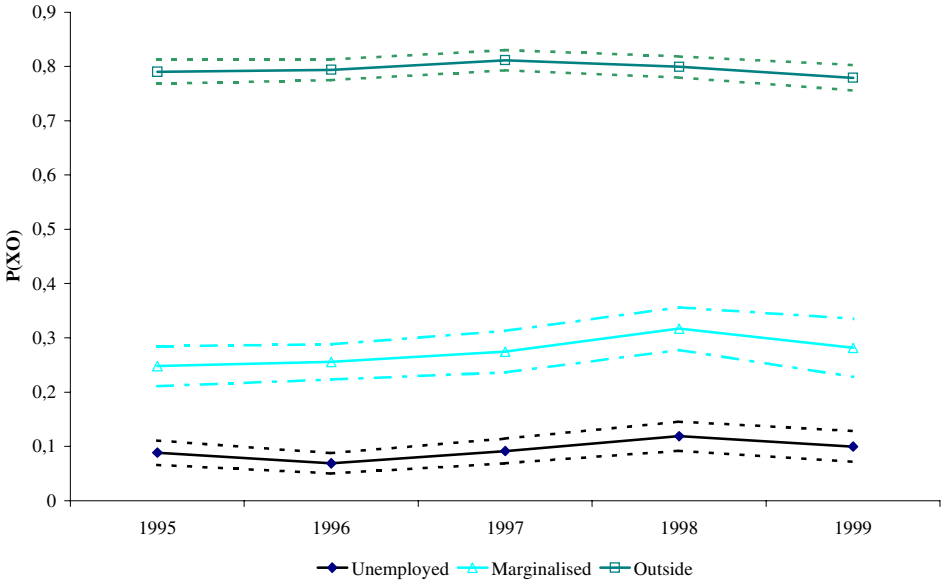


Figure 5: Transition probabilities to employment.

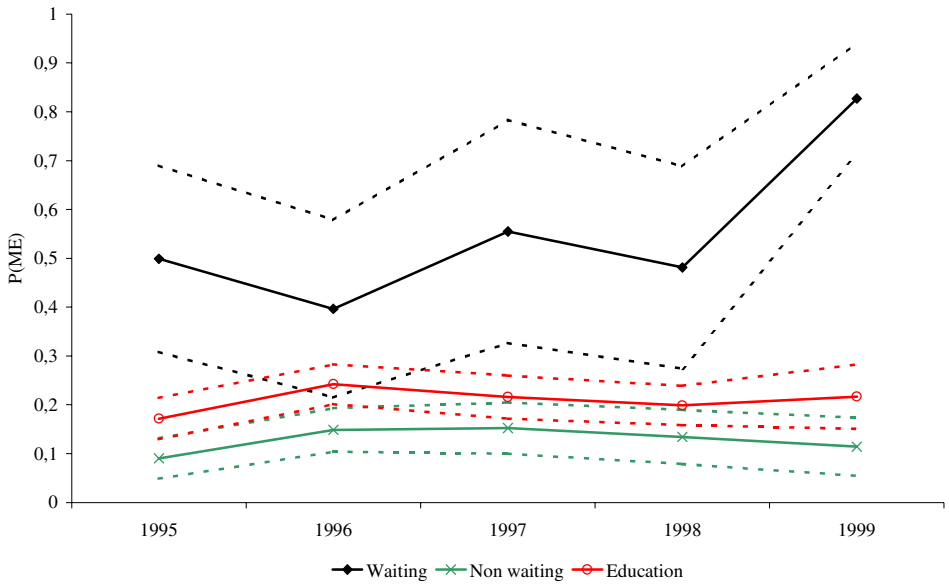


Figure 6: Transition probabilities to unemployment.

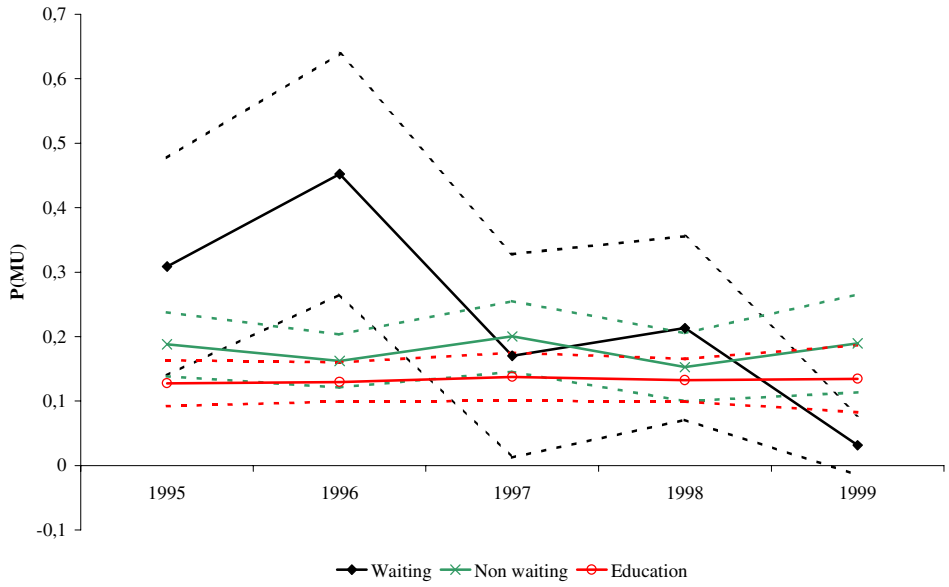


Figure 7: Transition probabilities to marginalisation.

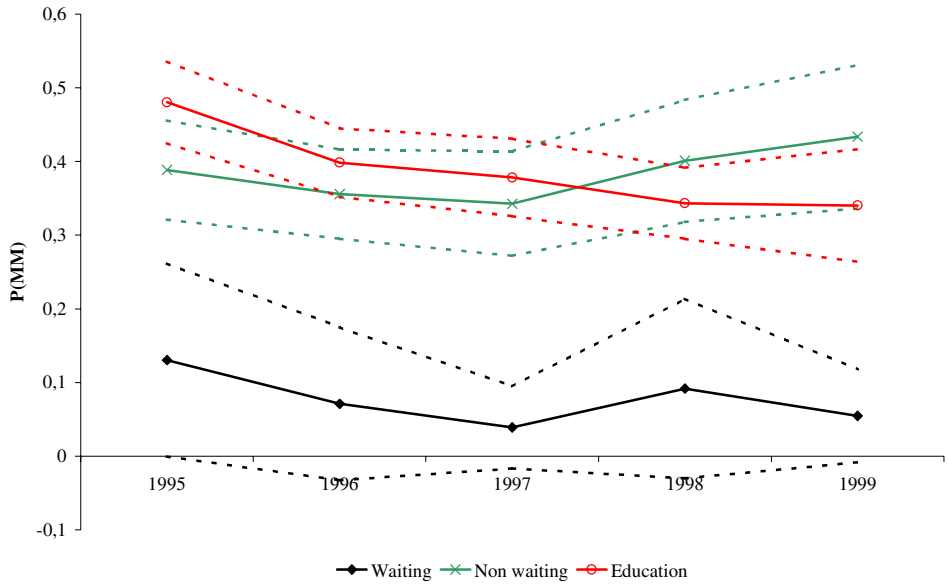
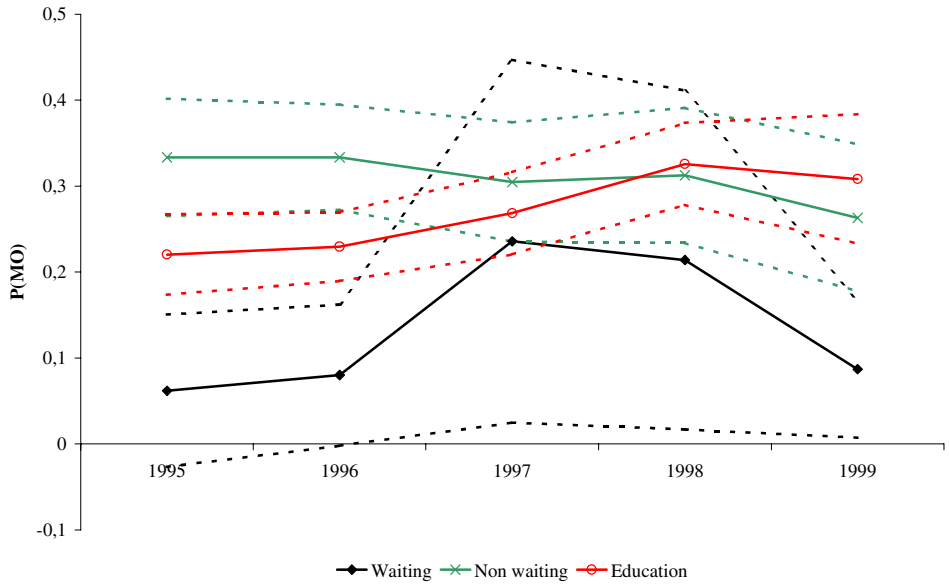


Figure 8: Transition probabilities out of the labour market.



vided into the different subgroups according to reason for marginalisation as described in section 4. The estimations are generally restrained by the limited degrees of freedom when the marginalisation state is broken into subgroups. Especially the "waiting" subgroup suffers from wide confidence bands. Still, some interesting observations can be made from the estimators. One interesting finding is that the stable transition probabilities from the marginalisation state as found in figure 1 to 4 seem to be mainly due to individuals stating education or "non waiting" as reason for marginalisation. Individuals who state that they are waiting for employment display transition probabilities which seems to be highly correlated with the boom of the Danish economy since 1994. One reason for this may be that firms due to the boom hire or rehire unemployed individuals who have some contact to the firm, for instance through previous employment in the firm. Hiring from this group may reduce hiring costs for the firm and the individuals' productivity may be higher than other unemployed individuals due to specific skills and knowledge previously obtained in the firm.

The figures also indicate a large degree of heterogeneity between the different subgroups. In figure 5, the transition probability into employment is presented. Notice that individuals who report that they are waiting for employment display a transition probability which for most years is significantly higher than both the "non waiting" and "education" group. A similar result is found in figure 7 where the probability of staying marginally attached for the waiting subgroup is significantly lower than for the two other subgroups. This also indicates that individuals in the "waiting" subgroup do not wait for very long. The two other subgroups, "non waiting" and "education", display very similar transition probabilities. There is some indication that individuals who report education as the reason for marginalisation have a higher probability of entering employment than individuals who are "not waiting"

for employment. The difference between the two subgroups, though, is only significant for 1995 and 1996.

In figure 9 to 12, the subgroups of marginalisation are compared with the unemployment and out of labour force state. The confidence bands have been omitted for clarity. One interesting finding is that the waiting subgroup actually has a higher probability of finding employment than unemployed individuals. Furthermore, the increase in the transition probabilities into employment over the years is stronger for the waiting group than for unemployed individuals. As mentioned before, this may be due to firm specific human capital among the waiting subgroup. Apart from when it comes to entering employment or unemployment, the waiting subgroup actually seems to be closely linked with the unemployment subgroup. The probability of both staying in the marginally attached state and leaving the labour market is low for the waiting subgroup just as for the unemployed state. The other subgroups, "non waiting" and "education" does not seem to follow the transition pattern of neither the unemployed nor the outside group. The two subgroups generelly appear to have stronger labour market attachment than the outside group but weaker attachment than the unemployed group.

In figure 13 to 16, the transition probabilities are displayed with marginalisation categorised according to availability. This division of the marginalisation group does not give as clear indications as dividing according to reason for marginalisation. There is a weak tendency that individuals who are available within a week or a month have higher probability of finding employment or enter unemployment than individuals who are available later than a month. Also, when it comes to the share that stays marginally attached after a quarter, individuals who are available later than within a month do have a higher probability of staying marginally attached than individuals who are more quickly available, cf. figure 15.

Figure 9: Transition to employment for different subgroups.

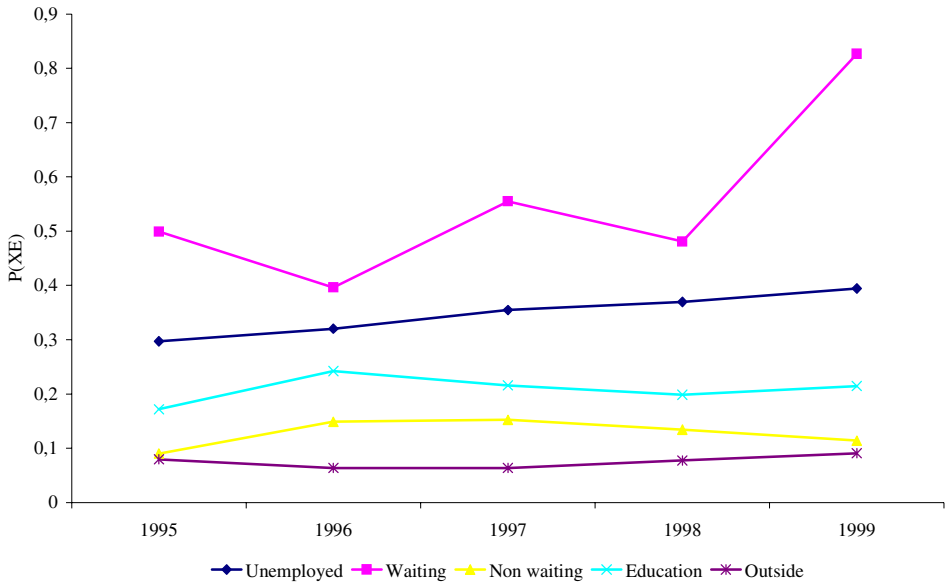


Figure 10: Transition to unemployment for different subgroups.

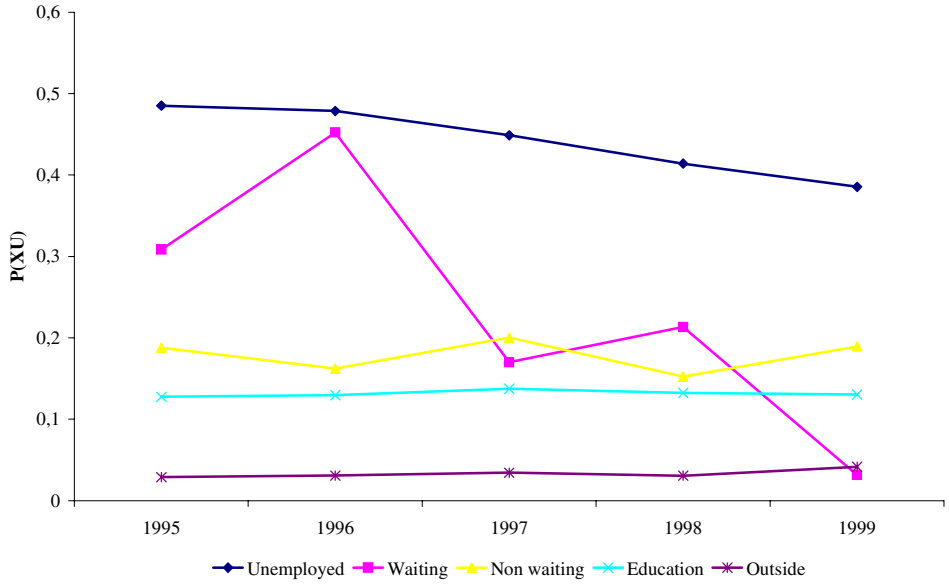


Figure 11: Transition to marginalisation for different subgroups.

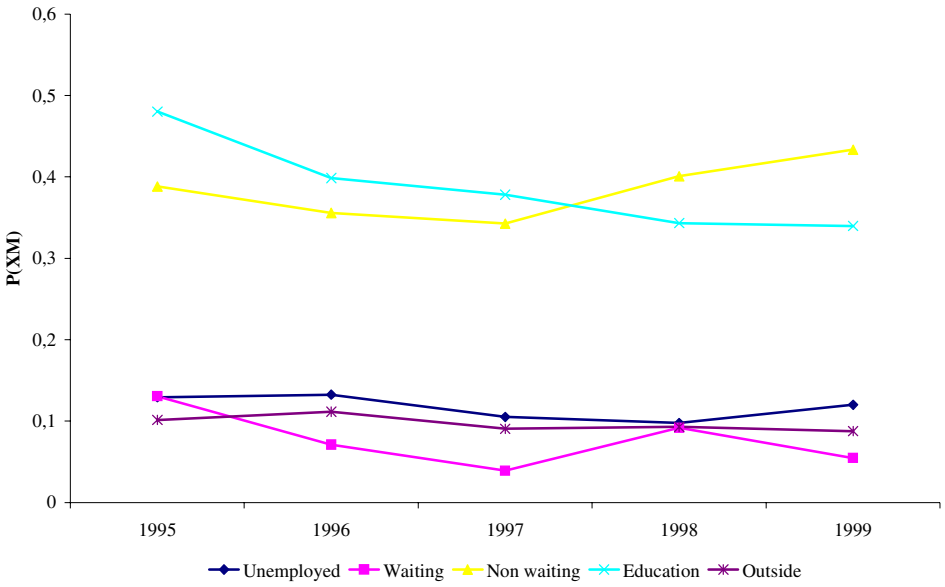


Figure 12: Transition out of the labour market for different subgroups.

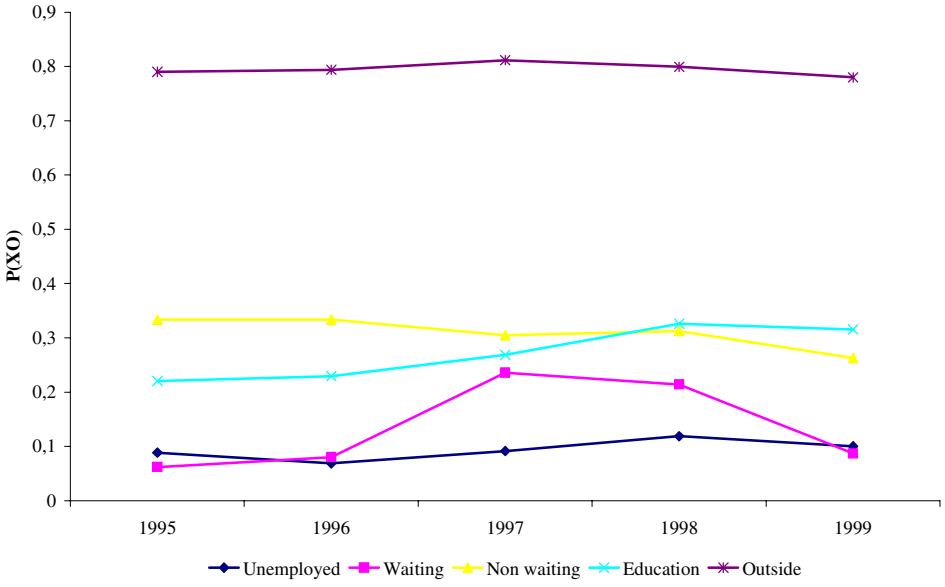


Figure 13: Transition to employment for different subgroups including unemployed and outside labour market.

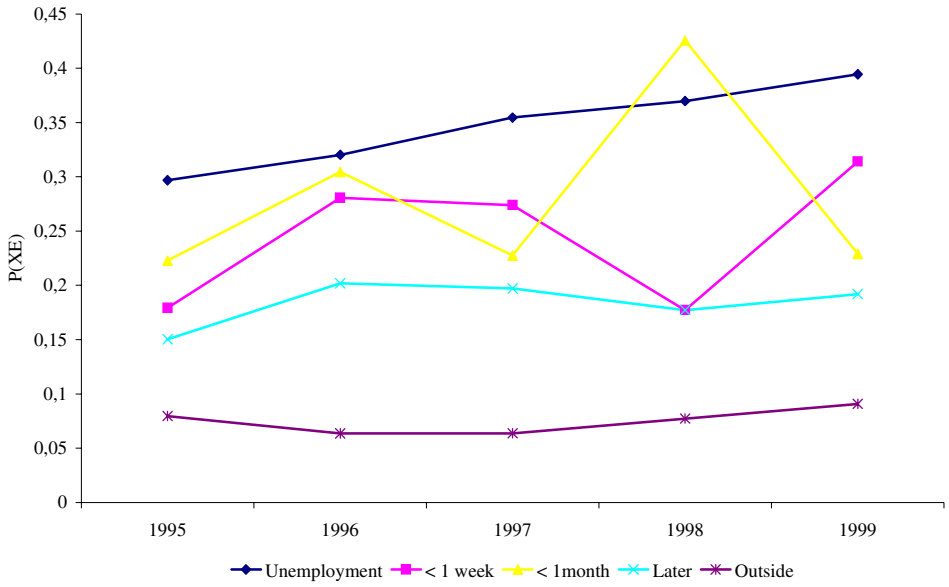


Figure 14: Transition to unemployment for different subgroups including unemployed and outside labour market.

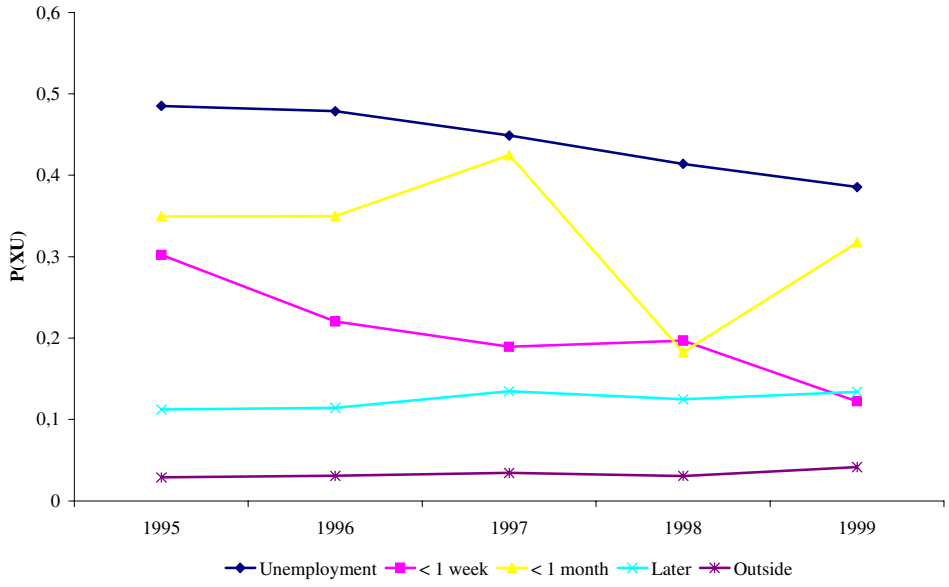


Figure 15: Transition to marginalisation for different subgroups including unemployed and outside labour market.

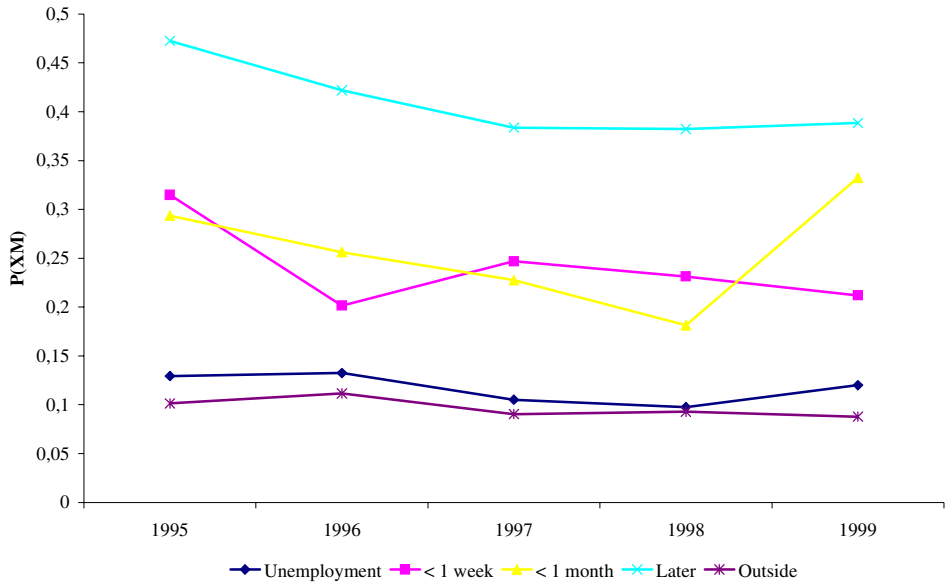
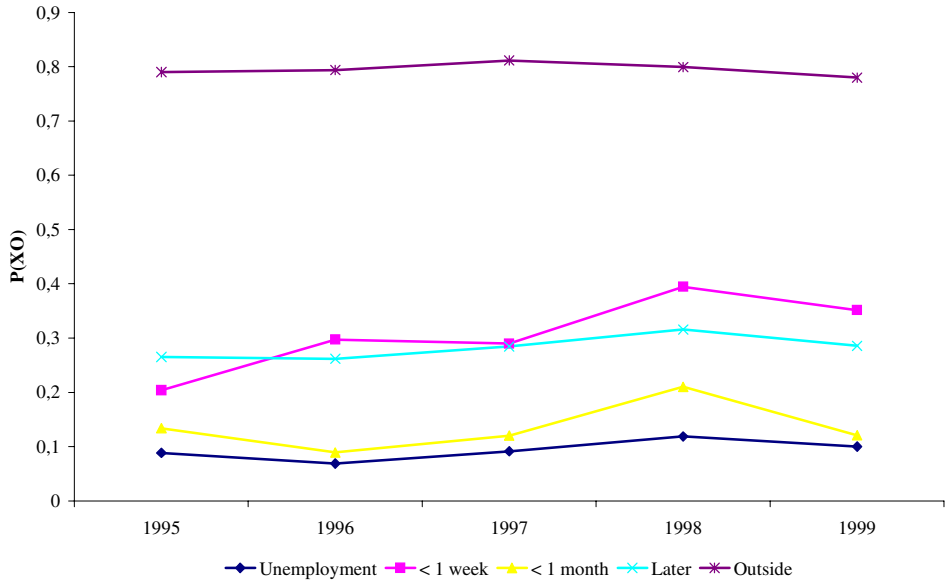


Figure 16: Transition out of the labour market for different subgroups including unemployed and outside labour market.



7 Estimation and equivalence test of labour market states

The next step of the examination of the marginally attached state is to estimate the movements between labour market states conditioned on various demographic variables. In the following I present different estimations of movements between states a quarter after and one year after first observation. The data set has been divided both according to age and gender in order to look for specific effects for these subgroups. The estimation results from the divided data set are presented in appendix C. When it comes to departure states, I have limited the data set to the three non employment states (unemployment, marginally attached, outside). The movements have been modelled with a multinomial logistic model. In all of the estimations presented, both seasonal dummies as well as year dummies have been included at one point. Almost none of these dummies turned out significantly (typically pr(0)>0.45) and therefore they have been omitted in most of the following estimations. The results from the estimations are presented as average percentage point changes in the probability as a specific dummy is changed from zero to one. For example, the effect of being unemployed on the probability of finding employment is presented as the difference in average probability of employment between individuals who are unemployed and individuals who are not unemployed.

In table 9, the estimation results of the entire sample are presented. The estimation is conditioned on the three non employment states (unemployment, marginally attached and outside the labour force). In general, the results follow the movements displayed in the figure 1 to 4. The probability of employment seems to be highest for unemployed people followed by marginally attached individuals and finally individuals outside the labour force. After one year this ranking stays unaffected but the differences in the employment probability between the states increases. The estimation does reveal some

Table 9: Estimation results of a Multinomial Logit model of individuals transition states conditioned on departure states and other covariates.

After a	quarter		year	
Variables	dp/dx	St.error.	dp/dx	St.error
Pr(Employed) =	0.1877		0.2579	
Unemployed	0.2320	0.0124	0.3310	0.0146
marginally attached	0.0627	0.0124	0.1428	0.0149
Male	0.0326	0.0087	0.0411	0.0107
15≤Age<30	0.1323	0.0121	0.1831	0.0141
30≤Age<60	-0.1026	0.0096	-0.1843	0.0103
60≤Age<70	-0.1196	0.0099	-0.2516	0.0100
Pr(Unemployed) =	0.1346		0.0966	
Unemployed	0.4295	0.0136	0.2267	0.0136
marginally attached	0.1822	0.0158	0.1232	0.0138
Male	0.0268	0.0069	0.0063	0.0058
15≤Age<30	-0.0255	0.0071	-0.0201	0.0063
30≤Age<60	-0.0412	0.0071	-0.0308	0.0060
60≤Age<70	-0.1326	0.0072	-0.1218	0.0061
Pr(marginally attached) =	0.1434		0.0914	
Unemployed	-0.0301	0.0065	0.0103	0.0068
marginally attached	0.0877	0.0106	0.0519	0.0087
Male	-0.0074	0.0068	-0.0099	0.0056
15≤Age<30	0.0450	0.0083	0.0455	0.0076
30≤Age<60	-0.1067	0.0071	-0.0786	0.0063
60≤Age<70	-0.2064	0.0065	-0.1436	0.0057
Pr(outside) =	0.5343		0.5541	
Unemployed	-0.6314	0.0086	-0.5680	0.0110
marginally attached	-0.3326	0.0129	-0.3179	0.0147
Male	-0.0520	0.0129	-0.0375	0.0141
15≤Age<30	-0.1517	0.0158	-0.2085	0.0170
30≤Age<60	0.2505	0.0140	0.2937	0.0135
60≤Age<70	0.4585	0.0123	0.5170	0.0113

interesting points which do not appear in the average transition proportions displayed in figure 1 to 4. According to the Logit model estimators, being in the marginally attached state does not result in nearly as high a probability of staying marginally attached as figure 3 indicates. This difference between the mean transition rates and the Logit estimates may be due to the age distribution of the marginally attached group. Remember that almost half of the marginally attached individuals are under 30 years of age and report education as reason for being in the marginally attached state, cf. table 6. And the "education" subgroup of the marginally attached does according to figure 7 have a high probability of staying marginally attached. This explanation is supported by the age dummy estimator for marginalisation as transition state, cf. table 9. Dividing the sample according to age and gender (cf. table 20 and 21 in appendix C) does generally not reveal any major differences in the findings reported in table 9.

In table 10, the conditioning variable "marginally attached" has been divided into the three substates "waiting", "nonwaiting" and "education"[8]. According to the estimation, individuals who are waiting for employment actually have a higher probability of finding employment the following quarter than unemployed individuals. This result did also appear in the average transition proportions, cf. figure 5, and possible explanations for this are given in the section above. It appears that the marginally attached state consists of individuals with very different probability of finding employment where individuals who report non waiting or education as a reason for marginalisation have the lowest probability of employment. When the transition period is expanded from one quarter to a year the employment probability for marginally attached individuals waiting for employment seems to approach the probability of the unemployed. The probability also increases for the two re-

[8] See section 4 for a description of the subgroups.

maining marginally attached groups. But it is still lower than for individuals who are unemployed or waiting for employment. The results from the total sample is also found when the sample is divided according to age and gender. One exception is young individuals (less than 30 years of age) for whom being marginally attached and waiting for employment does not result in as large a probability for employment as being unemployed. This may be because this group does not possess the same degree of firm specific human capital as the older age groups.

In table 11, the marginally attached state has been split up according to availability. marginally attached people who are available for work within a week have a slightly higher probability of finding employment than marginally attached individuals who are not as readily available. The difference is only minor, though, and after a year it changes so that individuals who are available within a month have the highest probability of finding employment. This result cannot be refound when the sample only consists of women, cf. table 22 in appendix C. For women, the marginally attached group who are available within one month have the highest probability of employment both after a quarter and after a year. The same is the case for young people (less than 30 years of age).

A last remark on the estimations on the samples divided according to gender. In general, the differences in estimation results between the gender seem to be very limited. These results differ from the findings of Jones and Riddell (1998) on the Canadian labour market. They find that women generally have a lower attachment to the labour market than men. This difference between Denmark and Canada may be a result of the weaker labour market attachment for women in Canada compared to Denmark, cf. OECD (2002).

In table 12, test values of the hypotheses that the marginally attached state is equivalent to other labour market states are presented. The hypothe-

Table 10: Estimation results where the marginalised have been divided according to reason for being in the state.

Transition after one:	quarter		year	
	dp/dx	St.error	dp/dx	St.error
Pr(employed) =	0.1864		0.2577	
Unemployed	0.2316	0.0122	0.3328	0.0144
Waiting	0.3799	0.0526	0.3057	0.0517
Non waiting	0.0028	0.0173	0.1049	0.0215
Education	0.0393	0.0140	0.1358	0.0176
Male	0.0294	0.0087	0.0403	0.0107
15≤Age<30	0.1386	0.0123	0.1844	0.0142
50≤Age<60	-0.1076	0.0094	-0.1866	0.0102
60≤Age<70	-0.1230	0.0097	-0.2539	0.0099
Pr(unemployed)	0.1360		0.0971	
Unemployed	0.4253	0.0132	0.2208	0.0132
Waiting	0.2132	0.0515	0.1835	0.0480
Non waiting	0.2224	0.0229	0.1532	0.0202
Education	0.1463	0.0191	0.0933	0.0166
Male	0.0271	0.0070	0.0072	0.0059
15≤Age<30	-0.0194	0.0075	-0.0162	0.0066
50≤Age<60	-0.0461	0.0071	-0.0332	0.0060
60 ≤Age<70	-0.1372	0.0071	-0.1245	0.0060
Pr(marginally attached)	0.1435		0.0915	
Unemployed	-0.0282	0.0065	0.0112	0.0068
Waiting	-0.0983	0.0152	-0.0105	0.0229
Nonwaiting	0.1173	0.0170	0.0432	0.0127
Education	0.0821	0.0124	0.0575	0.0106
Male	-0.0056	0.0069	-0.0102	0.0056
15≤Age<30	0.0477	0.0087	0.0438	0.0076
50≤Age<60	-0.1073	0.0071	-0.0789	0.0063
70≤Age<70	-0.2062	0.0065	-0.1439	0.0057
P(outside) =	0.5341		0.5538	
Unemployed	-0.6288	0.0087	-0.5647	0.0111
Waiting	-0.4948	0.0149	-0.4787	0.0221
Nonwaiting	-0.3424	0.0165	-0.3014	0.0204
Education	-0.2677	0.0160	-0.2866	0.0180
Male	-0.0509	0.0129	-0.0374	0.0141
15≤Age<30	-0.1669	0.0159	-0.2120	0.0170
50≤Age<60	0.2610	0.0140	0.2987	0.0135
60≤Age<70	0.4664	0.0121	0.5224	0.0111

Table 11: Estimation results where the marginalised have been divided according to availability.

Transition after one:	quarter		year	
	dp/dx	St.error	dp/dx	St.error
P(employed)=	0.1880		0.2589	
Unemployed	0.2354	0.0124	0.3313	0.0145
<1 week	0.1054	0.0260	0.1204	0.0289
<1 month	0.0984	0.0356	0.2022	0.0427
Later	0.0385	0.0133	0.1269	0.0162
Male	0.0314	0.0087	0.0407	0.0107
15≤Age<30	0.1385	0.0122	0.1864	0.0142
50≤Age<60	-0.1052	0.0096	-0.1870	0.0103
60≤Age<70	-0.1206	0.0098	-0.2536	0.0100
P(unemployed)=	0.1343		0.0962	
Unemployed	0.4245	0.0134	0.2255	0.0135
<1 week	0.2719	0.0298	0.2286	0.0293
<1 month	0.3875	0.0401	0.1582	0.0390
Later	0.1352	0.0172	0.1019	0.0150
Male	0.0259	0.0069	0.0057	0.0058
15≤Age<30	-0.0209	0.0073	-0.0178	0.0063
50≤Age<60	-0.0443	0.0071	-0.0333	0.0060
60≤Age<70	-0.1346	0.0071	-0.1228	0.0061
P(marginally attached) =	0.1443		0.0917	
Unemployed	-0.0293	0.0065	0.0110	0.0068
<1 week	0.0138	0.0174	0.0403	0.0167
<1 month	-0.0220	0.0192	0.0526	0.0245
Later	0.1082	0.0123	0.0516	0.0096
Male	-0.0074	0.0069	-0.0101	0.0056
15≤Age<30	0.0424	0.0083	0.0455	0.0076
50≤Age<60	-0.1069	0.0071	-0.0792	0.0063
60≤Age<70	-0.2074	0.0065	-0.1441	0.0057
P(outside) =	0.5334		0.5531	
Unemployed	-0.6306	0.0086	-0.5679	0.0111
<1 week	-0.3912	0.0183	-0.3893	0.0223
<1 month	-0.4638	0.0181	-0.4129	0.0300
Later	-0.2820	0.0146	-0.2804	0.0165
Male	-0.0499	0.0130	-0.0363	0.0141
15≤Age<30	-0.1601	0.0158	-0.2141	0.0170
50≤Age<60	0.2563	0.0141	0.2995	0.0136
60≤Age<70	0.4626	0.0122	0.5205	0.0112

ses have been tested using different subsamples of the data set. In general, the hypothesis that the marginally attached state is equivalent to unemployment is strongly rejected both after a quarter and after a year. One exception is the sample of individuals over the age of 60. The hypothesis that the marginally attached state is identical to the outside labour force state is also generally rejected both after a quarter and after a year. But the test values are not as large as in the previous test. Especially for young individuals (age between 15 and 30) the hypothesis is not rejected. This may be due to the large proportion of students in this agegroup who are likely to be located in both labour market states.

When the marginally attached group is divided into subgroups according to reason for marginalisation, the test results change, cf. table 13. For the subgroup who claim that they are waiting for employment, the hypothesis that they are identical to unemployed individuals is generally not rejected. This is the case after one quarter but even more so after one year. For the other subgroups, "non waiting" and "education", the hypothesis that these states are identical to the outside labour force is clearly rejected almost no matter how the sample is divided.

Table 12: Hypothesis test of the marginally attached state (M) against unemployed (U) and outside the labour force (O) (Wald test).

Transition after one:	quarter		year	
	Test value	Prob.	Test value	Prob.
H_0: P(MX) = P(UX)				
Entire sample	598.97	0.0000	293.14	0.0000
Male	230.75	0.0000	118.41	0.0000
Female	376.98	0.0000	175.36	0.0000
15≤Age<30	258.81	0.0000	83.28	0.0000
30≤Age<50	255.12	0.0000	127.78	0.0000
50≤Age<60	59.51	0.0000	33.23	0.0000
70≤Age<70	6.73	0.0346	4.06	0.1313
H_0: P(MX) = P(OX)				
Entire sample	41.94	0.0000	19.92	0.0000
Male	16.64	0.0002	7.67	0.0215
Female	28.88	0.0000	12.74	0.0017
15≤Age<30	1.86	0.3948	1.26	0.5324
30≤Age<50	7.86	0.0197	13.87	0.0010
50≤Age<60	28.18	0.0000	11.41	0.0033
70≤Age<70	21.81	0.0000	3.69	0.1584

In table 14, test results from the estimation in which the marginally attached are divided according to availability are presented. The hypothesis that the subgroups are identical to either unemployment or outside labour force is rejected for most of the subgroups. One exception is individuals who are available within one month. After one year the hypothesis that they are identical to individuals outside the labour force cannot be rejected. This is the case no matter how the sample is divided.

Table 13: Hypothesis test of subgroups of marginally attached, waiting (MW), non waiting (MNW), education (ME) against unemployed (U) and outside the labour force (O) (Wald test).

Transition after one	quarter		year	
	Test value	Prob.	Test value	Prob.
H_0:P(MWX) = P(UX)				
Entire sample	5.97	0.0504	0.09	0.9565
Male	1.59	0.4513	1.86	0.3944
Female	4.73	0.0938	1.02	0.6015
15≤Age<30	0.50	0.7790	0.62	0.7330
30≤Age<50	5.48	0.0644	0.16	0.9232
50≤Age<60	2.31	0.3156	0.93	0.6297
70≤Age<70	.	.	.	.
H_0:P(MEX) = P(OX)				
Entire sample	24.27	0.0000	4.78	0.0915
Male	20.12	0.0000	2.67	0.2625
Female	10.27	0.0059	2.14	0.3427
15≤Age<30	0.63	0.7300	4.87	0.0876
30≤Age<50	4.14	0.1261	4.91	0.0858
50≤Age<60	16.14	0.0003	11.92	0.0026
70≤Age<70	6.50	0.0387	10.74	0.0046
H_0:P(MNWX)=P(OX)				
Entire sample	51.42	0.0000	25.83	0.0000
Male	11.10	0.0039	15.23	0.0005
Female	40.87	0.0000	13.18	0.0014
15≤Age<30	9.68	0.0079	4.16	0.1249
30≤Age<50	8.83	0.0121	7.89	0.0194
50≤Age<60	37.14	0.0000	11.89	0.0026
70≤Age<70	16.34	0.0003	3.50	0.1741

In order to further examine the marginalisation state I present in appendix D an estimation of a Markov Model which uses all three observations in the panel data to examine for state dependency[9]. The model clearly indicates that both employment and out of labour force are both absorbing states. If a person has been in one of these states during the first two interviews, then the probability of also being in the state during the third interview is over 90 per cent for both states. Also unemployment and marginalisation show sign of negative state dependency. For both these states the probability of staying in the state increases if individuals have been in the state for the two previous interviews compared to only one interview. Still, the increase is only marginal (from 20 per cent to 27 per cent for marginally attached) and the numbers give no indication of an absorbing state.

Table 14: Hypothesis test of subgroups of marginally attached, available within 1 week (M1W), one month (M1M), later (ML) against unemployed (U) and outside the labour force (O) (Wald test).

Transition after one:	quarter		year	
	Test value	Prob.	Test value	Prob
H_0:P(M1WX) = P(UX)				
Entire sample	98.76	0.0000	62.41	0.0000
Male	36.11	0.0000	19.04	0.0000
Female	69.24	0.0000	45.60	0.0000
15≤Age<30	40.19	0.0000	20.64	0.0000
30≤Age<50	45.52	0.0000	20.99	0.0000
50≤Age<60	22.84	0.0000	22.82	0.0000
70≤Age<70	5.89	0.0525	6.05	0.0485
H_0:P(M1WX) = P(OX)				
Entire sample	43.89	0.0000	34.28	0.0000
Male	6.13	0.0466	17.06	0.0002
Female	45.34	0.0000	18.33	0.0001
15≤Age<30	7.50	0.0235	0.24	0.8851
30≤Age<50	32.76	0.0000	22.67	0.0000
50≤Age<60	8.10	0.0174	12.16	0.0023
70≤Age<70	14.97	0.0006	4.64	0.0984

[9]The model is described in section 3.

Table 14: Continued.

Transition after one:	quarter Test value	Prob.	year Test value	Prob
H_0:P(M1MX)=P(UX)				
Entire sample	22.08	0.0000	21.00	0.0000
Male	7.79	0.0203	11.75	0.0028
Female	15.51	0.0000	13.59	0.0011
15≤Age<30	12.92	0.0016	4.47	0.1068
30≤Age<50	4.86	0.0880	13.37	0.0012
50≤Age<60	10.48	0.0053	4.38	0.1121
70≤Age<70	1.34	0.5129	.	.
H_0:P(M1MX)=P(OX)				
Entire sample	59.11	0.0000	4.48	0.1064
Male	8.86	0.0119	4.82	0.0897
Female	53.14	0.0000	1.35	0.5091
15≤Age<30	18.85	0.0001	0.83	0.6608
30≤Age<50	31.44	0.0000	3.70	0.1574
50≤Age<60	10.51	0.0052	2.03	0.3629
70≤Age<70	4.87	0.0874	0.51	0.7746
H_0:P(MLX)=P(UX)				
Entire sample	620.86	0.0000	293.49	0.0000
Male	244.40	0.0000	121.59	0.0000
Female	383.79	0.0000	172.83	0.0000
15≤Age<30	267.57	0.0000	83.88	0.0000
30≤Age<50	263.11	0.0000	123.29	0.0000
50≤Age<60	43.38	0.0000	17.72	0.0001
70≤Age<70	2.18	0.3356	0.51	0.7746
H_0:P(MLX)=P(OX)				
Entire sample	31.10	0.0000	9.95	0.0069
Male	21.67	0.0000	2.19	0.3339
Female	12.41	0.0020	8.10	0.0175
15≤Age<30	1.33	0.5130	1.81	0.4051
30≤Age<50	8.28	0.0160	5.83	0.0543
50≤Age<60	19.78	0.0001	7.22	0.0270
70≤Age<70	6.88	0.0320	0.67	0.7163

In order to further examine for state dependence I present results from a Logit Model in table 15 where all three state observations are used[10]. The transition into labour market states is conditioned on 12 possible state combinations where OO is included in the constant term. Notice that the sample used does not contain individuals who were employed in the second interview. The results indicate that previous states do affect the transition probabilities.

[10] See section 3 for a description of the Markov model which is the basis of the estimation.

For instance, the marginal effect on the probability of employment from unemployment is 37 per cent if the person was employed during the first interview and only 17 per cent if the person was outside the labour force during the same interview. The estimation shows in the same way that the probability of staying marginally attached goes up by 8 per cent if one was marginally attached in the first observed state compared to only 1 or 2 per cent if one was employed or unemployed in the first observed state.

The more flexible model has been used to test whether individuals' movement on the labour market can be modelled with the simplest Markov model assuming no state dependency as described in section 3, cf. table 16. The Markov assumption is clearly rejected.

Table 15: Estimation values of Logit model where all state observations have been applied.

Cond.var.	dp/dx	St.error	dp/dx	St.error
	P(employ)=0.2396		P(marg)=0.0870	
EU	0.3783	0.0356	-0.0287	0.0104
UU	0.3108	0.0276	-0.0088	0.0096
MU	0.3083	0.0399	-0.0057	0.0152
OU	0.1707	0.0487	-0.0138	0.0183
EM	0.3503	0.0373	0.0130	0.0165
UM	0.1733	0.0418	0.0178	0.0199
MM	0.1362	0.0295	0.0764	0.0196
OM	0.1324	0.0328	0.0619	0.0199
EO	0.3218	0.0343	0.0329	0.0182
UO	0.1693	0.0523	-0.0310	0.0153
MO	0.0704	0.0307	0.0670	0.0210
Male	0.0311	0.0124	-0.0109	0.0065
3.quart	0.0103	0.0129	-0.0102	0.0066
15≤Age<30	0.1250	0.0170	0.0394	0.0090
50≤Age<60	-0.1476	0.0125	-0.0666	0.0071
70≤Age<70	-0.2452	0.0126	-0.1271	0.0077

Table 15: Continued.

Cond.var.	dp/dx	St.error	dp/dx	St.error
	P(unempl)=0.0836		P(outs)=0.5898	
EU	0.2487	0.0368	-0.5983	0.0115
UU	0.3555	0.0297	-0.6575	0.0106
MU	0.2503	0.0420	-0.5529	0.0148
OU	0.3137	0.0555	-0.4706	0.0254
EM	0.1145	0.0359	-0.4777	0.0210
UM	0.3454	0.0454	-0.5365	0.0175
MM	0.2466	0.0361	-0.4592	0.0189
OM	0.1853	0.0377	-0.3796	0.0235
EO	0.0687	0.0304	-0.4235	0.0212
UO	0.2693	0.0574	-0.4076	0.0332
MO	0.2276	0.0397	-0.3649	0.0246
Male	0.0074	0.0064	-0.0277	0.0168
3.quart.	0.0056	0.0067	-0.0058	0.0174
$15 \leq$Age<30	-0.0268	0.0065	-0.1376	0.0215
$50 \leq$Age<60	-0.0203	0.0069	0.2346	0.0171
$70 \leq$Age<70	-0.0978	0.0082	0.4701	0.0149

Given this, I have used the estimated model to test the marginally attached state against the other labour market states, cf. table 16. The hypothesis that the marginally attached state is identical to unemployment is clearly rejected. When it comes to the hypothesis that marginally attached is identical to being outside the labour force, the rejection is not equally clear. The hypothesis is rejected at a 5 per cent level but not at a 1 per cent level. This may be due to the large proportion of individuals undertaking an education in the marginally attached group. A natural extension would be to perform estimations of the full model dividing the marginal state into subgroups. Unfortunately, my data set is not large enough to perform this estimation.

Table 16: Hypothesis testing of the Markov assumption and the marginalised state using the full model (Wald test).

	D.F.	Test value	Prob.
H_0: Markov assumption	27	1121.26	0.0000
H_0: P(MX)=P(UX)	8	122.92	0.0000
H_0: P(MX)=P(OX)	8	17.03	0.0298

8 Comparison between the Danish and international marginalisation definition

In most countries, labour market states are defined and measured by interviewing individuals about their own perception of their labour market attachment. In Denmark, statistics on the labour market is almost solely based on administrative data. This is possible primarily because Denmark is a country with a very intense registration of individuals' movements on the labour market as well as in other aspects of life. Every person is at birth or immigration given a personal code which follows the individual his or her entire life. All statistics are linked to that personal code and by merging data it is therefore possible to obtain extremely detailed and long panels describing individuals' movements on the labour market. These statistics are used to monitor the labour market in Denmark. In Denmark, conventional labour market states are employment, unemployment and outside the labour force. Employment figures are constructed by using information reported by all firms in Denmark about who they employ over the year. Unemployment figures are constructed by using information on unemployment insurance and social benefit payments over the year. In other words, the unemployment figures are not conditioned on individuals' search behaviour or self reported availability for work. As a supplement to the conventional reported labour market

Table 17: Estimate fractions of the population divided according to Eurostat definitions and Danish definitions (using weights).

DK def.\Eurostat def.	Employed	Unemployed	marginally attached	Outside	Total
Employment	48.14	19.70	32.72	10.79	39.88
Unemployment	0.81	18.69	4.52	1.46	2.01
marginally attached	0.90	9.96	5.24	1.57	1.70
Outside A	47.22	46.16	42.53	13.61	41.52
Outside B	2.92	5.48	14.99	72.57	14.89
Total	2,637,233	177,384	205,784	575,641	3,596,042

statistics, there has since the beginning of the 1990s been reported numbers on long term unemployment and marginalisation. Marginalisation is in Denmark normally defined as unemployment more than 70 to 80 per cent of the last three years. Marginalisation numbers using this definition has been reported by among others the Ministry of Finance (1997) as well as Ingerslev and Pedersen (1996).

Comparing the Danish labour market states with the labour market states defined by Eurostat as well as Jones and Riddell can produce a first glimpse of the possible reasons for marginalisation. Can long periods of non employment for instance increase the risk of ending up as marginally attached as defined by Jones and Riddell? Or is marginalisation more a product of random chocks or specific life cycle decisions which give people a disadvantage on the labour market[11]?

In table 17, the Danish labour market states are crossed with the Eurostat

[11] An example of a random chock could be sickness which influences one's performance on the labour market, or give that signal to the employers. Decisions somewhat endogenous to individuals can be the choice of having children and the resulting problem with child minding which may lower the availability for the labour market, or give that signal to the employers.

Table 18: Estimate fractions of the marginalised group divided according to subgroups and Danish labour market definitions (using weights).

DK def.\Marg.subg.	Waiting	Non waiting	Education	No response	Total
Employed	24.66	14.63	42.41	26.51	32.72
Unemployed	13.46	5.66	2.97	13.89	4.52
marginally attached	5.24	7.87	3.85	7.32	5.24
Outside short	43.03	34.65	46.76	34.61	42.53
Outside perm.	13.60	37.20	4.01	17.68	14.99
Total	7,687	63,315	128,594	6,188	205,784

and Jones and Riddell definitions. Some peculiarities are bound to exist in this table due to the difference in timing. The Danish definitions are primarily based on monthly data but also to some extend on yearly data. This means that individuals in one month according to Danish data will be categorised as employed. They can, however, at the same time in a given week give answers to the LFS which place them in a non employment category according to the Eurostat definitions. For people marginally attached according to Jones and Riddell it appears that more than 25 per cent are counted as employed by Danish definitions. This is more than for unemployed individuals (15 per cent). Also, long-term unemployment or marginalisation according to the Danish definition is overrepresented in the marginally attached state. But still less overrepresented than in the unemployment state.

In table 18, the marginally attached state has been divided according to the stated reason for marginalisation. This does give some more information about the subgroups in the marginally attached state. When it comes to the Danish employment state there may be some problems. This is indicated by the fact that more than 40 per cent of the individuals giving education as a

reason for marginalisation are classified as employed according to the Danish definitions. The reason for this may be that the Danish register information on employment are not as precise as on the different unemployment transfers people can get. The large employment group may also be due to the fact that many students have jobs beside their studies. If they have not worked during the week of the survey, they will not be registered as employed. Another interesting finding is that individuals who by Danish definitions count as permanently outside the labour force (on various pension schemes) constitute more than 37 per cent of the non waiting marginally attached. This is about 23,000 individuals or about 11 per cent of the marginally attached group. These are individuals who in the Danish system are normally regarded as lost for the labour market. The proportion of the Danish long-term unemployment definition (DK marginally attached) in the marginally attached group is over average. And the group is largest for the non waiting marginally attached. Still, the table does not give any clear evidence that long term unemployment is an important factor in the creation of the marginally attached state.

9 Conclusion

In this paper I have tested for the existence of a marginally attached state on the labour market in Denmark. I have examined whether this state consists of heterogenous groups with regard to labour market behaviour. The following can be concluded:

1. It is important for the definition of the marginally attached state that the questions used to single out individuals are very precise and identical from study to study. In this study, individuals are asked to report whether they would like to work now or later, whereas Jones and Riddell ask individuals whether they would like to find employment in a given week. This difference appears to result in some difference in the

marginally attached groups between the two studies. The evidence of how important a precise definition is can also be used as an important reminder to other labour market states. The search requirement in the unemployment state, for instance, is defined very differently between countries, cf. OECD (1987).

2. The empirical study indicates that there does exist a marginally attached state in Denmark where individuals display labour market behaviour significantly different from both unemployed individuals as well as individuals outside the labour force. The state consists of about 200,000 individuals which is about the same size as the number of unemployed individuals during the sample period.

3. The state seems to consist of very heterogenous groups. Individuals waiting for employment display labour market behaviour which is similar to unemployed individuals and in the short run actually display an employment probability which surpasses the probability of unemployed individuals.

4. Individuals who are not waiting for employment, display labour market behaviour significantly different from both unemployed individuals and individuals outside the labour force.

5. Dividing the marginally attached state according to availability reveals that about 30,000 individuals or about 15 per cent of the marginally attached report that they are available for employment within 1 week and 22 per cent within 1 month.

6. Tests of state dependency indicate that individuals' labour market behaviour is influenced by their labour market history. The marginally attached state does not, however, give indication of being an absorbing

state in the same way as employment and outside the labour force.

7. Comparing the Eurostat labour market definitions and the marginally attached state with the Danish labour market states does not at first glimpse indicate that entering marginalisation is a result of long-term unemployment. Dividing the marginally attached state according to reason for marginalisation, however, reveals that almost 40 per cent of individuals who are not waiting for employment are in Denmark counted as permanently outside the labour force[12]. This is almost 11 per cent of the entire marginally attached group as measured in this paper. This indicates that some individuals who are commonly regarded as engaged in household production and permantly lost for the labour market actually do wish to find employment.

The findings of this paper raise some new questions. For example, which processes lead people into the marginalisation state? And what are the prospects of marginally attached individuals on the labour market? The finding of heterogenous subgroups in the marginally attached state leads me to believe that there are many different reasons for marginalisation which may also reflect individuals' future chances on the labour market. Future research will hopefully tell us whether this is the case.

[12]This Danish category includes individuals who receive different forms of pensions such as early retirement pension, disability pension, etc. cf. section 8.

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A Questions used to define labour market states in LFS

Table 19: Questions used to define employed, unemployed and out of the labour force in LFS.

Employed	Were you at work in the reference week? • Yes, worked for at least one hour
Else	
Unemployed	Why do you not want to become employed? • Have already found employment Have you within the last months done anything in order to find employment or start your own firm? • Have already obtained employment which will commence later
Or	Would you like to find employment now or later? • Yes Have you been in contact with the Job Center, the Municipality or unemployment fund? • Yes, within the last month • Yes, within the last 3 months • Yes, more than 3 months ago Have you within the last month done anything else in order to find employment? • Been in contact with private job center • Direct application to employer • Contacted friends, relatives, unions, etc. • Inserted or answered advertisement in papers, TV, magazines, etc. • Read but not answered the employment pages in papers, tv, magazines and other places • Have applied permission, licenses, loan enterprise allowance, etc. • Have applied for business premises, land, equipment • Have already obtained job which will commence later • Other ways When would you be able to start working if you got a job or got the opportunity to start as self employed? • Within 1 week • Within 2 weeks
Else	(Continued next page)

Table 19: Continued.

Outside	Have you within the last month done anything else in order to find employment? • Have been promised a job within the next 6 months • Have not done anything • Waiting for answer from application • Waiting for offer from the Job Center or the local Municipality job center • Waiting for results from entrance examination with regard to job in the public sector
And	All remaining individuals

B Questions and answers used to construct subcategories of marginally attached

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Waiting

Why have you not done anything in order to find employment?

* Have already been in contact with the employment service within the last 3 months
* Hopes to be re-employed

Have you within the last month done anything to find employment?

* Waiting for reply on job application
* Waiting for offer from the Employment Service
* Waiting for test results with regard to employment within the public sector
* Have been promised employment within 6 months

Non waiting

Why have you not done anything in order to find employment?

* Sickness, handicap
* Family related commitments, taking care of children, sick (including maternity leave)
* Is getting or applying for disability pension, early retirement pension
* Have given up finding employment

Why can you not commence employment within 2 weeks?

* Have to finish military service
* Commitments to family, taking care of children, sick (including marternity leave)
* Sickness
* Is finishing vacation or leave

Education

Why have you not done anything in order to find employment?

* Undertaking education/applying or start on an education

Why can you not commence employment within 2 weeks?

* Have to finish education

C Estimation results of transition between labour market states.

Table 20: Estimation of labour market states where sample has been divided according to gender.

Data construct	Transfer after a Variables	quarter dp/dx	St.error.	year dp/dx	St.error
Men	Pr(employed) =	0.1701		0.2409	
	Unemployed	0.2333	0.0161	0.3224	0.0191
	Marginalised	0.0710	0.0149	0.1381	0.0181
	15≤Age<30	0.1210	0.0144	0.1865	0.0175
	30≤Age<60	-0.1066	0.0110	-0.1869	0.0124
	60≤Age<70	-0.1321	0.0111	-0.2449	0.0115
	Pr(unemployed) =	0.1262		0.0972	
	Unemployed	0.4363	0.0178	0.2244	0.0177
	Marginalised	0.1877	0.0192	0.1266	0.0171
	15≤Age<30	-0.0258	0.0086	-0.0176	0.0080
	50≤Age<60	-0.0461	0.0084	-0.0361	0.0077
	60≤Age<70	-0.1273	0.0083	-0.1236	0.0074
	Pr(marginalised) =	0.1503		0.0872	
	Unemployed	-0.0282	0.0084	0.0174	0.0085
	Marginalised	0.0851	0.0131	0.0576	0.0109
	15≤Age<30	0.0456	0.0105	0.0428	0.0090
	50≤Age<60	-0.1175	0.0091	-0.0816	0.0082
	60≤Age<70	-0.2276	0.0079	-0.1557	0.0068
	P(outside) =	0.5087		0.5281	
	Unemployed	-0.6206	0.0141	-0.5726	0.0172
	Marginalised	-0.3099	0.0216	-0.3048	0.0240
	15≤Age<30	-0.1784	0.0266	-0.2107	0.0281
	50≤Age<60	0.2033	0.0259	0.2642	0.0245
	60≤Age<70	0.4129	0.0227	0.5060	0.0205

Table 20: Continued.

Data construct	Transfer after a Variables	quarter dp/dx	St.error.	year dp/dx	St.error
Women	Pr(employed) =	0.2144		0.2876	
	Unemployed	0.2289	0.0194	0.3450	0.0228
	Marginalised	0.0465	0.0216	0.1494	0.0255
	15≤Age<30	0.1557	0.0216	0.1830	0.0238
	50≤Age<60	-0.0880	0.0183	-0.1792	0.0186
	70≤Age<70	-0.1002	0.0189	-0.2647	0.0187
	Pr(unemployed) =	0.1489		0.0955	
	Unemployed	0.4218	0.0210	0.2284	0.0213
	Marginalised	0.1723	0.0274	0.1177	0.0234
	15≤Age<30	-0.0224	0.0127	-0.0217	0.0100
	50≤Age<60	-0.0292	0.0131	-0.0221	0.0100
	70≤Age<70	-0.1406	0.0134	-0.1188	0.0106
	Pr(marginalised) =	0.1281		0.0888	
	Unemployed	-0.0302	0.0098	-0.0008	0.0103
	Marginalised	0.0911	0.0177	0.0377	0.0135
	15≤Age<30	0.0451	0.0136	0.0494	0.0133
	50≤Age<60	-0.0862	0.0116	-0.0629	0.0105
	70≤Age<70	-0.1720	0.0113	-0.1226	0.0102
	P(outside) =	0.5533		0.5746	
	Unemployed	-0.6414	0.0108	-0.5642	0.0145
	Marginalised	-0.3438	0.0161	-0.3222	0.0187
	15≤Age<30	-0.1409	0.0195	-0.2116	0.0213
	50≤Age<60	0.2701	0.0165	0.3046	0.0161
	70≤Age<70	0.4870	0.0142	0.5242	0.0131

Table 21: Estimation of labour market states where sample has been divided according to age.

Sample construct	Transfer after one: Variables	quarter dp/dx	St.error	year dp/dx	St.erro
15≤Age<30	P(employed) =	0.3007		0.4786	
	Male	0.0215	0.0163	0.0347	0.0183
	Unemployed	0.2462	0.0222	0.1808	0.0236
	Marginalised	0.0210	0.0198	0.0341	0.0211
	P(unemployed) =	0.1618		0.1127	
	Male	0.0238	0.0127	-0.0031	0.0112
	Unemployed	0.2085	0.0207	0.0753	0.0174
	Marginalised	0.0421	0.0173	-0.0018	0.0139
	P(marginalised) =	0.2860		0.2122	
	Male	-0.0246	0.0155	-0.0317	0.0147
	Unemployed	-0.2265	0.0161	-0.0963	0.0176
	Marginalised	0.0274	0.0169	0.0328	0.0166
	P(outside) =	0.2515		0.1965	
	Male	-0.0207	0.0150	0.0001	0.0145
	Unemployed	-0.2282	0.0146	-0.0651	0.0147
	Marginalised	-0.0906	0.0150	-0.1599	0.0145
30≤Age<50	P(employed) =	0.2456		0.3799	
	Male	0.0103	0.0183	0.0447	0.0216
	Unemployed	0.1904	0.0194	0.3265	0.0233
	Marginalised	0.0286	0.0274	0.1163	0.0317
	P(unemployed) =	0.2858		0.2119	
	Male	0.0233	0.0188	0.0084	0.0170
	Unemployed	0.4788	0.0209	0.2255	0.0214
	Marginalised	0.1856	0.0334	0.1497	0.0308
	P(marginalised) =	0.2436		0.1671	
	Male	-0.0340	0.0183	-0.0418	0.0161
	Unemployed	-0.1315	0.0158	-0.0683	0.0155
	Marginalised	0.0426	0.0224	-0.0091	0.0182
	P(outside) =	0.2250		0.2410	
	Male	0.0004	0.0184	-0.0113	0.0197
	Unemployed	-0.5377	0.0138	-0.2568	0.0154
	Marginalised	-0.2567	0.0146	-0.4838	0.0160

Table 21: Continued.

Sample construct	Transfer after one: Variables	quarter dp/dx	St.error	year dp/dx	St.erro
50≤Age<60	P(employed) =	0.1448		0.1518	
	Male	0.0506	0.0189	0.0455	0.0186
	Unemployed	0.1463	0.0163	0.2679	0.0209
	Marginalised	0.0066	0.0259	0.1433	0.0359
	P(unemployed) =	0.1550		0.1062	
	Male	0.0402	0.0175	0.0126	0.0135
	Unemployed	0.5685	0.0188	0.4073	0.0219
	Marginalised	0.3178	0.0423	0.3350	0.0422
	P(marginalised) =	0.1120		0.0585	
	Male	-0.0104	0.0155	0.0025	0.0121
	Unemployed	0.0831	0.0141	0.0531	0.0125
	Marginalised	0.2420	0.0383	0.1082	0.0295
	P(outside) =	0.5883		0.6835	
	Male	-0.0804	0.0308	-0.0606	0.0280
	Unemployed	-0.7978	0.0117	-0.5866	0.0248
	Marginalised	-0.5664	0.0192	-0.7283	0.0158
70≤Age<70	P(employed) =	0.0374		0.0346	
	Male	0.0291	0.0068	0.0188	0.0067
	Unemployed	0.1032	0.0300	0.0661	0.0245
	Marginalised	0.0540	0.0318	0.1225	0.0449
	P(unemployed) =	0.0080		0.0046	
	Male	0.0030	0.0020	0.0007	0.0014
	Unemployed	0.4511	0.0398	0.2054	0.0348
	Marginalised	0.1713	0.0416	0.0531	0.0208
	P(marginalised) =	0.0121		0.0045	
	Male	0.0075	0.0036	0.0048	0.0024
	Unemployed	0.0913	0.0239	0.0741	0.0254
	Marginalised	0.1110	0.0426	0.0277	0.0188
	P(outside) =	0.9425		0.9563	
	Male	-0.0395	0.0082	-0.0244	0.0074
	Unemployed	-0.6456	0.0380	-0.2033	0.0510
	Marginalised	-0.3363	0.0586	-0.3456	0.0422

Table 22: Estimation values of multinomial logit model with marginalisation subgroups and sample split according to gender.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
Men	Pr(employed)	0.1681		0.2403	
	Unemployed	0.2327	0.0158	0.3263	0.0188
	Waiting	0.3710	0.0775	0.2522	0.0738
	Non waiting	-0.0075	0.0189	0.0945	0.0247
	Education	0.0694	0.0179	0.1508	0.0225
	15≤Age<30	0.1178	0.0144	0.1820	0.0176
	50≤Age<60	-0.1098	0.0108	-0.1883	0.0123
	70≤Age<70	-0.1350	0.0107	-0.2457	0.0114
	P(unemployed) =	0.1280		0.0981	
	Unemployed	0.4307	0.0173	0.2153	0.0172
	Waiting	0.2606	0.0766	0.2046	0.0692
	Non waiting	0.2218	0.0269	0.1358	0.0232
	Education	0.1511	0.0238	0.0982	0.0211
	15≤Age<30	-0.0211	0.0090	-0.0148	0.0084
	50≤Age<60	-0.0507	0.0084	-0.0391	0.0076
	70≤Age<70	-0.1324	0.0082	-0.1272	0.0073
	Pr(marginalised) =	0.1503		0.0872	
	Unemployed	-0.0254	0.0085	0.0187	0.0086
	Waiting	-0.1123	0.0190	0.0191	0.0354
	Nonwaiting	0.1142	0.0200	0.0554	0.0156
	Education	0.0785	0.0156	0.0635	0.0135
	15≤Age<30	0.0495	0.0110	0.0420	0.0091
	50≤Age<60	-0.1176	0.0091	-0.0816	0.0082
	70≤Age<70	-0.2267	0.0079	-0.1554	0.0068
	Pr(outside) =	0.5536		0.5743	
	Unemployed	-0.6380	0.0110	-0.5603	0.0147
	Waiting	-0.5194	0.0181	-0.4760	0.0377
	Non waiting	-0.3285	0.0208	-0.2857	0.0254
	Education	-0.2989	0.0196	-0.3125	0.0229
	15≤Age<30	-0.1462	0.0196	-0.2092	0.0214
	50≤Age<60	0.2781	0.0164	0.3090	0.0161
	70≤Age<70	0.4941	0.0137	0.5283	0.0130

Table 22: Continued.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
Women	Pr(employed)	0.2134		0.2878	
	Unemployed	0.2285	0.0191	0.3444	0.0226
	Waiting	0.3798	0.0711	0.3714	0.0656
	Non waiting	0.0336	0.0354	0.1238	0.0414
	Education	-0.0100	0.0222	0.1162	0.0285
	15≤Age<30	0.1774	0.0223	0.1940	0.0243
	50≤Age<60	-0.0961	0.0180	-0.1839	0.0186
	70≤Age<70	-0.1036	0.0188	-0.2702	0.0185
	P(unemployed) =	0.1498		0.0949	
	Unemployed	0.4204	0.0204	0.2273	0.0208
	Waiting	0.1654	0.0689	0.1568	0.0617
	Non waiting	0.2136	0.0425	0.1896	0.0397
	Education	0.1400	0.0318	0.0878	0.0270
	15≤Age<30	-0.0148	0.0133	-0.0164	0.0104
	50≤Age<60	-0.0356	0.0130	-0.0251	0.0099
	70≤Age<70	-0.1452	0.0130	-0.1201	0.0103
	P(marginalised) =	0.1283		0.0890	
	Unemployed	-0.0294	0.0097	-0.0007	0.0102
	Waiting	-0.0779	0.0229	-0.0538	0.0175
	Nonwaiting	0.1249	0.0318	0.0111	0.0203
	Education	0.0851	0.0199	0.0442	0.0158
	15≤Age<30	0.0458	0.0141	0.0454	0.0132
	50≤Age<60	-0.0881	0.0115	-0.0633	0.0105
	70≤Age<70	-0.1741	0.0113	-0.1237	0.0101
	Pr(outside) =	0.5085		0.5282	
	Unemployed	-0.6196	0.0145	-0.5709	0.0175
	Waiting	-0.4673	0.0230	-0.4744	0.0250
	Non waiting	-0.3722	0.0264	-0.3246	0.0345
	Education	-0.2151	0.0275	-0.2482	0.0291
	15≤Age<30	-0.2084	0.0269	-0.2230	0.0282
	50≤Age<60	0.2198	0.0262	0.2724	0.0248
	70≤Age<70	0.4229	0.0226	0.5140	0.0203

Table 23: Estimation values of multinomial logit model with marginalisation subgroups and sample split in age groups.

	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
15≤Age<30	Pr(employed) =	0.2997		0.4796	
	unemployed	0.2401	0.0220	0.1799	0.0238
	Waiting	0.2593	0.0959	0.1895	0.0802
	Nonwaiting	-0.0557	0.0333	0.0040	0.0352
	Education	0.0154	0.0209	0.0328	0.0224
	Male	0.0195	0.0164	0.0349	0.0183
	Pr(unemployed)	0.1634		0.1130	
	unemployed	0.2108	0.0206	0.0749	0.0175
	Waiting	0.1707	0.0941	0.0568	0.0656
	Nonwaiting	0.1049	0.0347	0.0544	0.0257
	Education	0.0285	0.0188	-0.0189	0.0147
	Male	0.0258	0.0129	-0.0006	0.0114
	Pr(marginalised) =	0.2859		0.2113	
	Unemployed	-0.2257	0.0161	-0.0959	0.0175
	Waiting	-0.2338	0.0394	-0.0868	0.0542
	Nonwaiting	0.0567	0.0313	-0.0032	0.0271
	Education	0.0289	0.0181	0.0446	0.0181
	Male	-0.0232	0.0156	-0.0338	0.0146
	Pr(outside) =	0.2510		0.1961	
	unemployed	-0.2252	0.0146	-0.1589	0.0145
	Waiting	-0.1962	0.0339	-0.1595	0.0288
	Nonwaiting	-0.1059	0.0211	-0.0553	0.0218
	Education	-0.0728	0.0153	-0.0585	0.0148
	Male	-0.0221	0.0149	-0.0005	0.0145

Table 23: Continued.

	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
30≤Age<50	Pr(employed) =	0.2438		0.3795	
	unemployed	0.1873	0.0188	0.3325	0.0228
	Waiting	0.3272	0.0822	0.1831	0.0857
	Nonwaiting	-0.0340	0.0318	0.0757	0.0397
	Education	-0.0061	0.0330	0.1312	0.0399
	Male	0.0026	0.0184	0.0418	0.0216
	Pr(unemployed) =	0.2904		0.2144	
	unemployed	0.4714	0.0214	0.2130	0.0206
	Waiting	0.1111	0.0830	0.1634	0.0838
	Nonwaiting	0.1802	0.0409	0.1332	0.0395
	Education	0.1394	0.0421	0.1045	0.0388
	Male	0.0219	0.0190	0.0079	0.0172
	Pr(marginalised) =	0.2409		0.1667	
	Unemployed	-0.1283	0.0157	-0.0674	0.0154
	Waiting	-0.2089	0.0182	-0.1095	0.0322
	Nonwaiting	0.0481	0.0288	-0.0165	0.0221
	Education	0.0743	0.0305	-0.0039	0.0227
	Male	-0.0294	0.0184	-0.0412	0.0162
	Pr(outside) =	0.2249		0.2394	
	unemployed	-0.5304	0.0139	-0.4781	0.0160
	Waiting	-0.2294	0.0121	-0.2371	0.0131
	Nonwaiting	-0.1944	0.0135	-0.1923	0.0150
	Education	-0.2076	0.0131	-0.2317	0.0137
	Male	0.0048	0.0186	-0.0085	0.0197

Table 23: Continued.

	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
50≤Age<60	Pr(employed) =	0.1412		0.1564	
	unemployed	0.1433	0.0160	0.2612	0.0207
	Waiting	0.3406	0.0964	0.2977	0.0915
	Nonwaiting	-0.0822	0.0213	0.0526	0.0434
	Education	-0.0365	0.0357	0.0960	0.0582
	Male	0.0419	0.0186	0.0496	0.0192
	Pr(unemployed)	0.1585		0.1091	
	unemployed	0.5692	0.0187	0.4053	0.0217
	Waiting	0.2235	0.0968	0.2333	0.0872
	Nonwaiting	0.3275	0.0538	0.2979	0.0544
	Education	0.2854	0.0712	0.4778	0.0712
	Male	0.0408	0.0177	0.0160	0.0137
	Pr(marginalised) =	0.1127		0.0588	
	Unemployed	0.0824	0.0141	0.0538	0.0126
	Waiting	0.0043	0.0621	0.0900	0.0565
	Nonwaiting	0.2658	0.0509	0.1352	0.0448
	Education	0.3140	0.0697	0.0884	0.0445
	Male	-0.0062	0.0158	0.0034	0.0122
	Pr(outside) =	0.5877		0.6758	
	unemployed	-0.7949	0.0118	-0.7203	0.0160
	Waiting	-0.5684	0.0209	-0.6210	0.0361
	Nonwaiting	-0.5111	0.0231	-0.4856	0.0348
	Education	-0.5629	0.0208	-0.6622	0.0197
	Male	-0.0765	0.0306	-0.0689	0.0284

Table 23: Continued.

	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
70≤Age<70	Pr(employed) =	0.0374		0.0338	
	unemployed	0.1051	0.0303	0.0678	0.0248
	Waiting	0.1698	0.1237	0.1303	0.1040
	Nonwaiting	0.0375	0.0338	0.1260	0.0525
	Education	0.0940	0.1219	-0.0346	0.0033
	Male	0.0291	0.0068	0.0185	0.0066
	Pr(unemployed)	0.0080		0.0042	
	unemployed	0.4551	0.0400	0.1881	0.0326
	Waiting	0.2734	0.1379	-0.0045	0.0011
	Nonwaiting	0.1580	0.0467	0.0539	0.0226
	Education	0.4499	0.2167	-0.0042	0.0010
	Male	0.0031	0.0020	0.0008	0.0013
	Pr(marginalised) =	0.0110		0.0041	
	Unemployed	0.0823	0.0217	0.0678	0.0233
	Waiting	-0.0122	0.0018	-0.0045	0.0012
	Nonwaiting	0.1117	0.0463	0.0263	0.0198
	Education	0.0896	0.1013	-0.0042	0.0011
	Male	0.0070	0.0032	0.0045	0.0022
	Pr(outside) =	0.9436		0.9579	
	unemployed	-0.6424	0.0383	-0.3237	0.0411
	Waiting	-0.4310	0.1603	-0.1213	0.1040
	Nonwaiting	-0.3073	0.0653	-0.2061	0.0584
	Education	-0.6335	0.2237	0.0430	0.0036
	Male	-0.0393	0.0080	-0.0237	0.0071

Table 24: Estimation values of multinomial logit model with marginalisation split according to availability and sample split according to gender.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
Women	P(employed) =	0.1709		0.2419	
	Unemployed	0.2375	0.0161	0.3221	0.0190
	<1 week	0.0685	0.0319	0.0995	0.0362
	<1 month	0.0923	0.0415	0.2194	0.0540
	Later	0.0578	0.0162	0.1241	0.0196
	15≤Age<30	0.1256	0.0145	0.1893	0.0176
	50≤Age<60	-0.1085	0.0111	-0.1888	0.0125
	70≤Age<70	-0.1331	0.0111	-0.2464	0.0115
	P(unemployed) =	0.1255		0.0972	
	Unemployed	0.4296	0.0176	0.2238	0.0176
	<1 week	0.3271	0.0389	0.2183	0.0379
	<1 month	0.4210	0.0478	0.1576	0.0491
	Later	0.1325	0.0206	0.1120	0.0188
	15≤Age<30	-0.0208	0.0088	-0.0161	0.0081
	50≤Age<60	-0.0491	0.0083	-0.0382	0.0076
	70≤Age<70	-0.1285	0.0082	-0.1242	0.0073
	P(marginalised) =	0.1511		0.0876	
	Unemployed	-0.0270	0.0085	0.0179	0.0086
	<1 week	-0.0077	0.0220	0.0479	0.0215
	<1 month	-0.0313	0.0220	0.0821	0.0337
	Later	0.1082	0.0151	0.0558	0.0118
	15≤Age<30	0.0429	0.0105	0.0432	0.0091
	50≤Age<60	-0.1170	0.0091	-0.0821	0.0082
	70≤Age<70	-0.2285	0.0079	-0.1560	0.0068
	P(outside) =	0.5525		0.5733	
	Unemployed	-0.6401	0.0109	-0.5638	0.0146
	<1 week	-0.3879	0.0258	-0.3657	0.0313
	<1 month	-0.4820	0.0215	-0.4591	0.0358
	Later	-0.2985	0.0179	-0.2918	0.0207
	15≤Age<30	-0.1477	0.0195	-0.2164	0.0214
	50≤Age<60	0.2746	0.0166	0.3090	0.0162
	70≤Age<70	0.4900	0.0140	0.5266	0.0131

Table 24: Continued.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
Men	P(employed) =	0.2138		0.2890	
	Unemployed	0.2309	0.0193	0.3468	0.0227
	<1 week	0.1464	0.0421	0.1449	0.0468
	<1 month	0.1193	0.0667	0.1739	0.0701
	Later	0.0016	0.0225	0.1313	0.0279
	15≤Age<30	0.1654	0.0217	0.1878	0.0241
	50≤Age<60	-0.0914	0.0181	-0.1832	0.0187
	70≤Age<70	-0.1021	0.0187	-0.2684	0.0186
	P(unemployed) =	0.1494		0.0946	
	Unemployed	0.4195	0.0207	0.2262	0.0209
	<1 week	0.2050	0.0455	0.2439	0.0465
	<1 month	0.3097	0.0723	0.1633	0.0653
	Later	0.1410	0.0305	0.0843	0.0250
	15≤Age<30	-0.0185	0.0129	-0.0178	0.0102
	50≤Age<60	-0.0325	0.0130	-0.0249	0.0099
	70≤Age<70	-0.1436	0.0132	-0.1206	0.0104
	P(marginalised) =	0.1291		0.0892	
	Unemployed	-0.0299	0.0098	-0.0002	0.0103
	<1 week	0.0404	0.0269	0.0251	0.0241
	<1 month	0.0035	0.0392	-0.0018	0.0309
	Later	0.1064	0.0208	0.0400	0.0152
	15≤Age<30	0.0430	0.0137	0.0487	0.0133
	50≤Age<60	-0.0872	0.0116	-0.0637	0.0106
	70≤Age<70	-0.1734	0.0113	-0.1234	0.0101
	P(outside) =	0.5077		0.5271	
	Unemployed	-0.6205	0.0142	-0.5728	0.0174
	<1 week	-0.3919	0.0252	-0.4138	0.0306
	<1 month	-0.4325	0.0369	-0.3354	0.0547
	Later	-0.2491	0.0253	-0.2556	0.0275
	15≤Age<30	-0.1899	0.0267	-0.2188	0.0282
	50≤Age<60	0.2111	0.0260	0.2717	0.0248
	70≤Age<70	0.4191	0.0226	0.5124	0.0205

Table 25: Estimation values with marginalisation split according to availability and sample split according to age.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
15≤Age<30	P(employed) =	0.3015		0.4789	
	Unemployed	0.2470	0.0222	0.1803	0.0237
	<1 week	0.0590	0.0450	0.0269	0.0455
	<1 month	0.0793	0.0570	0.1019	0.0623
	Later	0.0080	0.0208	0.0282	0.0219
	Male	0.0212	0.0164	0.0347	0.0183
	P(unemployed) =	0.1607		0.1127	
	Unemployed	0.2071	0.0206	0.0755	0.0174
	<1 week	0.1123	0.0428	0.0205	0.0316
	<1 month	0.1939	0.0577	0.0053	0.0424
	Later	0.0214	0.0183	-0.0051	0.0144
	Male	0.0234	0.0127	-0.0032	0.0112
	P(marginalised) =	0.2861		0.2122	
	Unemployed	-0.2265	0.0161	-0.0963	0.0176
	<1 week	-0.0405	0.0361	0.0328	0.0381
	<1 month	-0.1206	0.0365	-0.0201	0.0486
	Later	0.0442	0.0179	0.0353	0.0175
	Male	-0.0246	0.0155	-0.0318	0.0147
	P(outside) =	0.2517		0.1962	
	Unemployed	-0.2276	0.0146	-0.1595	0.0145
	<1 week	-0.1309	0.0249	-0.0802	0.0254
	<1 month	-0.1525	0.0273	-0.0871	0.0355
	Later	-0.0737	0.0153	-0.0584	0.0149
	Male	-0.0200	0.0150	0.0003	0.0145

Table 25: Continued.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
30≤Age<50	P(employed) =	0.2474		0.3824	
	Unemployed	0.1909	0.0194	0.3223	0.0232
	<1 week	0.0864	0.0499	-0.0046	0.0529
	<1 month	0.0470	0.0553	0.1046	0.0685
	Later	-0.0164	0.0300	0.1075	0.0352
	Male	0.0076	0.0184	0.0450	0.0217
	P(unemployed) =	0.2882		0.2116	
	Unemployed	0.4751	0.0209	0.2256	0.0213
	<1 week	0.2598	0.0554	0.2950	0.0571
	<1 month	0.3331	0.0596	0.1428	0.0670
	Later	0.1137	0.0381	0.1123	0.0346
	Male	0.0216	0.0192	0.0061	0.0170
	P(marginalised) =	0.2410		0.1677	
	Unemployed	-0.1304	0.0157	-0.0678	0.0156
	<1 week	-0.1472	0.0240	-0.0654	0.0263
	<1 month	-0.1457	0.0259	-0.0199	0.0352
	Later	0.1152	0.0277	-0.0016	0.0205
	Male	-0.0296	0.0186	-0.0410	0.0162
	P(outside) =	0.2234		0.2383	
	Unemployed	-0.5356	0.0140	-0.4801	0.0160
	<1 week	-0.1991	0.0131	-0.2250	0.0140
	<1 month	-0.2345	0.0116	-0.2275	0.0135
	Later	-0.2125	0.0135	-0.2182	0.0145
	Male	0.0004	0.0184	-0.0101	0.0197

Table 25: Continued.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
50≤Age<60	P(employed)=	0.1439		0.1526	
	Unemployed	0.1470	0.0164	0.2646	0.0207
	<1 week	0.0344	0.0412	0.0757	0.0483
	<1 month	-0.0987	0.0338	0.1433	0.0963
	Later	-0.0156	0.0314	0.1301	0.0498
	Male	0.0490	0.0188	0.0463	0.0187
	P(unemployed) =	0.1567		0.1058	
	Unemployed	0.5670	0.0195	0.4083	0.0218
	<1 week	0.3097	0.0617	0.3846	0.0601
	<1 month	0.4567	0.1131	0.3030	0.1229
	Later	0.2747	0.0562	0.3388	0.0600
	Male	0.0390	0.0175	0.0129	0.0134
	P(marginalised) =	0.1135		0.0583	
	Unemployed	0.0815	0.0141	0.0532	0.0124
	<1 week	0.1878	0.0552	0.0916	0.0387
	<1 month	0.2208	0.1110	0.1730	0.1077
	Later	0.2722	0.0533	0.1048	0.0421
	Male	-0.0111	0.0157	0.0026	0.0121
	P(outside) =	0.5858		0.6833	
	Unemployed	-0.7955	0.0118	-0.7261	0.0159
	<1 week	-0.5318	0.0233	-0.5519	0.0335
	<1 month	-0.5788	0.0177	-0.6193	0.0346
	Later	-0.5313	0.0220	-0.5736	0.0297
	Male	-0.0770	0.0307	-0.0618	0.0280

Table 25: Continued.

Sample contruct	Transfer after one:	quarter dp/dx	St.error	year dp/dx	St.error
60≤Age<70	P(employed)=	0.0375		0.0327	
	Unemployed	0.1033	0.0300	0.0639	0.0237
	<1 week	0.0524	0.0409	0.1428	0.0573
	<1 month	0.0927	0.1017	-0.0346	0.0033
	Later	0.0525	0.0580	0.1332	0.0945
	Male	0.0291	0.0068	0.0180	0.0064
	P(unemployed) =	0.0080		0.0043	
	Unemployed	0.4513	0.0398	0.1970	0.0337
	<1 week	0.1802	0.0535	0.0700	0.0286
	<1 month	0.2098	0.1258	-0.0045	0.0011
	Later	0.1696	0.0881	0.0302	0.0346
	Male	0.0030	0.0020	0.0007	0.0013
	P(marginalised) =	0.0121		0.0045	
	Unemployed	0.0910	0.0238	0.0752	0.0256
	<1 week	0.0797	0.0496	0.0178	0.0142
	<1 month	0.3232	0.1864	0.0452	0.0560
	Later	0.1537	0.0867	0.0577	0.0651
	Male	0.0076	0.0036	0.0049	0.0024
	P(outside) =	0.9425		0.9585	
	Unemployed	-0.6456	0.0380	-0.3361	0.0417
	<1 week	-0.3122	0.0736	-0.2305	0.0634
	<1 month	-0.6257	0.1516	-0.0061	0.0561
	Later	-0.3758	0.1165	-0.2210	0.1125
	Male	-0.0397	0.0082	-0.0235	0.0070

D Exploratory dynamics of the 8×12 model

	E_1	E_2	E_3	U_1	U_2	U_3	M_1	M_2	M_3	O_1	O_2	O_3
E_1		ee-		eu-			em-			eo-		
		-ee		-eu			-em			-eo		
E_2			eee	eeu			eem			eeo		
U_1	ue-				uu-		um-			uo-		
	-ue				-uu		-um			-uo		
U_2	uue					uuu	uum			uuo		
M_1	me-			mu-				mm-		mo-		
	-me			-mu				-mm		-mo		
M_2	mme			mmu					mmm	mmo		
O_1	oe-			ou-			om-				oo-	
	-oe			-ou			-om				-oo	
O_2	ooe			oou			oom					ooo

	E_1	E_2	E_3	U_1	U_2	U_3	M_1	M_2	M_3	O_1	O_2	O_3
E_1		.9477		.0175			.0142			.0206		
		.6921		.0923			.0824			.1331		
E_2			.9337	.0202			.0169			.0292		
U_1	.3462				.4435		.1178			.0925		
	.5458				.1964		.1108			.1471		
U_2	.4653					.3303	.0909			.1135		
M_1	.1999			.1518				.3745		.2738		
	.4032			.126				.1943		.2765		
M_2	.3355			.1547					.2705	.2394		
O_1	.0741			.0332			.0966				.7961	
	.3152			.099			.1704				.4154	
O_2	.0538			.0129			.0316					.9017

Does labour market training motivate job search? A study of incentive effects of compulsory ALMP in the Danish UI system

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Abstract

Since 1993, Denmark has shown a remarkable fall in unemployment going from more than 10 per cent in 1993 to just over 4 per cent in 2000. In this paper I argue that the improved performance by the Danish labour market may in part be due to the Danish unemployment insurance system (UI) which was reformed in 1994. The UI system consists of two finite periods, a passive period and an activation period. In the passive period individuals are generally not met with demands. When they enter the activation period, however, they have to participate in labour market training in order to receive benefits. The purpose of the activating period is twofold: 1) activation may improve individuals' qualifications and reintroduce them to the labour market, 2) the compulsory aspect may work as a motivating factor in the same way as a benefits reduction for individuals who do not need activation.

In this paper I estimate the motivation effect of compulsory labour market programmes using legislative changes in duration of the passive period. I find that the activation period does result in a significant motivation effect which in size is comparable to effects found in studies of benefits systems where individuals are at risk of loosing their rights to benefits all together.

1 Introduction

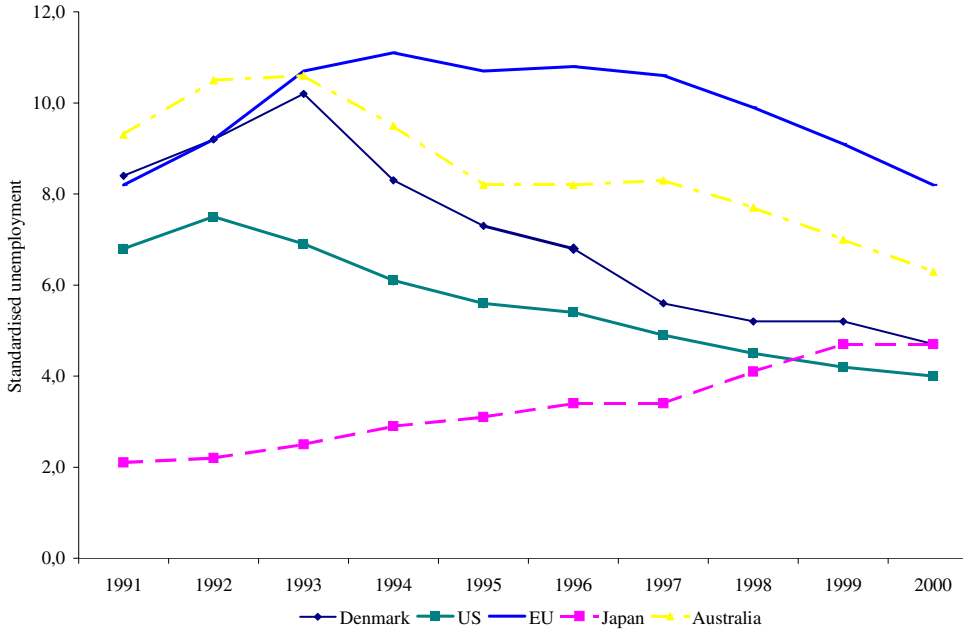
In most western countries, unemployment insurance (UI) is an important feature of the labour market. It reduces the variation of income in case of job loss and stabilises the economy during a recession. UI systems typically affect a large proportion of the labour force. In 2000, almost 83 per cent of the labour force in Denmark was insured, cf. Statistics Denmark (2001). And in the first quarter of 2002, more than 500,000 or about 18 per cent of the labour force were unemployed for at least one day, cf. Statistics Denmark (2002). The fact that such a large proportion of the labour force is in contact with the UI system makes it all the more important to have a good understanding of how the design of the system affects individuals' labour market behaviour.

The notion that the structure of the unemployment insurance system is important for the labour market seems especially relevant for Denmark from 1993 and onwards. In 1993, Denmark experienced one of its highest unemployment levels ever. When the recession ended in 1993-1994, the unemployment decreased rapidly. Denmark was not the only country with a falling unemployment after 1993. But the rate dropped with a rate higher than for almost any other country, cf. Figure 1. There can be many reasons for the steep drop in unemployment. One contributing factor may be the labour market reform which was implemented in Denmark in January 1994 and further expanded over the following years.

The Danish UI system is a voluntary system. It is characterised by easy accessibility and designed with the intend to include a majority of the work force and generally compensate for differences in living conditions between individuals with and without work, cf. Kvist (2002). Before 1994, individuals on the UI were only met with very few obligations. Individuals who met the eligibility criteria were entitled to two and a half years of the UI. After that, individuals were given the chance of regaining the right to the UI through

government supported employment for half a year. In other words, individuals could stay on the UI without unsupported employment for a very long period had they first entered the system[1].

Figure 1: Standardised unemployment levels in per cent, 1991-2000. Source: OECD (2002).



Perhaps due to the high unemployment in the beginning of the nineties a shift towards more obligations in UI systems were observed in almost all western countries, cf. Kvist (2002). Denmark was no exception. With the reform in 1994 the re-earning of the UI right through government supported work was removed and replaced with a 7-year UI period. At the same time the focus of the UI system was changed. An active labour market policy was formed whose main focus was to improve individuals' qualifications in fields where there is a great demand for labour. The policy entailed a wide range of activation measures such as education, job training in public or private firms

[1]Prior to 1994 it was possible to receive the UI for up to 9 years without unsupported employment.

and support for starting as self employed.

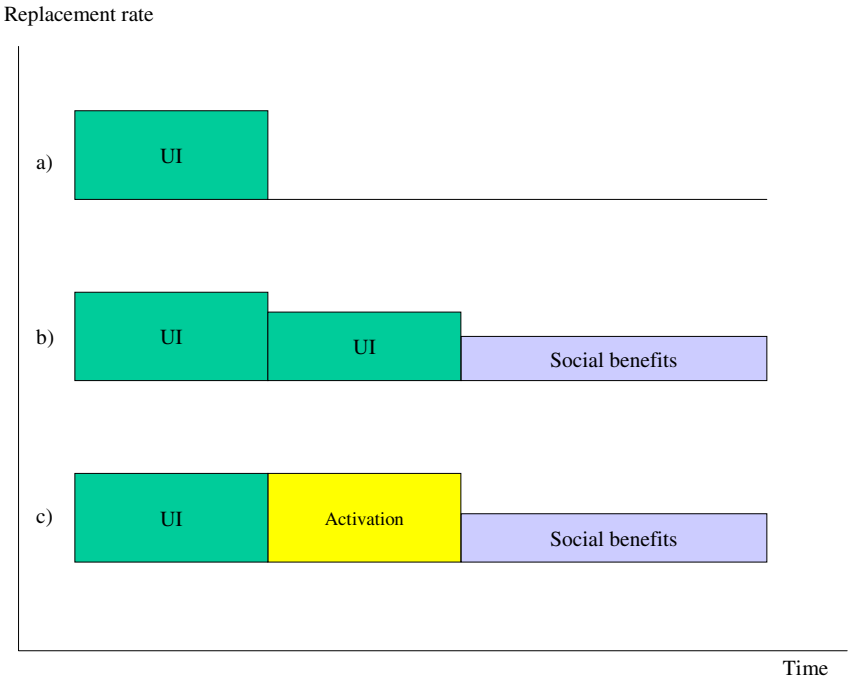
With the reform, the unemployment period was divided into a passive period and an activation period. In the passive period individuals are only met with a limited amount of obligations and are, especially in the beginning of the unemployment spell, left to conduct their own job search. If individuals are interested in activation offers in this period, however, they do have access to it. The shift in obligations occurs when individuals leave the passive period and enter the activation period. In the activation period individuals have to participate in activation. If they refuse, they loose their right to unemployment insurance.

Many approaches have been tried in UI systems in order to motivate individuals to search for and accept job offers. One approach is to make the replacement rate dependent on unemployment duration thereby making it less attractive to stay unemployed for a longer period, cf. Figure 2 b). This can be found in several UI systems. Examples are the Dutch and British UI systems, cf. Stancanelli (1999). A more extreme motivation construction is a short duration of unemployment insurance either followed up by social benefits at a lower rate or alternatively nothing, cf. Figure 2 a). This construction can be found in the US, cf. Rogers (1998). In the Danish unemployment insurance system after 1994, a third version has been implemented. The benefit level stays constant or may even increase slightly if individuals participate in the activation offers, cf. Figure 2 c). The motivating factor in the Danish system is therefore only the compulsory activation.

The purpose of the compulsory activation can be regarded as twofold. Individuals who have not been able to find employment in the passive period may need activation in order to improve their qualifications or reintroduce them to the labour market. At the same time the compulsory aspect of activation and hence reduction of leisure may work as a motivating factor in

the same way as a benefit reduction for individuals who do not need activation. Activation thereby makes it possible to motivate some individuals who are able to find employment without punishing all other individuals in the UI system with a benefit reduction.

Figure 2: Three different models for UI systems.



In 1994, when the labour market reform was implemented, the passive period was set to 4 years of unemployment insurance and the activation period was set to 3 years of insurance. Since then the passive period has been shortened. In July 1996, the passive period was shortened to 3 years and in January 1998 it was shortened to 2 years. Between 1995 and 2001 the average number of people in activation has been stable around 300,000. If we assume that the average activation spell is half a year, then about half a million people undertake activation each year[2]. If activation does have a motivating effect on

[2]The duration of activation spells goes from just a few weeks for courses to job training

individuals, the total effect on unemployment may therefore be substantial.

When it comes to studies of unemployment insurance, the focus has been on how individuals react either to changes in their replacement rate or prior to running out of unemployment insurance. Only very few studies examine the effect of a softer motivation approach such as compulsory activation. Furthermore, there has not yet been a study which tries to identify the size of the motivation effect in a system such as the Danish one.

One of the major problems when analysing motivation effects in a UI system is identification of the effect. Most often, the available data does not give access to plausible observations of the counter-factuals. In other words, it is difficult to find individuals in the data who only differ in terms of how much time they have left until the motivating event (UI exhaustion or activation). In order to obtain identification, different assumptions have been used in the literature. It has for instance been assumed that individuals do not differ in terms of unobservables over regions with different UI duration or according to how many months they have already spent of their UI period, cf. Geerdsen (2002) for a description of different identification assumptions.

In this paper I will examine individuals' labour market behaviour prior to activation. I will examine whether the prospect of activation has a motivation effect similar to the prospect of running out of the UI as analysed in other empirical studies. In order to examine the motivation effect, I perform an estimation of individuals' duration in the UI system. I obtain identification of the motivation effect by assuming that the legislative changes in the duration of the passive period is evenly distributed over unemployed individuals in the population. One fact which supports this assumption is that legislative changes are imposed in the same way on every person who is unemployed.

In section 2, I describe the construction of the Danish UI system before

programmes which last up to 2 years.

and after 1994 as well as the activation policy after 1994. In section 3, I give a review of the empirical literature on motivation effects in UI systems. I review both studies where the focus has been on individuals' behaviour prior to running out of benefits all together as well as studies where the motivation effect of compulsory labour market training is analysed. In section 4, I describe the theoretical model commonly used to analyse possible effects of a finite UI system and I describe the effects of imposing compulsory activation. I also describe the problems which arise when modelling individuals' expectations on time to the activation period. In section 5, I give a description of the data used in the analysis and in section 6 I describe the findings in data. In section 7, I explain the specification of the hazard model and the identification of the motivation effect. In section 8, I report the estimation results. In order to test the sensitivity of the results I also report estimation results of estimations where different expectation models have been applied. Finally I conclude in section 9.

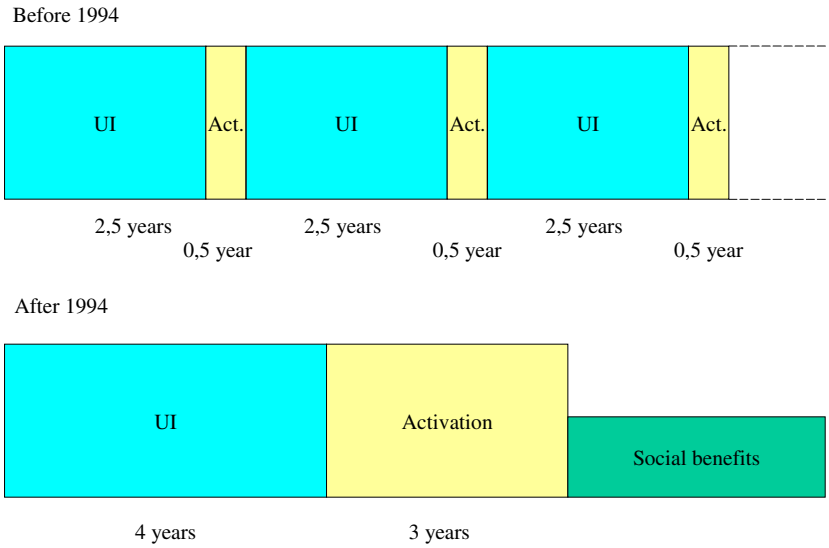
2 A description of the Danish UI system

2.1 The UI system before 1994

The unemployment insurance system was a system which had stayed almost unchanged from 1970 to 1994. The central aspect of the system was that individuals by participating in activation could stay on the UI infinitely. According to rules, individuals were eligible for unemployment insurance as long as they had had more than half a year of employment within the three last years. Participation in activation did count as employment. It therefore became common that individuals received unemployment insurance for 2,5 years followed by half a year of activation thereby regaining the right to the UI, cf. Figure 3.

The unemployment insurance system was a voluntary system. In order

Figure 3: The structure of the Danish unemployment insurance system before and after 1994.



to enter the system one had to be between 18 and 65 years old and have at least 5 weeks of continuous employment prior to enrolment. The eligibility to benefits was generally obtained after 12 months of membership as well as at least 26 weeks of employment within the last 3 years. Certain groups such as people who had just finished education or apprenticeship obtained the right to the UI after only one month of membership and without the employment requirement.

The replacement rate in Denmark was 90 per cent of individuals' previous income and the maximum level of benefits was in 1994 140,000 DDK per year. Because of the low ceiling on the benefits most individuals on the UI actually had a replacement rate which was lower than the 90 per cent. For individuals who had just finished education or apprenticeship and therefore have no prior

wage income, the benefits were set to 82 per cent of the maximum UI level.

These rules of the UI system have only undergone minor changes during the seventies and eighties. The UI system was extended to self employed persons in 1976, and prolonged to the age of 67 in 1980.

2.2 The UI system after 1994

During the summer of 1993 an amendment[3] to the Law on Unemployment Insurance was proposed and passed. The amendment entailed a total restructuring of the insurance system.

The central change of the system was that re-earning of the UI eligibility was removed through activation. This in fact meant that Denmark broke with the access to unlimited duration of the UI which had persisted through more than twenty years, cf. Figure 3. The new system with only limited UI duration was paired with a stronger emphasis on activation schemes with both longer duration as well as a stronger focus on improving people's skills for the labour market.

In the new system, eligibility to the UI was as before based on at least one year of membership as well as at least half a year of employment within a three-year period. Also just as before 1994 certain groups such as people who had just finished education or apprenticeship obtained the right to the UI after only one month of membership and without the employment requirement.

The new innovation in the UI system was that the insurance period was divided into a "passive" period and an "active" period, also called period 1 and period 2. An unemployed individual who in 1994 fulfilled the UI eligibility criteria had the right to 48 months of passive UI within a 60-month period followed by 36 months of activation within a 48-month period.

Activation is not only limited to the activation period. Individuals who

[3] Lov om ændring af lov om arbjedsformidling og arbejdsløshedsforsikring m.v. Nr. 436 30. juni 1993.

have been unemployed for more than 12 months within a 15-month period may be offered activation. If they receive an offer and refuse it, their benefits is reduced to 80 per cent of maximum UI.

The benefits received in the UI system are just as before 1994 based on the wage received in employment prior to unemployment[4] as well as the number of months on the UI prior to the given month. The replacement rate in the UI system is 90 per cent but with the limit set so low that the majority of unemployed individuals have a replacement rate lower than 90 per cent.

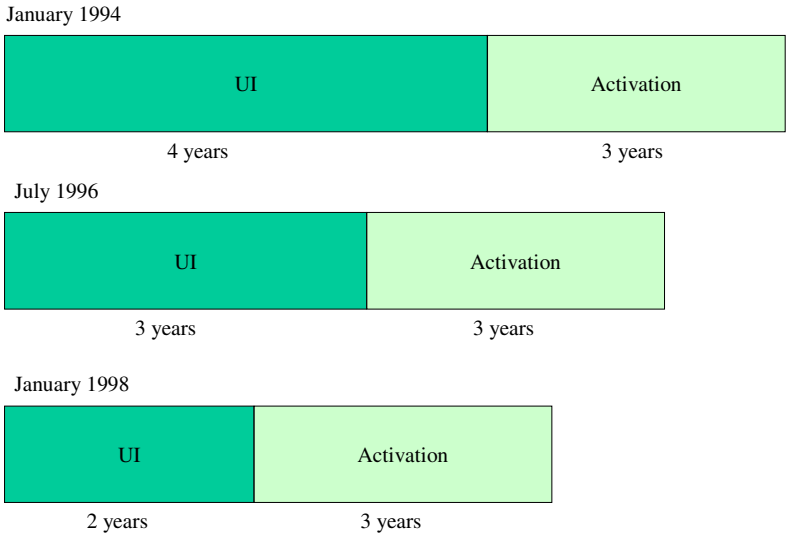
During the nineties this system underwent several changes. Most importantly, the duration of passive UI has been shortened from 48 months in 1994 to 36 months from July 1996 and further to 24 months from January 1998, cf. Figure 4. The shortenings of UI duration affected not only spells starting after the date of change but also individuals who were unemployed when the changes came into effect. In other words, there was no "grandfathering" of previous UI durations. One result of these UI shortenings since 1994 is that no person starting on a fresh UI spell between 1994 and 1999 has been able to receive the full number of passive UI months which he or she was entitled to at the beginning of the spell.

With the new rules in 1994 the UI system was left with a tremendous task of fitting all the unemployed into the new rules. This was done accordingly to a departmental order[5]. The UI case workers were given 5 months to place all unemployed in the new system. The rules are described in appendix A.

[4] Recall that employment is a requirement for earning the right to the UI.

[5] Bekendtgørelse om overgangsordninger for medlemmer af anerkendte arbejdsløshedskasser ved ikrafttræden af love om en aktiv arbejdsmarkedspolitik og lov om arbejdsløshedsforsikring m.v. af 1. december 1993, nr. 906.

Figure 4: The shortening of the passive period after 1994.



2.3 Activation and the activation period after 1994

In the summer of 1993, a law was passed which in detail sets out the rules for activation under the UI system[6]. The law states the rights as well as the restrictions which unemployed individuals are met with if they do not accept activation offers. From 1994 and onwards several changes and amendments have been made to the law. These changes have mostly been either smaller adjustments or tightening of the activation requirements.

After 1994, activation has played an increasing role in the Danish labour market policy. The activation offers consist of a wide variety of offers from education to work training and help to starting as self employed. The activation offers can be divided into the following categories:

[6]Lov om en aktiv arbejdsmarkedspolitik Nr. 434, 30. juni 1993.

- Job training in a private firm
- Job training in a public institution
- Education
- Help to self employment

Individuals in both public and private job training receive the minimum wage set by collective bargaining in the given sector. The working hours for individuals on public job training are restricted so that the wage income does not surpass the maximum benefit level. Individuals in private job training can have normal working hours and thereby have an income higher than maximum benefits. The right to private job training was removed in April 1995. Individuals on education generally receive income equal to the benefits they received prior to starting on the education offer. Between 1994 and 1998 individuals could also receive economic support for self employment under the rules of activation. The help was given for up to 2.5 years and was 50 per cent of maximum benefits.

About three or four months before individuals enter the activation period they are called to a guidance meeting by the unemployment fund. At the same time the unemployment fund will inform the employment service, which is responsible for the activation, about the individuals' approaching entrance to the activation period. This means that individuals three months prior to the activation period at the latest should be aware of their remaining time in the passive period as well the rights and obligations they will have if entering the activation period.

When individuals enter the activation period they are met with both rights and obligations. When the rules were implemented in 1994, individuals had the right to deny activation offers for one year in return for a 20 per cent deduction of their benefits. This rule was quickly changed. From April 1995,

individuals in the activation period had both the right and the obligation to receive an activation offer. If they did not do so, they would loose their right to the UI[7]. This limitation, though, is based on the condition that individuals in fact do receive activation offers. If that is not the case, then the restrictions do not apply and individuals can stay on passive UI for a longer period. During the shortenings of the passive period (1996,1998) when large groups of unemployed individuals were transferred to the activation period it has been a general rule that activation is offered first to persons with the longest unemployment history[8].

Prior to participating in activation, individuals have to have made an action plan[9]. The plan is supposed to describe future plans for the unemployed individuals regarding employment and shall determine which sort of activation the individual needs. Since an action plan has to be drawn out prior to activation, individuals who are about to enter the activation period will be summoned to a meeting in order to prepare the action plan.

Even though the UI system is divided into a passive period and an activation period, individuals do have access to activation prior to entering the activation period. When the rules on activation were implemented in 1994, individuals who had been unemployed for at least 12 months within a 15-month period had the right to participate in all the above mentioned activation offers. From April 1995, this access was limited to education and help to self employment[10]. Since January 1998, the right to activation has been limited

[7] Lov om ændring af lov om en aktiv arbejdsmarkedspolitikk og lov om arbejdsløshedsforsikring m.v. Nr. 1085 21. december 1994, §1 26. §1 27. §2 4.

[8] Bekendtgørelse om overgangsordninger for medlemmer af anerkendte arbejdsløshedskasser ved ikrafttræden af lov om en aktiv arbejdsmarkedspolitik og lov om arbejdsløshedsforsikring m.v nr. 906 af 1. december 1993. Bekendtgørelse om gradvis indføring af ret og pligt til tilbud i aktivperioden nr. 1016 af 17. december 1997. Bekendtgørelse om overgangsregler for lediges rettigheder og pligter ved ikrafttræden af lov om ændring af lov om en aktiv arbejdsmarkedspolitik nr. 947 af 16. december 1998

[9] §29 i Lov om en aktiv arbejdsmarkedspolitik Nr. 434 af 30. juni 1993. §1 2. i Lov om ændring af lov om en aktiv arbejdsmarkedspolitik Nr. 1059 af 20. december.

[10] Lov om ændring af lov om en aktiv arbejdsmarkedspolitik Nr. 1059 af 20. december 1995.

to educational offers.

3 Literature

3.1 Literature on motivation effects in finite UI systems

Most empirical studies of motivation effects have focused on UI systems without activation. Especially the US unemployment insurance system with its finite insurance period has been the subject of a couple of studies. One of the earliest studies is Moffit (1985). He uses administrative data from 12 different states in the US for the period 1978-1983. Moffit presents Kaplan Meier estimates of the hazard out of unemployment insurance and finds clear spikes around the time of UI exhaustion. The same data set has been further explored by Meyer (1990). He estimates a semi parametric proportional hazard model on the data conditioning on a spline function for remaining weeks until UI exhaustion. Meyer finds that the hazard of leaving insured unemployment increases by approximately 65 per cent from 6 to 2 weeks from UI exhaustion and further 100 per cent when individuals have only one week left on the UI. In total the hazard increases by approximately 200 per cent from 6 to 1 week from UI exhaustion. These results are backed up by later studies on the data, cf. Katz & Meyer (1990). Rogers (1998) has used the same data to estimate the hazard out of unemployment insurance. Roger chooses to sample the data differently from Meyer and Mofitt which may explain some of the differences in the results. Rogers only samples men from Pennsylvania and she limits the sample to the period July 1980 to August 1984. Also, the men have to be married and under 55 years of age when they begin their unemployment spell. Finally, she only includes one unemployment spell per man and only spells where the individuals have fully gained or regained the right to the UI. She finds a motivation effect but the percentage increase in the hazard is not as high as found by Meyer (1990) or Katz & Meyer (1990). The increases

in the hazard when individuals enter the last weeks of the UI is in Roger's analysis typically around 25 per cent.

Canadian data has also been used in studies of the motivation effect. Ham and Rea (1987) use administrative data from January 1975 to December 1980. They find indications of a motivation effect prior to exhaustion of benefits just as in the US studies. A later study also on Canadian data is Jones (1995). Jones uses quasi experimental data. In the study Jones analyses a UI reform implemented in Canada in April 1993. The reform entailed shorter duration for individuals who entered the UI system after April 1993, whereas individuals who entered earlier continued to receive the UI according to the old rules. The data used by Jones describe two samples. The first includes individuals who began receiving the UI between January 31 and March 7. The second sample includes individuals who began receiving the UI between April 25 and June 5. In spite of the good data set, Jones is not able to find an effect on the duration in unemployment from the shortening of the UI period.

The same lack of a motivation effect is found by Stancanelli (1999). She uses British UI data describing UI spells starting between July 1983 and August 1983. She uses a piecewise constant proportional hazard model where the time to benefits exhaustion is modelled with time varying dummies.

One reason for the lack of motivation effects in these later studies may be that UI exhaustion in the analysed labour markets does not result in a significant drop in the income for individuals. In England, for the period Stancanelli analyses, individuals may be able to receive means-tested social benefits when their UI runs out. Benefits which according to Stancanelli is almost at the level as the UI. Even though Stancanelli does have information on individuals' savings when they begin the UI spell, these savings may have been used when the UI runs out thereby making individuals eligible for social benefits.

3.2 Literature on motivation effects in UI systems with activation

The empirical literature on motivation effects of activation is very limited. So far there has only been published one study on Swedish data and two primarily descriptive studies on Danish data. Carling et al. (1996) estimate the motivation effect of activation on Swedish data. The data they use is based on inflow into the unemployment registers for the period February, May and August 1991. In this period individuals were offered activation as a way of regaining the right to the UI. If individuals refused to participate in activation their right to the UI would end and they would instead receive social benefits at a rate which is substantially lower than the UI. They specify a competing risk model between entering activation and employment. The model is a proportional hazard model with unrestricted baseline hazard very similar to the one used by Meyer (1990). Carling et al. do find that the hazard into employment increases when the UI is about to run out[11] but the estimate is insignificant at the 5 per cent level. They indicate that the insignificant result may be due to very few observations around the time of UI exhaustion.

Kyhl (2001) examines the Danish UI system from 1996 to 1998. He uses a 10 per cent sample of individuals who have been in contact with the Danish UI system in those three years. He estimates a mixed proportional hazard model with piece wice constant base line hazard. Kyhl finds that the baseline hazard decreases in the first couple of months and thereafter is almost flat. Around the time when passive UI is supposed to run out and be replaced by activation offers the baseline hazard displays peaks. This may indicate that the activation period does have a motivating effect on individuals in the UI system.

[11] Carling et al. find that being less than four weeks from UI exhaustion increases the baseline hazard by approximately 170 per cent.

4 Theory

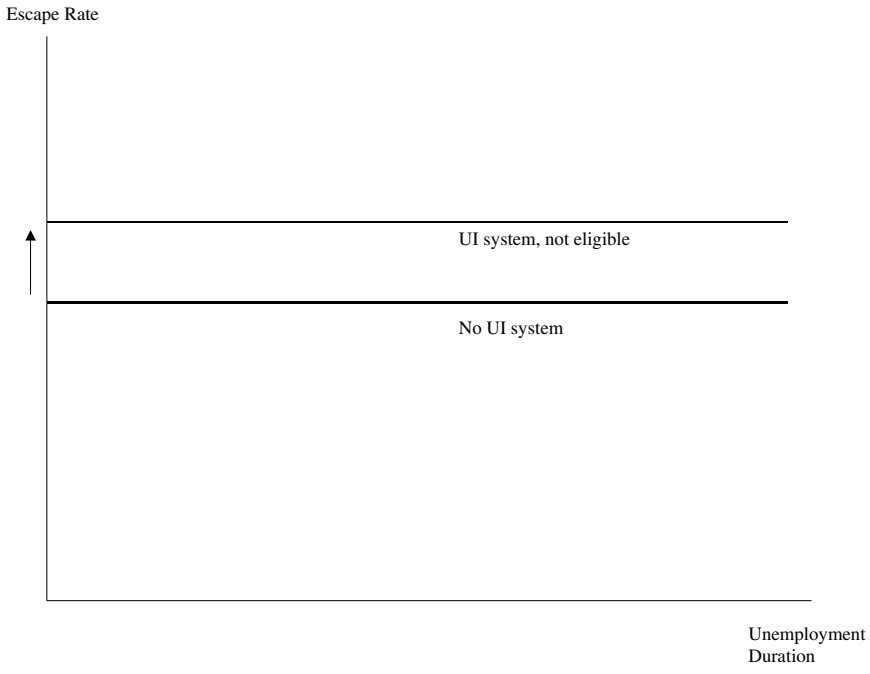
The standard job search model seems to be a very good framework for analysis of UI systems. It is used as a theoretical framework in most empirical articles about unemployment insurance systems and motivation effects, cf. among others Meyer (1990), Rogers (1998). The job search framework provides a partial analysis of the labour market focusing on the decision making of unemployed individuals. It is based on a market with imperfect wage information where the job possibilities of an individual worker can be characterised by a distribution over possible wage offers. It is assumed that the distribution is known and that workers search by sampling from this distribution in a sequential manner. The optimal strategy for workers is then to accept the first offer obtained greater than some reservation wage. The reservation wage is the wage that maximises the expected present value of the future earning stream in such a way that the cost of search equals the expected gain in future income attributable to search.

One particular article which is often cited in empirical studies of unemployment insurance is Mortensen (1977). Using standard job search framework with fixed wage offer distribution Mortensen analyses the effects of an unemployment insurance system where insurance benefits have a finite duration and where new entrants or workers who quit jobs do not qualify for unemployment insurance directly. Mortensen's general finding is that the total effect on the reservation wage and search intensity from the introduction of unemployment insurance is ambiguous. Still, the analysis gives helpful insight to the behaviour of individuals on the labour market. One important finding is that the introduction of unemployment insurance splits the labour force into those who do and those who do not have access to benefits resulting in different labour market behaviour.

For individuals who are not eligible for benefits, the effect of introducing an

unemployment insurance system is clear in this model. Since access to benefits can only be gained through employment, it is profitable for individuals to accept work at a lower wage rate than without the unemployment insurance system. Individuals outside the system will therefore reduce their reservation wage as well as increase their job search and hence experience an increase in their escape rate out of unemployment, cf. Figure 5.

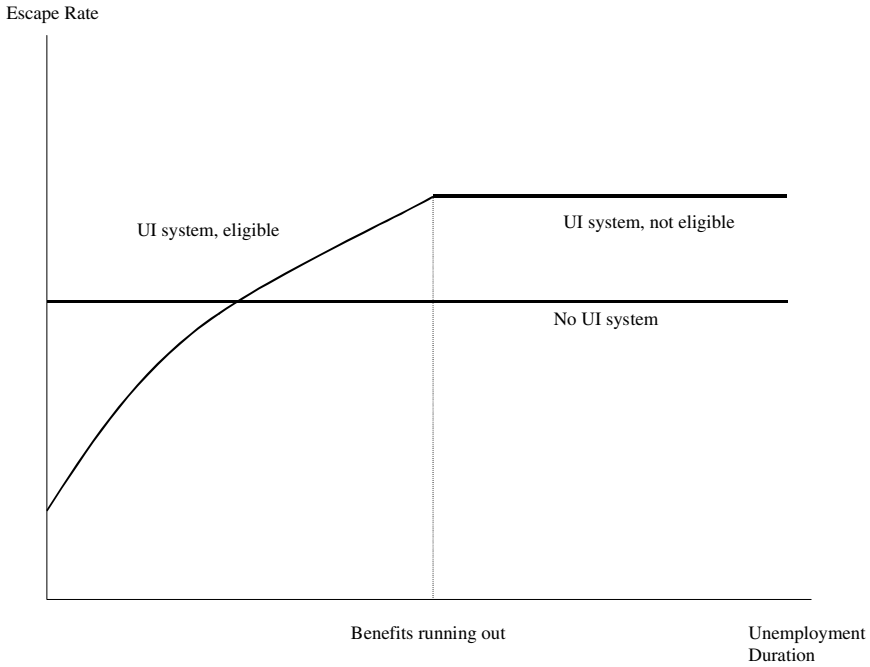
Figure 5: The escape rate out of unemployment for individuals not eligible for benefits.



For individuals who are eligible for benefits, there will be two opposing effects. Access to benefits will have the standard disincentive effect on employment (increase in reservation wage and decreasing search intensity). This is because benefits increase the value of staying unemployed and thereby makes it less costly to prolong the search for a high wage job. Since benefits can only be received for a finite period, however, the disincentive effect will be

dominating in the beginning of the unemployment spell, cf. Figure 6. When individuals are approaching the end of their benefit period, they will gradually reduce their reservation wage and increase their job search. This is due to the prospect of an income drop which makes future search more costly. On top of that, the fact that eligibility to the UI can be regained through employment amplifies the effect on the job search rate and reservation wage as benefits are about to run out.

Figure 6: The escape rate out of unemployment for individuals eligible for benefits



So, Mortensen finds that individuals' reservation wage goes down and search intensity up as they approach benefit exhaustion which in a restricted setup (as Mortensen's) results in an increasing escape rate which alternatively would have stayed constant. In a more flexible model where job offer arrival rate and wage offer distribution can fluctuate, the escape rate is unlikely to

stay constant over the unemployment spell in the absence of finite benefits. It is therefore not possible to predict whether the escape rate will be displaying an increasing trend over the spell when finite benefits are introduced. Mortensen's result, however, does make it clear that finite benefits will result in a higher escape rate prior to exhaustion than in the absence of finite benefits. This difference is exactly the motivation effect which empirical studies are trying to estimate.

Due to the long UI period in Denmark[12] only a fraction of individuals on the UI ever get close to the end of their entitlement period. The motivation effect of reaching the end of the benefit period as described by Mortensen does therefore most likely not play a significant part in the reduction of the Danish unemployment from 1993 and onwards. But the activation period may have the same effect. When individuals receive activation in the Danish UI system they are entitled to the same income as on passive UI. A search model which only analyses effects of the UI through a maximisation of income will therefore not reveal any effects prior to activation. It seems very unlikely, though, that individuals will not respond to a change in the requirements they are met with in return for receiving the UI even though the benefits they receive stay unchanged.

The expectation of an activation requirement in return for benefits may influence individuals' reservation wage and search intensity in a both negative and positive direction.

- In activation, individuals are forced to work or study for the same income previously received without working[13]. The fact that individuals have less free time for the same income in the activation period may result in a reduction of the reservation wage and increasing job search

[12] Up to 7 years on the UI with both passive period and activation period.

[13] In private job training individuals have the possibility of earning more than their benefits. Private job training only constitutes a small proportion of the activation spells, though.

intensity.

- Individuals may think that employers will regard activation as a signal of low productivity. This effect is called scarring or stigma in economic literature, cf. among others Heckman & Borjas (1980). If this results in less and worse job offers, the prospect of activation may result in a lowering of the reservation wage and an increasing job search prior to the activation period.

- Activation may result in less time to job search and thereby less job offers. The prospect of less job offers while on activation may also increase the job search intensity and reduce the reservation wage prior to activation.

- Individuals may perceive activation as a chance to improve their human capital as well as contact to the labour market. In contrast to all the other effects this effect may result in a reduction of the job search intensity and increase of the reservation wage prior to activation.

4.1 Individuals' expectations on activation

In the search model by Mortensen, individuals are assumed to know the duration until their benefits run out. This assumption, though, may not hold in a UI system as the Danish one. First of all, the passive period in Denmark in the analysed period is long (up to 4 years) compared to almost any other country in the world (up to 4 years). Individuals may therefore over the UI spell loose track of how many months of benefits they have left. Secondly, their expectations may be further confused by the change in rules for regaining the UI right. Between 1994 and 1996 half a year of unsupported employment within a three-year period resulted in a regaining of the UI right. From 1997 and onwards the necessary employment was increased to one year

within a three-year period. Thirdly, the passive period has been shortened twice between 1994 and 1998. First from four to three years in July 1996 and second from three to two years in January 1998. Individuals may do not take account of these shortenings in their expectations from the beginning of their UI spells.

Because of all these circumstances it may be more correct to model individuals with uncertainty in the UI system. In order to include uncertainty in the search model one has to model both the probability of receiving the UI in the given month as well as the probability of receiving the UI in future months since the reservation wage is a function of the expected duration of the remaining UI. It is possible under certain conditions to retain the qualitatively same results in such a model as in the perfect foresight version of Mortensen (1977). Thereby meaning that an expected shortening of the remaining UI will result in a lowering of the reservation wage just as a known shortening of the remaining UI will in Mortensen (1977).

Even though we can show that we, given the same assumptions, can make the results of the theoretical model hold independently of uncertainty, the choice of expectation model is still important for the empirical estimation of the motivation effect. Assume that individuals actually lower their reservation wage when they believe they have 3 months or less to activation. In order to estimate the effect of this, it is crucial to correctly model when individuals actually believe that they are 3 months away from activation. An incorrect specification will result in a watering down of the estimated effect[14]. This can be illustrated with the following three different expectation models:

- Perfect foresight model: in this expectation model I assume that individuals from the beginning of the unemployment spell are aware of the shortenings of the passive UI period which will occur. In other words,

[14] This point was made by Rogers (1998).

individuals know how many months they have left until the activation period from the beginning of the spell.

- System foresight: in this expectation model I assume that individuals first learn about changes in the passive UI period when they are either introduced or implemented. Individuals following this expectation model may therefore experience discreet shortenings of their expected months to the activation period.

- No foresight: in this expectation model individuals do not learn about shortenings of the passive period until they enter the activation period. Individuals following this model may therefore believe that they have a positive number of months left until the activation period whereupon they are informed that this is not the case.

For all three models individuals' expectations about remaining passive benefits can be represented with the following accounting equation

$$R(t) = E - t + RJ(t)$$

where R is the remaining UI until the activation period, E is entitlement at the beginning of the spell, t is time period elapsed since the beginning of the spell and RJ is realised jumps in entitlement after beginning of spell.

In order to describe the difference between the three models, let us look at an example where individuals begin a spell with UI entitlement equal to, say, 20 months. 6 months later this entitlement is shortened by 12 months. In the *perfect foresight model* individuals will form their expectations and corresponding labour market behaviour according to the following equation

$$R(t) = 20 - t - 12,$$

which describes that individuals from the beginning of the spell know about any shocks which may occur during the spell.

If individuals follow the *system foresight* model, their expectations on remaining months to activation period will be:

$$R(t) = 20 - t \qquad for\ t < 6$$
$$R(t) = 20 - t - 12 \qquad for\ t \geq 6.$$

Notice the discreet shortening of the expected remaining months when the legislative change is implemented.

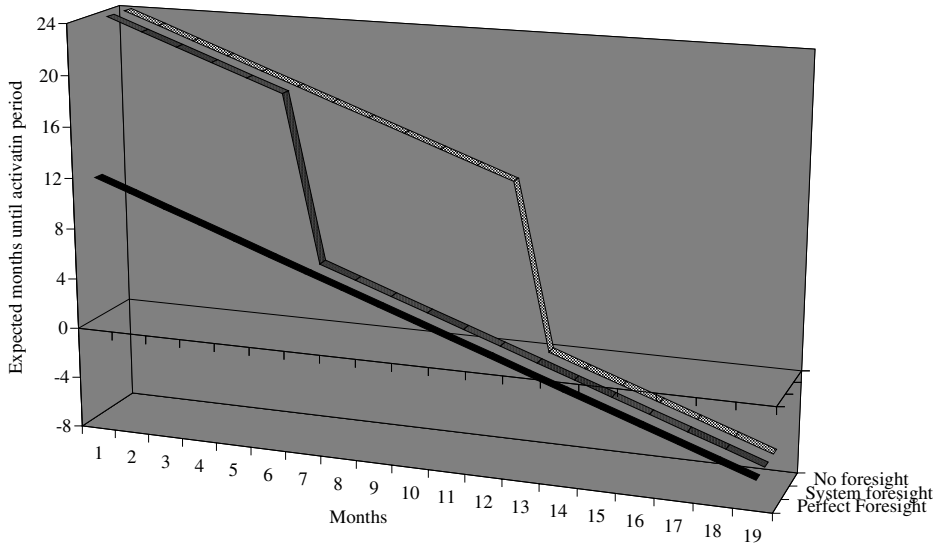
A third alternative is the *no foresight* model where individuals do not at all gather information about the UI system and as such do not know about changes until it affects them. In this model individuals will not find out about the changes until they are noticed about upcoming activation and the equation will be:

$$R(t) = 20 - t \qquad for\ 20 - t - 12 > 0$$
$$R(t) = 20 - t - 12 \qquad for\ 20 - t - 12 \leq 0.$$

In Figure 7, the example of the three expectation models are presented. Notice that the perfect foresight model does not reveal any discreet jumps since individuals from the beginning of their UI spell realise the shortening. In the two other expectation models expectation are updated as the UI spell evolves. We therefore see discreet jumps in the expected remaining UI in both of the models. The difference between the models is based on when the discreet jumps occur.

One important result of the three different expectation models in the example above is that individuals' belief about their time to activation differs.

Figure 7: Expected remaining UI according to three different expectations models.



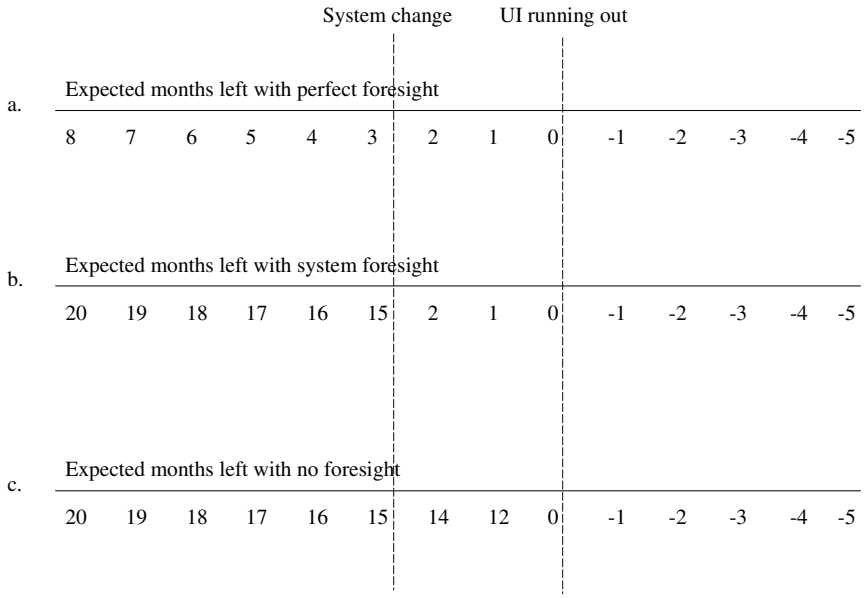
Using an incorrect model will therefore mean that individuals' reaction to their expected time to activation will be associated with the wrong months. In Figure 8, the three different expectation models are illustrated. Notice the difference in the expected remaining UI (R). If individuals have perfect foresight and expectations are modelled with, say, no foresight, then any effect prior to activation that we may be estimating will be diluted due to the mis-specification of the Remaining UI-variable.

In the accounting equation presented above I have described entitlement (E) as a constant which is set when individuals commence their UI-spell. Under certain conditions that may not be the case. In order for it not to be the case, individuals must:

1. have perfect foresight, and

2. be in a situation where they can use more months of passive UI than

Figure 8: Expected months of remaining passive UI (R) according to three different expectation models.



the future legislative change will allow.

As an example let us construct an individual with perfect foresight who has received passive UI for 3 years. A legislative change is announced which in a year will shorten the passive UI period from 4 to 3 years. Within the next year this person's months of entitlement will fall by 1 each month independently of whether or not he receives the UI. The reason for this is that he with his 3 years on passive UI knows that he will enter the activation period directly when the legislative change is employed and his entitlement is therefore simply counting down until that date arrives.

This special situation is extremely rare in the data set which I will use below and I will therefore not go further in my analysis of the case and its possible implications.

5 Data

The data used in the following estimations comes from different administrative databases. In Denmark every person is from birth or immigration given a unique personal code called a CPR-number (civil register number). This code is used in government and municipal institutions for administrative purposes to register people's use of different services. Statistics Denmark uses its access to the different administrative registers to create merged data sets which describe the entire population. The data sets are created in accordance with demand from government, municipalities, different organisations on the labour market, the press, etc. The access to the merged data is limited by law. The data is not allowed outside Statistics Denmark and Statistics Denmark removes the CPR- number as well as checks that individuals cannot be recognised in the data before releasing data for analysis.

Since these merged data sets are maintained and renewed by Statistics Denmark on a yearly basis, it is possible to track individuals in some of these data sets more than twenty years back in time. This gives researchers a unique access to very long and detailed panels. Statistics Denmark retains the CPR-numbers of any individuals who appears in the merged data sets. This makes it possible to further merge the different data sets both with each other but also with various surveys as well as other original administrative data sets which are not used by Statistics Denmark.

5.1 Data sources

The estimation of the motivation effect in the Danish UI system is based on variables describing 1) duration of UI spells, 2) time to activation period and 3) demographics. These variables are constructed using register data supplied by Statistics Denmark.

In order to construct these variables I have used information on:

1. Use of unemployment insurance

2. Use of activation offers

3. Employment

4. Demographic information on education, family composition and gender

Individuals' use of passive unemployment insurance has been drawn from a Statistics Denmark data set named The Coherent Social Register (SSHS)[15]. The purpose of the SSHS is to give a coherent view over the number of people who each year receives one or several forms of income replacing benefits. The SSHS is constructed by merging different administrative registers which again are based on different basis registers. Information about insured unemployed individuals are collected from The Central Register for the Labour Market (CRAM). CRAM is constructed from information reported by the unemployment funds and is based on the records according to which unemployed individuals are paid benefits. The UI information in the data set is saved as number of days on the UI each month.

Information about activation on the UI after 1994 are collected from a register called Register on Labour Market Measures (AMFORA). This register is primarily used for labour market surveillance by municipalities and ministries. The information on UI activation in this data set comes from a core data set called the Labour Market Agency's Labour Market Policy Register (AMPO). The information in the AMPO register is based on reports from the employment services and the unemployment funds which administrate these schemes. These reports state when individuals begin and end activation. This information has in the data set been transformed into number of days in activation each month.

[15] In the following I will translate the name of the different registers but use the Danish abbreviations, hence the obvious disproportion between the two.

Information about activation earlier than 1994 is taken directly from an administrative register called the Job Offer Data Set (ATB). The data set has been used by the employment services to keep track of individuals' participation in activation. The data set contains information about when individuals begin and end training. The data set goes back to 1980 and end in 1994 when the new activation legislation was implemented.

Information on employment is taken from a Statistics Denmark register called IDA. The register contains two variables on employment. One variable which describes individuals' employment in November each year, and one variable which describes how many months out of the year individuals have been employed. In order to find out when individuals are employed over the months, I have used information on any other state which individuals could be in over the year and located the employment in the residual months. This is possible since data on other states such as different leave schemes, unemployment insurance, activation, early retirement, social benefits etc. are available either on a monthly or weekly basis.

The variables describing gender as well as family composition are taken from the IDA register. The variable originates from the CPR register. The variable on family composition describes the family on a yearly basis. The variable describing individuals' level of education is also drawn from the IDA register. This variable is constructed by Statistics Denmark. The original source is the Integrated Student Register which is based on yearly reports from all educational institutions in Denmark.

5.2 Construction of sample and variables

For the analysis I have used a 10 per cent sample of the Danish population between the age of 17 and 67 in the analysis. The 10 per cent limitation has been imposed mainly in order to save resources since Statistics Denmark, as

already mentioned, do have observations for the whole population of the variables used in the analysis. The sample has been constructed as a panel from 1980 to 1998. Individuals who reach 68 years of age, who leave the country or who die between 1980 and 1998 all leave the sample. In order to maintain representativeness on a yearly basis, the sample is supplemented each year with 10 per cent of all individuals who becomes 17 years of age or immigrate to Denmark in the particular year. For the estimations I have restricted the sample further to unemployment spells beginning between January 1994 and January 1998. This is done in order to focus on the unemployment spells which are influenced by the labour market reform and adjustments in 1994, 1996 and 1998. In table 6, some descriptives are presented on the data.

Table 1: Descriptives.

Variable	Min	Max	Mean	Standard deviation
1=man			46.30	
1=spouse			64.76	
1=children			52.88	
1=university degree			16.87	
Spell length	1	57	5.28	6.59
Number of spells	1	20	3.56	2.08
Initial Prior unemployment (months)	0	46.13	5.33	6.95

Number of spells=94,869, Number of individuals=33,431
Number of right censored spells=1277

In order to construct the unemployment insurance spells for the analysis, I have assumed that an unemployment spell consists of at least 15 days of unemployment within any given month. A spell is broken if an individual is not receiving the UI for more than 2 weeks in a month or if an individual regains the right to a new unemployment insurance period midspell. Notice that the individual does not necessarily have to find employment in order to leave the spell. When individuals end their spell they can just as well move into maternity leave, other leave schemes, social benefits, early retirement,

disability pension or education. Since my data is not precise enough to fully track individuals' movement out of unemployment, I have chosen only to focus on the fact that individuals leave unemployment and not where they go to after that.

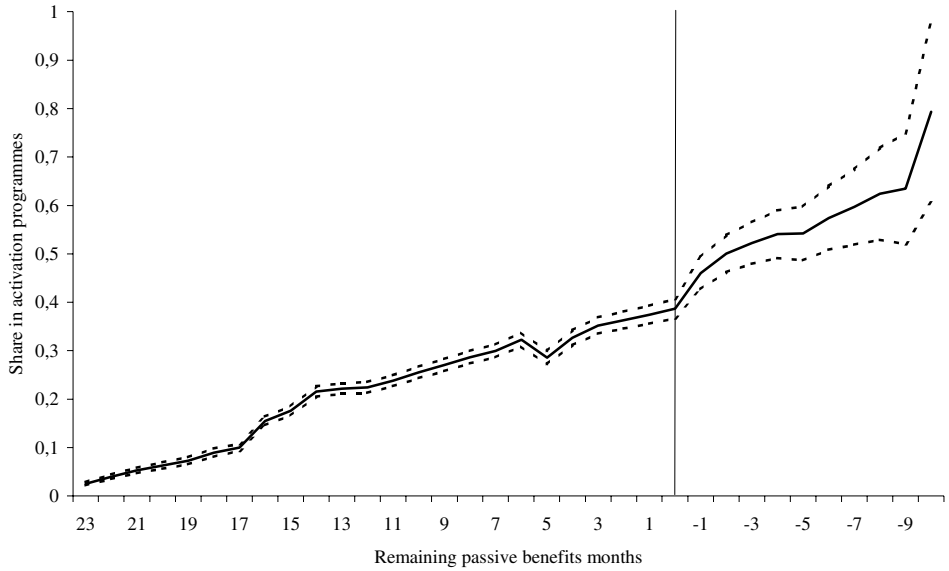
Another variable that is crucial to the analysis is time left until activation period begins. In order to construct this variable, it has been necessary to replicate the process which case workers have gone through with each unemployed person first time they are placed in the new UI system after January 1994. With the implementation of the new UI system in Denmark in 1994, a departmental order on how each individual should be placed in the system were given. Through this placing it was decided how much passive UI each unemployed person was entitled to before entering the activation period. In other words, individuals did not necessarily start with the right to 4 years of the UI in 1994. In general, the more activation, the more UI and the less employment prior to 1994, the shorter time the unemployed individual is granted in the passive period. The rules are described in detail in appendix A.

6 A descriptive analysis of data

Before looking at individuals' departure from unemployment, let us take a look at the activation offers. As stated in section 2.3, individuals have access to activation prior to the activation period. And individuals also make use of this possibility is clear from Figure 9. Please also recall that if individuals are offered activation after one year on passive UI and refuse, then benefits are reduced. This may also have an effect on the increasing activation proportion in the passive period.

Just as everybody is not passive in the passive period everybody is not activated in the activation period. As a matter of fact, the proportion is only slightly higher than for individuals in the last months of the passive period,

Figure 9: The proportion of individuals in activation as a function of time remaining until activation period begins.



increasing, however, throughout the period. The reasons for this are:

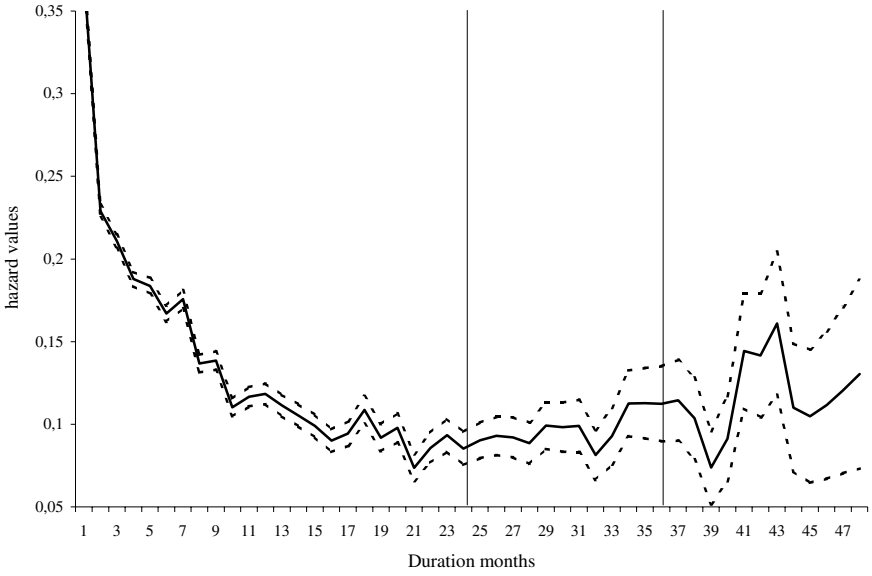
1. Individuals have to have made an action plan before starting in activation. For most individuals this may not happen before the activation period has actually commenced. For this reason actual participation in activation will be moved well into the activation period.

2. Individuals may have to wait for openings at educational institutions or job training positions. Also, education may start at specific dates during the year which results in waiting periods without activation.

3. Until April 1995, individuals in the activation period could refuse to participate in activation for up to one year without loosing the right to the UI.

4. Due to the sheer number of individuals who have had to be allocated in activation the authorities have had to prioritize between the unemployed

Figure 10: Kaplan Meyer estimates of the hazard out of unemployment insurance, 1994-1998.

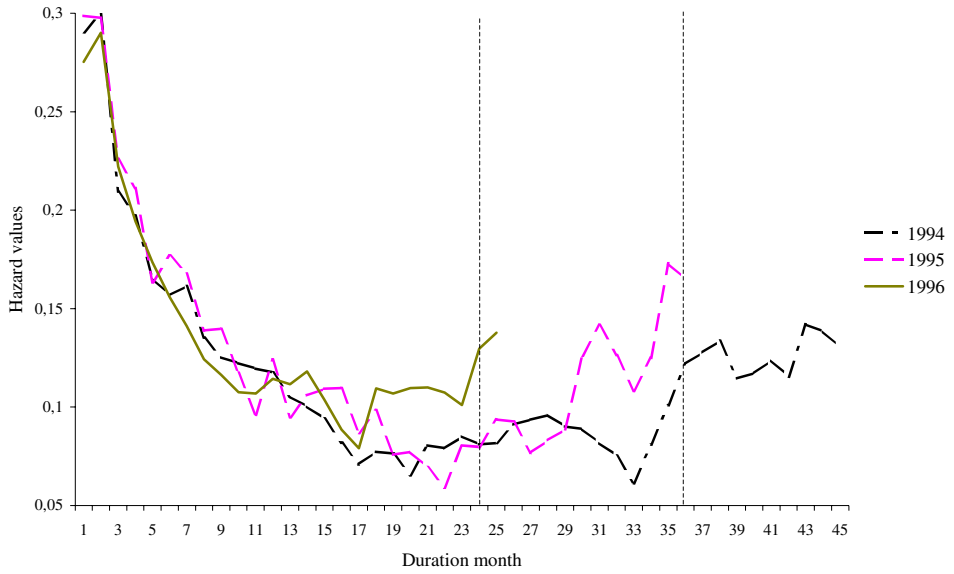


individuals. This has been especially relevant just after introduction of rule changes such as January 1994, June 1996 and January 1998. As described in the section above, the law dictates that the activation effort should be targeted first on the unemployed individuals with the highest "seniority" in the unemployment system. This means that especially individuals who have just entered the activation period may be able to avoid activation (if they want to) for a period.

From Figure 9, it is not clear whether entering the activation period should necessarily have any significant motivation effect. Even though the activation proportion is higher in the activation period, it is still far less than 100 per cent and it therefore seems likely that individuals can avoid activation if they want to. Still, the mere fact that individuals in the activation period may be offered activation and will loose their UI either immediately[16] or eventually

[16] After April 1995

Figure 11: Kaplan Meyer estimates for spells beginning in 1994, 1995 and 1996.



may influence individuals' reservation wage and search behaviour. Finally, the activation proportion seems to increase sharply about 8-9 months into the activation period. This may indicate that this is the maximum duration that individuals can stay in the activation period before they are forced to enter some sort of activation scheme.

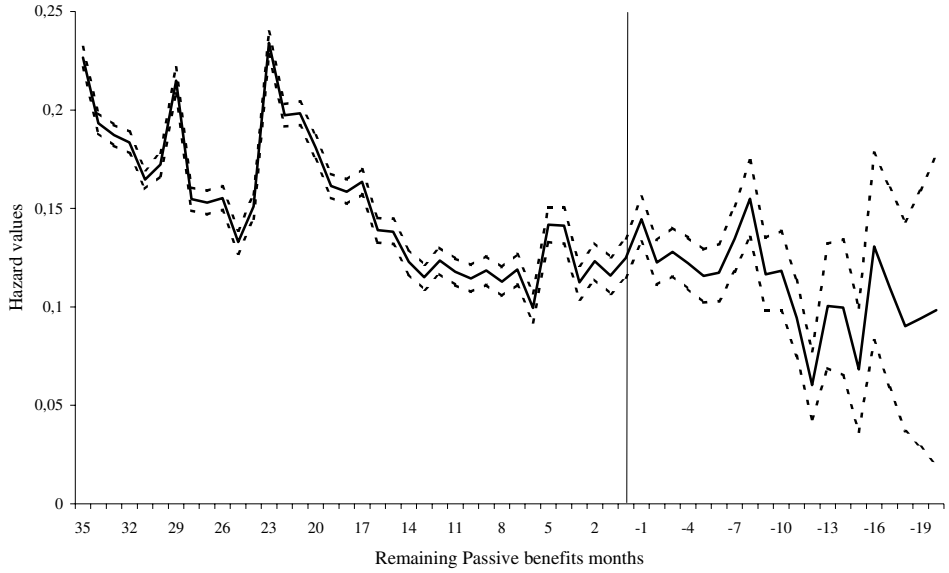
In Figure 10, the hazard out of unemployment for all individuals in the sample is illustrated. The graph displays a sharp decline in the hazard over the first year. After the second year it appears that the hazard is slightly increasing. It is not clear from this graph that individuals do react to the activation period, but the slight increase in the hazard may indicate that they do.

In Figure 11, the unemployment spells have been divided into spells beginning in 1994, 1995 and 1996. Because of the shortenings of the passive UI in 1996 and 1998, a division of spells by starting years should, given the exis-

tence of a motivation effect, result in a hazard increase which moves closer to 24 months over the samples. This is exactly what is illustrated in Figure 11. The hazard increase seems to be stronger and begin earlier for spells starting in 1995 than for other spells. One explanation for the stronger increase compared to earlier spells may be that individuals facing exhaustion of passive UI on average have been unemployed for a shorter period in the 1995 sample than in the earlier sample and as such may have better chances of finding a job in light of possible activation. The reason for the earlier hazard increase in the 1995 sample compared to the 1994 sample may be due to the fact that more individuals run into the 24-month passive UI constraint in this sample than in the earlier sample. The 1996 sample does not display an increase in hazard as strong as the other samples but at the same time does never reach as low a level. The reason why this sample does not show as clear an increase may be due to the fact that I only have observations on individuals in this sample for 2 to 3 years. It is therefore likely that the motivation effect in this sample exists beyond the data period (up to 1998) I have access to.

These preliminary findings do to some extend indicate that the hazard out of unemployment increases when passive UI runs out. In Figure 12, the hazard out of UI unemployment is described as a function of the constructed variable "remaining passive UI". The graph, in contrast to the two previous graphs, does not clearly show any motivation effect of the activation period. The fluctuation in the curve gives us a hint why this is so. In this Figure duration dependency may play an important part. Since individuals can begin an unemployment spell with less than full passive UI remaining, duration dependency effects will be spread out in the Figure. A good example is the hazard increase around 24 months of remaining passive UI displayed in the graph. This may primarily be due to the fact that individuals starting a fresh unemployment spell after January 1998 only have the right to 24 months of

Figure 12: Kaplan Meyer estimates as a function of time to activation period.



passive UI and therefore enter the Figure at 24 months remaining instead of 36 months remaining.

7 Empirical Specification and Estimation

In order to test for the motivation effect, I have modelled the hazard out of UI unemployment. In this setup the hazard is equal to the probability of leaving UI unemployment in a given month conditional on the unemployment spell up to that month. I have assumed that data can be represented by a discreet logistic specification,

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, E_{it}, X_{it})\}},$$

where h is the hazard at a given spell length t, y is a linear function of t duration in spell, R time remaining until the activation period, E Entitlement initial in the spell and X other exogenous variables.

The central variable to identify in the model is "remaining passive bene-

fits" (R) which will show whether there are any indications of a motivation effect. As described in section 4 remaining passive UI (R) can be described as a function of initial entitlement (E), duration (t) and realised jumps in passive UI duration (RJ)

$$R = E - t + RJ.$$

As the equation indicates, identification of the variables "remaining passive benefits" (R) is only possible if at least one of the right hand side variables of the equation do not have an effect on individuals' hazard out of unemployment and therefore is not included in the hazard model. In order to disentangle duration dependency from the motivation effects it is important to condition on duration (t) in the hazard estimation. The same goes for initial entitlement (E) since this variable may be correlated with individuals' labour market attachment. The duration variable (t) will be modelled fully flexible with a dummy construct but the entitlement variable (E) will only be modelled using a parametric form (linear and squared term). The reason for this is partly to keep the degrees of freedom reasonably high, partly to allow estimation of models with expectation models where there is no realised jumps (RJ). Geerdsen (2002) shows that using a parametric form of (E) instead of a dummy construct does not result in any significant changes in the estimatited hazard model. This means that the source of identification comes from 1) any realised jumps (RJ) which may appear according to the expectation model we choose and 2) the parametric form of the entitlement variable (E).

Since identification in this estimation is almost solely dependent on the variation of the "realised jumps" variable (RJ) it is all the more important to pick an expectation model which correctly describes how individuals form their expectations on their benefits and the structural changes which occur. In the following I will assume that individuals have no foresight about the

changes which occur in the passive benefits duration in the sample period. As described in section 4, this means that individuals do not realise any shortenings of the passive period until they are informed about their approaching entrance to the active period by the unemployment funds. This assumption is based on surveys made on Danish unemployed individuals which indicate that most individuals have only very little knowledge about their location in the unemployment insurance system, cf. Bjørn & Dohlmann (2001). As described in section 2.3, when individuals are about three months from the activation period they are called to a meeting and informed about their prospect of activation. According to legislation, individuals who are closest to benefits exhaustion will also be targeted with most activation. When the passive period is shortened due to legislative changes, individuals may find themselves moved up to 12 months closer to benefits exhaustion. Since location in the activation period affects the individual's probability of receiving activation and since individuals by law will be informed about this, it is assumed here that these discreet jumps into the activation period are known to the unemployed individual.

In the estimation I condition on gender, family composition and level of education as well as initial passive UI entitlement (E), remaining passive UI (R), and duration of the UI spell (t). All variables apart from initial entitlement (E) are all modelled using dummies. This is done in order to impose the least restrictions on the parametric form of the model which potentially could result in "false" indications of a motivation effect. The duration dummy variables go from 1 month to 60 months due to the fact that the sample span 5 years[17]. The variable "remaining passive UI" is modelled with 26 dummy variables representing each month from 12 months remaining of the passive period to more than 12 months into the activation period. The omitted

[17] Actually, the last 3 duration months do not appear in the estimations simply because no individuals in the survey have had uemployment spells that long.

dummy variables are: for family construction "single without children", for education "primary school only", for gender "woman", for duration "month 1" and for the "remaining passive UI" variable (R) it is "more than 12 months remaining".

8 Results

In table 2, some of the parameter values of the hazard estimation are presented. The parameters on family composition indicate that couples with children have the highest hazard out of UI unemployment followed by couples without children, singles with children, and singles without children. The fact

Table 2: Hazard Estimates of Demographics and Entitlement.

	Parameter values	Standard error
Secondary degree	-0.1962	0.0236
Upper secondary school	0.0436	0.0110
Vocational training	0.0216	0.0207
Shorter university degree	0.0461	0.0215
Bachelor degree	-0.0688	0.0233
Graduate degree	-0.1591	0.0128
Single with children	-0.0002	0.0178
Couple without children	0.1079	0.0131
Couple with children	0.1653	0.0110
Male	0.0384	0.0095
Entitlement	0.0141	0.0019
Entitlement^2	-0.0004	0.0000

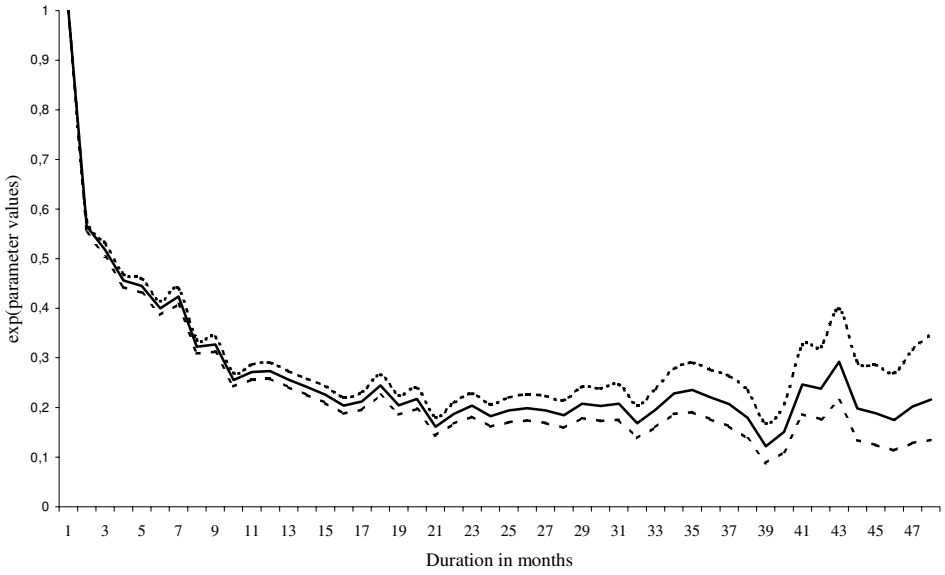
that singles with children have a lower hazard than couples without children may be due to the fact that employment will not increase the net income substantially for this group due to the income tax and the subsidies given to

them. For the different education groups it appears that individuals with a shorter university degree have the highest hazard followed by the upper secondary school group. The fact that bachelor degrees and graduate degrees do not result in an increase in the hazard compared to individuals with only primary school is surprising and not readily explainable. Both entitlement end entitlement squared are significant. According to the estimates, individuals with around 18 months of entitlement have the highest hazard.

In Figure 13, the parameter values of the duration dummies are displayed. The dummies display a sharp drop in the hazard over the first year of unemployment. After that it appears that the hazard stabilises with minor fluctuations. The estimation results of the duration dependency concur well with the Kaplan Meyer estimates of the hazard in Figure 10 and 11 which also displays a sharp decline in the hazard over the first months of unemployment. Notice that the duration dummies do not pick up much of the increasing hazard which is also displayed in the two Kaplan Meyer graphs mentioned before. This indicates that the increase may indeed be due to a motivation effect.

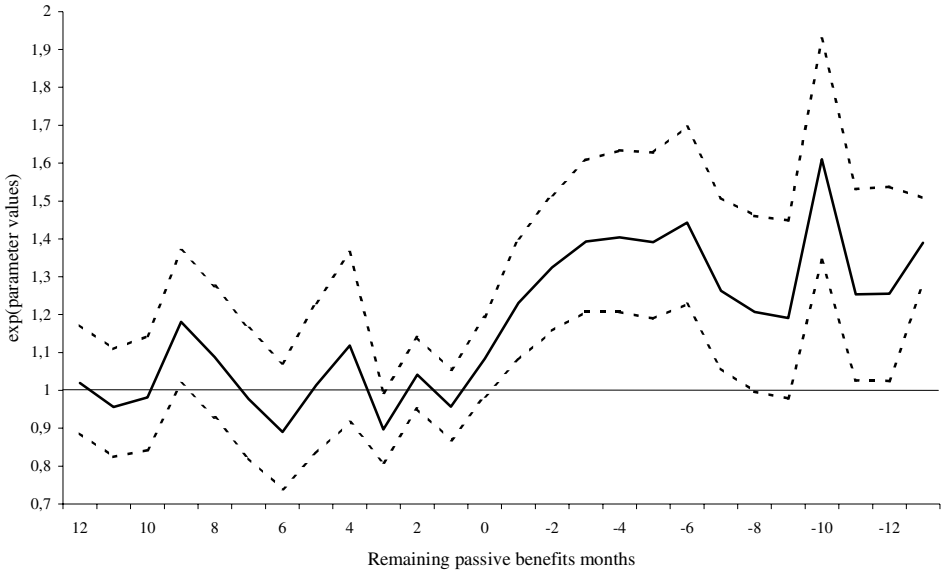
In Figure 14, the dummies for remaining benefits are displayed. From the estimation it appears that the motivation effect slowly begins from approximately when passive benefits run out and then increases up to six months into the activation period. Even though the variance is large it appears that the effect is significant. For instance, six months into the activation period the hazard is increased by approximately 40 per cent due to the motivation effect. Even though it may seem odd that the motivation effect does not peak before well into the activation period, this actually does make sense. When individuals enter the activation period they have to have made an activation plan (as described in section 2.3). In this plan the case worker together with the unemployed individual writes down what sort of activation the unemployed individual will have to participate in and they find out when the individual

Figure 13: Effect of duration in unemployment.



can commence the activation programme. At the meeting the unemployed individual will therefore learn exactly how much time he or she has left before the activation starts. Given that, it seems very likely that unemployed individuals do not increase their job search and reduce reservation before well into the activation period as the parameters indicate. In Figure 15, I have used the parameters of the estimation to construct the hazard value for a representative individual. The unemployed individual is assumed to be male, married with children and have an upper secondary education. I have assumed that the individual has 24 months of passive benefits entitlement when beginning the unemployment spell. The full line describes the hazard values as they are without the motivation effect and the dotted line is the hazard values when the motivation effect is included. The Figure indicates that the increasing hazard from the Kaplan Meyer estimates displayed in Figure 10 and 11 are almost all due to the motivation effect. It appears that the motivation effect results in an increase in the hazard which is somewhere between 3 and 5

Figure 14: The motivation effect of activation, measured as the exponent of the parameter values.



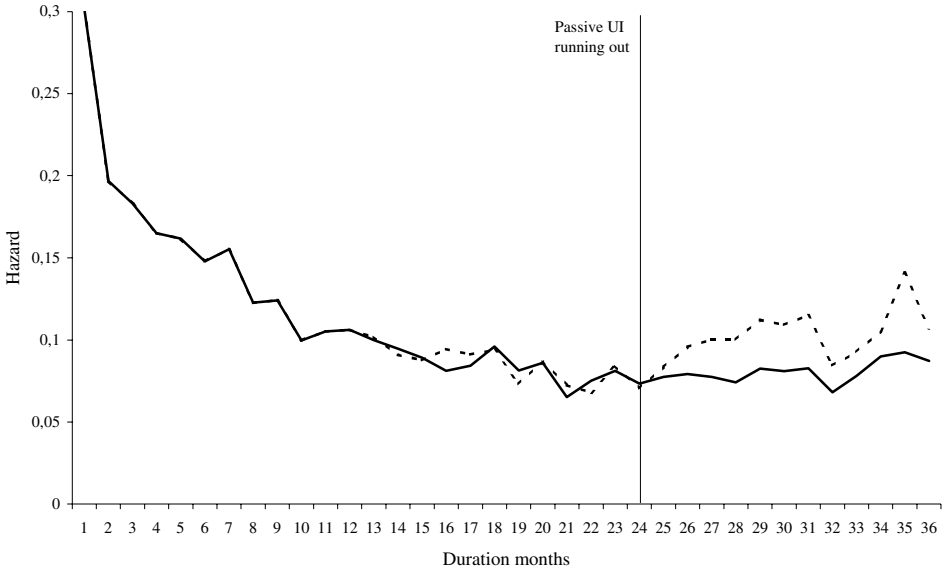
percentage points and somewhere between 30 and 40 per cent.

8.1 Sensitivity to different expectation models

In order to test robustness of the estimation result I have performed similar estimations using other expectation models. I have estimated 8 different expectation models. The models are based on the following structures regarding expectations on time to the activation period prior to running into the activation period:

- Perfect foresight model: in this expectation model I assume that individuals from the beginning of the unemployment spell are aware of the shortenings of the passive UI period which will occur. In other words, individuals know how many months they have left until the activation period from the beginning of the spell.

Figure 15: Estimated hazard values for male with family, children, upper secondary education and 24 months of entitlement.



- System foresight I: in this expectation model I assume that individuals in mid 1996 learn about both the changes in 1996 and 1998.

- System foresight II: in this expectation model individuals do not learn about changes before they are fully implemented. This means that they learn about the 1996 change in 1996 and the 1998 change in 1998.

- No foresight: in this expectation model individuals do not learn about shortenings of the passive period until three months prior to entering the activation period.

When the passive period is shortened, some individuals may already have used more passive benefits than they are entitled to. This is the case, for instance, for all individuals who in January 1998 have used more than 2 years in the passive period. These individuals will according to the law be moved well "into" the activation period with the number of months they have

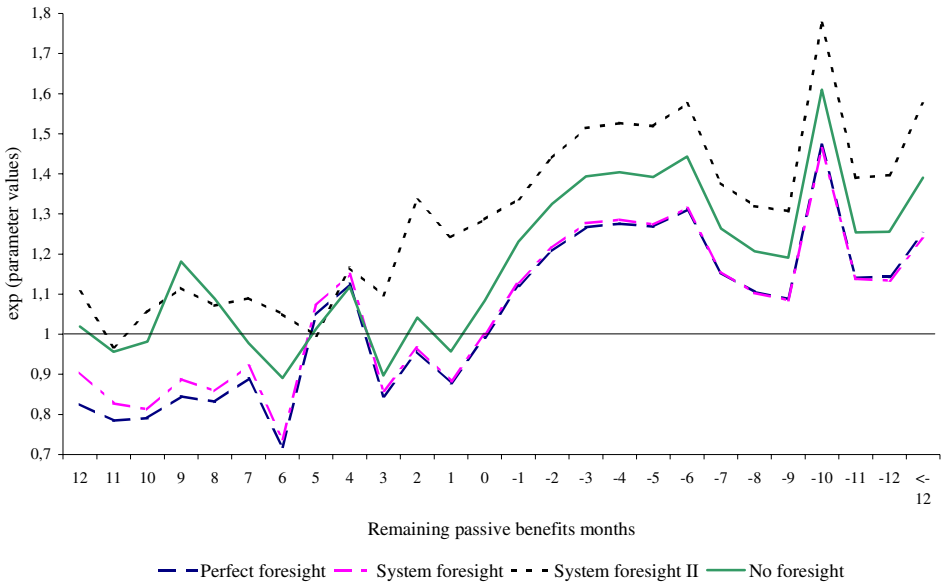
overspent in the passive period. Since the law dictates that individuals who are furthest into the activation period should be activated first, individuals who are moved into the activation period will have a higher possibility of activation than individuals who are just in the beginning of the activation period. In order to test whether individuals do actually take this risk into account in their expectations, I will use the four different expectation models described above in two different versions:

- Activation foresight A: I here assume that individuals know if they are moved further into the activation period because of a shortening of the passive period.
- Activation foresight B: I here assume that individuals only take account of the fact that they have entered the activation period and subsequently how many months they have spent in the activation period.

As described in section 4, the sources of identification of the motivation effect will vary as we change the expectation model. If we assume a perfect foresight, the changes in the passive period will have no effect on the identification. In practice some limited identification arises from construction of dummies which results in rounding differences between the variables who would otherwise be perfectly colinear. The majority of the identification comes from the variable "initial passive period remaining" (E) which in the estimations has been modelled with a linear and squared term. Imposing this restrictive form on (E) makes it possible to identify the motivation form. All the remaining expectation models have discreet jumps in the variable "remaining passive benefits" (R) which is used to identify the motivation effect.

In Figure 16, the four different expectation models for individuals taking account of the movement into the activation period are described (activation

Figure 16: Estimation result of motivation effect using different expectation models and assuming knowledge about movement into activation period (activation foresight A).

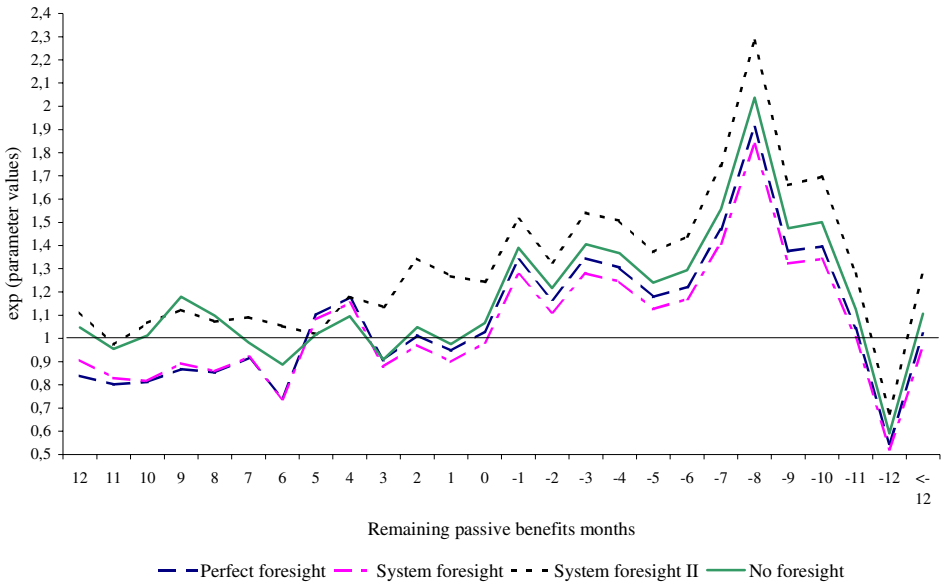


foresight A). In general it appears that the expectation models produce very similar results. The system foresight II model seems to produce the strongest results. This indicates that this expectation model gives the most precise picture of individuals' expectations. Interestingly, this model indicates that the motivation effect starts well before individuals run out of passive benefits. A result which is not found in any of the other expectation models.

In Figure 17, I have displayed the estimation results for the four different expectation models in which individuals do not take the movement into the activation period into account (activation foresight B). The estimation results are similar to the results found for the other four expectations up until the beginning of the activation period just as they should be[18]. In the activation period, however, the later models produce a spike in the estimated motivation

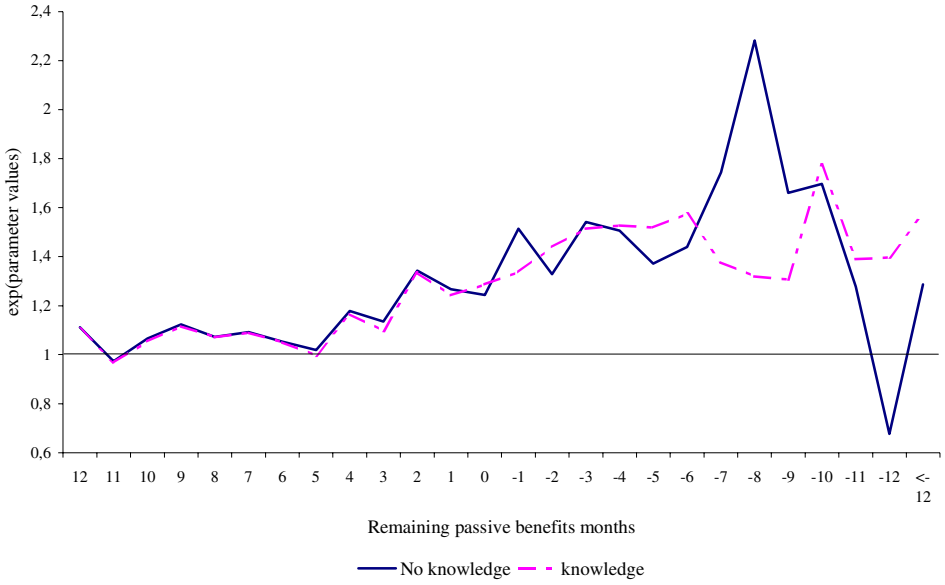
[18] Due to the construction of the expectations.

Figure 17: Estimation result of motivation effect using different expectation models and assuming no knowledge about movement into activation period (activation foresight B).



effect when individuals are 8 months into the activation period. This can be seen more clearly in Figure 18 where the system foresight II model in the two different activation foresight versions are compared. This spike concurs well with the knowledge we have about the activation period. Since individuals first have to make an activation plan, it is possible for individuals who wish to avoid activation to postpone it for up to about a year, cf. Figure 9. This means that the final deadline for leaving the UI system in order to avoid activation seems to be a little less than 1 year into the activation period, which is also exactly what we find in the estimation with the spike after 8 months. The following drop in the motivation effect can be explained by the fact that after a year into the activation period, almost every individual who do not wish to participate in activation have left the UI system. After that, almost all remaining individuals participate in activation and therefore reduce

Figure 18: Comparison of the estimation results from the no foresight model with the activation foresight model A and B.



their job search (lock in effect). The fact that this spike can not be found in the model where individuals are assumed to have knowledge about the movement into the activation period (activation foresight A) does indicate that this model is not as good at explaining individuals' expectations and consequently behaviour.

9 Concluding remark

In this chapter I have analysed whether the activation period introduced into the Danish UI system in 1994 has a motivating effect, which is similar to the effects found in insurance systems where individuals are motivated by the prospect of loosing their right to benefits all together. In general, I find that activation do have a motivating effect. I find that activation results in a significant motivation effect. The hazard out of insured unemployment is found to increase when individuals enter the activation period and continue well

into the activation period. The reason for this is most likely that individuals can continue for a while in the activation period before they are forced to participate in some sort of activation. The motivation effect appears for the first time somewhere between 0 and 4 months prior to the activation period and continues approximately 12 months into the activation period.

An important aspect of modelling the motivation effect is how individuals form their beliefs about time to the activation period. Applying a wrong expectation model will result in a watering down of the estimated motivation effect. Different expectation models were estimated. The results indicate that individuals do not update their expectations regarding time to the activation period before legislative changes are implemented. This is even though these changes may be announced well before the implementation. Furthermore, when the passive period is shortened, people who have been staying in the passive period longer than the new rules allow are according to UI rules moved into the activation period with the number of months they have "overspent" in the passive period. Since the risk of activation according to rules should be positively correlated with how many months a person is in the activation period, individuals may take account of this. The estimations indicate that this is not so. The expectation models where individuals only take into account how many months they have actually spent in the activation period give the strongest motivation results. By using the expectation models which give the best fit of the motivation effect I find that the motivation effect first appears approximately 5 months prior to the activation period by a 20-40 per cent increase, cf. Figure 18. The effect peaks 8 months into the activation period by a 130 per cent increase in the hazard. This is followed by a lock in effect for the remaining individuals who reduce their job search effort due to participation in activation.

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A The placing of the unemployed according to the new rules from 1994

The implementation of the UI rules from 1994 means that anybody who receives the UI after 1 January 1994 has to be given an "unemployment seniority". The seniority desides the remaining UI as well as activation for the individual. Below I give a short description of the rules that have been used for this purpose. The rules below are taken from the departmental order "Bekendtgørelse om overgangsordninger for medlemmer af anerkendte arbejdsløshedskasser ved ikrafttræden af love om en aktiv arbejdsmarkedspolitik og lov om arbejdsløshedsforsikring m.v." from 1 december 1993, nr. 906.

A.1 Calculation of unemployment seniority

- A member's unemployment seniority is determined the first time after 1 january 1994 the member claims the UI. If the member is unemployed at 1 january 1994, the seniority has to be determined within 5 months.

- No unemployment which is located prior to the last time a person fulfilled the UI eligibility criteria by non supported employment is counted in the seniority.

- For a member who has not been in activation, unemployment which has occurred up until three years prior to the determination of seniority is included.

- For a member who has participated in activation schemes, the unemployment starting from the first day after the last activation spell is counted in the seniority.

- For members who have participated in activation once, unemployment prior to the activation is counted in the seniority as twenty four months

irrespective of the actual length of the unemployment. The activation period is counted in the seniority with its actual duration.

- Members who have participated in two activation periods are placed in the activation period.
- For members who have discontinued an activation period, the period is counted in the seniority as a completed period with duration equal to what the member has completed.

B Tables

Table 3: Hazard estimates of the four expectation models with activation foresight model I.

	Perfect foresight		System foresight I	
Variables	Parameter	St.error	Parameter	St. error
t=1	0.0000		0.0000	
t=2	-0.5668	0.0120	-0.5687	0.0120
t=3	-0.6531	0.0132	-0.6563	0.0132
t=4	-0.7758	0.0148	-0.7810	0.0148
t=5	-0.7958	0.0160	-0.8027	0.0160
t=6	-0.8962	0.0179	-0.9046	0.0178
t=7	-0.8369	0.0189	-0.8460	0.0189
t=8	-1.1080	0.0223	-1.1172	0.0222
t=9	-1.0915	0.0236	-1.1016	0.0236
t=10	-1.3339	0.0274	-1.3440	0.0274
t=11	-1.2705	0.0284	-1.2832	0.0283
t=12	-1.2457	0.0301	-1.2640	0.0300
t=13	-1.3138	0.0327	-1.3284	0.0326
t=14	-1.3745	0.0354	-1.3883	0.0353
t=15	-1.4386	0.0384	-1.4544	0.0382
t=16	-1.5386	0.0421	-1.5549	0.0418
t=17	-1.4952	0.0434	-1.5136	0.0431
t=18	-1.3439	0.0433	-1.3640	0.0430
t=19	-1.5424	0.0491	-1.5582	0.0488
t=20	-1.4754	0.0503	-1.4923	0.0499
t=21	-1.7590	0.0595	-1.7765	0.0591
t=22	-1.6100	0.0583	-1.6265	0.0578
t=23	-1.5227	0.0591	-1.5407	0.0586
t=24	-1.5689	0.0663	-1.6399	0.0643
t=25	-1.4955	0.0683	-1.5747	0.0661
t=26	-1.4726	0.0710	-1.5448	0.0686
t=27	-1.5173	0.0750	-1.5709	0.0726
t=28	-1.5609	0.0804	-1.6106	0.0781
t=29	-1.4621	0.0812	-1.4842	0.0802
t=30	-1.4163	0.0867	-1.4286	0.0860
t=31	-1.5367	0.0913	-1.5560	0.0906
t=32	-1.7679	0.1042	-1.7901	0.1035
t=33	-1.5158	0.1041	-1.5312	0.1033
t=34	-1.3653	0.1021	-1.3830	0.1012
t=35	-1.3315	0.1087	-1.3481	0.1078
t=36	-1.3878	0.1160	-1.4108	0.1151
t=37	-1.4441	0.1248	-1.4699	0.1240
t=38	-1.5819	0.1379	-1.6100	0.1372
t=39	-1.9676	0.1668	-1.9979	0.1662
t=40	-1.7471	0.1606	-1.7782	0.1599
t=41	-1.2562	0.1437	-1.2869	0.1429
t=42	-1.2860	0.1555	-1.3178	0.1547
t=43	-1.0834	0.1597	-1.1134	0.1588
t=44	-1.4752	0.1986	-1.5034	0.1979
t=45	-1.5200	0.2145	-1.5487	0.2138

Table 3: Continued.

Variables	Perfect foresight		System foresight I	
	Parameter	St.error	Parameter	St. error
t=46	-1.5933	0.2218	-1.6214	0.2211
t=47	-1.4436	0.2313	-1.4712	0.2304
t=48	-1.3719	0.2433	-1.3993	0.2425
t=49	-1.6328	0.2955	-1.6615	0.2948
t=50	-1.4738	0.2977	-1.5048	0.2971
t=51	-1.8624	0.3710	-1.8940	0.3705
t=52	-1.3137	0.3259	-1.3468	0.3253
t=53	-0.9594	0.3202	-0.9936	0.3196
t=54	-1.3726	0.4054	-1.4065	0.4049
t=55	-1.2519	0.4408	-1.2874	0.4403
t=56	-2.0821	0.7314	-2.1176	0.7312
t=57	-2.5664	1.0212	-2.6021	1.0210
R=12	-0.1927	0.0322	-0.1006	0.0340
R=11	-0.2425	0.0339	-0.1892	0.0354
R=10	-0.2345	0.0356	-0.2083	0.0370
R=9	-0.1686	0.0366	-0.1187	0.0371
R=8	-0.1847	0.0388	-0.1530	0.0388
R=7	-0.1168	0.0396	-0.0816	0.0391
R=6	-0.3300	0.0442	-0.3037	0.0436
R=5	0.0473	0.0399	0.0688	0.0391
R=4	0.1179	0.0419	0.1396	0.0411
R=3	-0.1675	0.0481	-0.1521	0.0472
R=2	-0.0448	0.0481	-0.0344	0.0470
R=1	-0.1299	0.0515	-0.1241	0.0503
R=0	-0.0088	0.0512	-0.0004	0.0499
R=-1	0.1143	0.0682	0.1219	0.0672
R=-2	0.1881	0.0708	0.1953	0.0697
R=-3	0.2365	0.0749	0.2447	0.0739
R=-4	0.2435	0.0792	0.2512	0.0782
R=-5	0.2378	0.0821	0.2416	0.0811
R=-6	0.2701	0.0845	0.2732	0.0835
R=-7	0.1430	0.0923	0.1448	0.0914
R=-8	0.1001	0.0991	0.0980	0.0984
R=-9	0.0837	0.1016	0.0813	0.1008
R=-10	0.3866	0.0938	0.3810	0.0929
R=-11	0.1316	0.1036	0.1293	0.1028
R=-12	0.1335	0.1049	0.1256	0.1041
R<=-13	0.2239	0.0462	0.2133	0.0426

Table 3: Continued.

Variables	Perfect foresight Parameter	St.error	System foresight I Parameter	St. error
Single w.ch.	-0.0004	0.0155	-0.0004	0.0155
Couple without c.	0.1232	0.0112	0.1249	0.0112
Couple w.ch.	0.1777	0.0094	0.1803	0.0094
Male	0.0627	0.0081	0.0617	0.0081
Secondary	-0.1867	0.0204	-0.1872	0.0204
Upper secondary	0.0676	0.0095	0.0682	0.0094
Vocat. training	0.0651	0.0174	0.0665	0.0174
Shorter univers.	0.0862	0.0178	0.0850	0.0178
Bach. degree	0.0004	0.0190	-0.0001	0.0190
Grad. degree	-0.1482	0.0113	-0.1511	0.0113
Entitlement	0.0253	0.0026	0.0104	0.0019
Entitlement 2	-0.0007	0.0000	-0.0002	0.0000
Constant	-1.0449	0.0368	-0.9618	0.0314

Table 4: Hazard estimates of the four expectation models with activation foresight model I.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
t=1	0.0000		0.0000	
t=2	-0.5712	0.0120	-0.5704	0.0120
t=3	-0.6614	0.0132	-0.6597	0.0132
t=4	-0.7886	0.0148	-0.7860	0.0148
t=5	-0.8139	0.0160	-0.8102	0.0160
t=6	-0.9207	0.0178	-0.9158	0.0178
t=7	-0.8650	0.0188	-0.8588	0.0188
t=8	-1.1399	0.0222	-1.1324	0.0221
t=9	-1.1276	0.0235	-1.1186	0.0234
t=10	-1.3753	0.0273	-1.3643	0.0272
t=11	-1.3188	0.0282	-1.3054	0.0281
t=12	-1.3131	0.0298	-1.2963	0.0296
t=13	-1.3789	0.0324	-1.3618	0.0322
t=14	-1.4446	0.0351	-1.4222	0.0349
t=15	-1.5156	0.0380	-1.4893	0.0378
t=16	-1.6192	0.0416	-1.5925	0.0414
t=17	-1.5813	0.0430	-1.5503	0.0427
t=18	-1.4396	0.0428	-1.4082	0.0424
t=19	-1.6267	0.0487	-1.5893	0.0482
t=20	-1.5751	0.0498	-1.5276	0.0493
t=21	-1.8789	0.0591	-1.8268	0.0586
t=22	-1.7341	0.0578	-1.6763	0.0572
t=23	-1.6548	0.0586	-1.5926	0.0579
t=24	-1.7682	0.0645	-1.7008	0.0634
t=25	-1.6990	0.0663	-1.6419	0.0652
t=26	-1.6920	0.0688	-1.6175	0.0676

Table 4: Continued.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
t=27	-1.7270	0.0729	-1.6406	0.0716
t=28	-1.7748	0.0785	-1.6902	0.0769
t=29	-1.6765	0.0811	-1.5722	0.0774
t=30	-1.6844	0.0869	-1.5942	0.0826
t=31	-1.6467	0.0921	-1.5715	0.0874
t=32	-1.9260	0.1048	-1.7812	0.1003
t=33	-1.7790	0.1047	-1.6343	0.1009
t=34	-1.6762	0.1027	-1.4793	0.1006
t=35	-1.6430	0.1094	-1.4482	0.1072
t=36	-1.6626	0.1171	-1.5128	0.1146
t=37	-1.6801	0.1238	-1.5767	0.1235
t=38	-1.8218	0.1369	-1.7182	0.1366
t=39	-2.2119	0.1659	-2.1077	0.1657
t=40	-1.9966	0.1596	-1.8902	0.1594
t=41	-1.5103	0.1425	-1.4006	0.1423
t=42	-1.5463	0.1543	-1.4353	0.1541
t=43	-1.3425	0.1585	-1.2298	0.1583
t=44	-1.7377	0.1977	-1.6218	0.1975
t=45	-1.7894	0.2136	-1.6702	0.2134
t=46	-1.8685	0.2210	-1.7452	0.2208
t=47	-1.7338	0.2305	-1.6019	0.2302
t=48	-1.6644	0.2426	-1.5312	0.2423
t=49	-1.9272	0.2949	-1.7938	0.2946
t=50	-1.7715	0.2972	-1.6380	0.2969
t=51	-2.1609	0.3706	-2.0274	0.3704
t=52	-1.6142	0.3254	-1.4806	0.3252
t=53	-1.2614	0.3197	-1.1277	0.3195
t=54	-1.6744	0.4049	-1.5405	0.4048
t=55	-1.5558	0.4404	-1.4220	0.4402
t=56	-2.3862	0.7312	-2.2524	0.7311
t=57	-2.8707	1.0210	-2.7368	1.0209
R=12	0.1007	0.0424	0.0191	0.0713
R=11	-0.0324	0.0451	-0.0446	0.0756
R=10	0.0533	0.0445	-0.0184	0.0778
R=9	0.1089	0.0448	0.1665	0.0755
R=8	0.0687	0.0464	0.0846	0.0811
R=7	0.0862	0.0473	-0.0228	0.0892
R=6	0.0486	0.0501	-0.1159	0.0947
R=5	-0.0039	0.0535	0.0132	0.0994
R=4	0.1528	0.0532	0.1117	0.1016
R=3	0.0927	0.0577	-0.1085	0.0523
R=2	0.2891	0.0564	0.0409	0.0461
R=1	0.2165	0.0611	-0.0438	0.0495
R=0	0.2519	0.0637	0.0807	0.0491
R=-1	0.2906	0.0667	0.2077	0.0664
R=-2	0.3643	0.0691	0.2813	0.0688
R=-3	0.4147	0.0733	0.3317	0.0730
R=-4	0.4231	0.0774	0.3394	0.0772
R=-5	0.4180	0.0803	0.3305	0.0801

Table 4: Continued.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
R=-6	0.4546	0.0827	0.3669	0.0825
R=-7	0.3199	0.0907	0.2336	0.0905
R=-8	0.2773	0.0977	0.1880	0.0975
R=-9	0.2673	0.1002	0.1748	0.1000
R=-10	0.5746	0.0924	0.4762	0.0921
R=-11	0.3289	0.1024	0.2264	0.1021
R=-12	0.3343	0.1039	0.2274	0.1035
R<=-13	0.4541	0.0432	0.3292	0.0416
Single w.ch.	-0.0015	0.0155	-0.0014	0.0155
Couple w.out ch.	0.1250	0.0112	0.1254	0.0112
Couple w.ch.	0.1792	0.0094	0.1794	0.0094
Male	0.0626	0.0081	0.0632	0.0081
Secondary	-0.1877	0.0204	-0.1880	0.0204
Upper second.	0.0665	0.0094	0.0675	0.0094
Vocat. training	0.0657	0.0174	0.0663	0.0174
Shorter univers.	0.0818	0.0178	0.0840	0.0178
Bach. degree	-0.0025	0.0190	-0.0011	0.0190
Grad. degree	-0.1513	0.0113	-0.1508	0.0113
Entitlement	0.0182	0.0019	0.0127	0.0018
Entitlement 2	-0.0003	0.0000	-0.0002	0.0000
Constant	-1.2037	0.0347	-1.0781	0.0348

Table 5: Hazard estimates of the four expectation models with activation foresight model II.

Variables	Perfect foresight Parameter	St.error	System foresight I Parameter	St. error
t=2	-0.5672	0.0120	-0.5689	0.0120
t=3	-0.6536	0.0132	-0.6565	0.0132
t=4	-0.7770	0.0148	-0.7816	0.0148
t=5	-0.7973	0.0161	-0.8033	0.0160
t=6	-0.8981	0.0179	-0.9049	0.0178
t=7	-0.8398	0.0189	-0.8467	0.0189
t=8	-1.1116	0.0223	-1.1180	0.0222
t=9	-1.0972	0.0236	-1.1037	0.0236
t=10	-1.3403	0.0274	-1.3460	0.0274
t=11	-1.2783	0.0284	-1.2855	0.0283
t=12	-1.2553	0.0301	-1.2663	0.0300
t=13	-1.3243	0.0328	-1.3305	0.0326
t=14	-1.3876	0.0355	-1.3916	0.0353
t=15	-1.4523	0.0385	-1.4569	0.0382
t=16	-1.5537	0.0422	-1.5570	0.0419
t=17	-1.5096	0.0435	-1.5135	0.0432
t=18	-1.3599	0.0434	-1.3639	0.0430
t=19	-1.5659	0.0493	-1.5634	0.0488

Table 5: Continued.

Variables	Perfect foresight		System foresight I	
	Parameter	St.error	Parameter	St. error
t=20	-1.4981	0.0505	-1.4952	0.0500
t=21	-1.7846	0.0597	-1.7804	0.0592
t=22	-1.6345	0.0585	-1.6279	0.0579
t=23	-1.5473	0.0594	-1.5403	0.0587
t=24	-1.6084	0.0667	-1.6460	0.0644
t=25	-1.5511	0.0687	-1.5938	0.0663
t=26	-1.5227	0.0714	-1.5574	0.0688
t=27	-1.5578	0.0754	-1.5736	0.0727
t=28	-1.5935	0.0808	-1.6054	0.0782
t=29	-1.4919	0.0816	-1.4746	0.0804
t=30	-1.4510	0.0872	-1.4222	0.0861
t=31	-1.5968	0.0917	-1.5720	0.0907
t=32	-1.8256	0.1046	-1.8021	0.1036
t=33	-1.5698	0.1046	-1.5383	0.1035
t=34	-1.4052	0.1026	-1.3741	0.1014
t=35	-1.3832	0.1092	-1.3490	0.1079
t=36	-1.4316	0.1164	-1.4042	0.1152
t=37	-1.5601	0.1231	-1.5379	0.1219
t=38	-1.5773	0.1367	-1.5569	0.1355
t=39	-2.0119	0.1657	-1.9934	0.1647
t=40	-1.7591	0.1601	-1.7444	0.1590
t=41	-1.1982	0.1445	-1.1865	0.1433
t=42	-1.2481	0.1576	-1.2396	0.1564
t=43	-1.2299	0.1626	-1.2240	0.1614
t=44	-1.8195	0.2024	-1.8185	0.2015
t=45	-1.6102	0.2223	-1.6077	0.2214
t=46	-1.5485	0.2336	-1.5464	0.2327
t=47	-1.2356	0.2496	-1.2318	0.2488
t=48	-0.6927	0.2749	-0.6820	0.2743
t=49	-1.4179	0.3157	-1.4011	0.3144
t=50	-1.2687	0.3182	-1.2544	0.3170
t=51	-1.6572	0.3877	-1.6436	0.3866
t=52	-1.1082	0.3448	-1.0963	0.3436
t=53	-0.7537	0.3394	-0.7430	0.3382
t=54	-1.1669	0.4206	-1.1560	0.4197
t=55	-1.0458	0.4549	-1.0368	0.4540
t=56	-1.8760	0.7400	-1.8670	0.7395
t=57	-2.3602	1.0273	-2.3515	1.0270
R=12	-0.1760	0.0323	-0.0984	0.0340
R=11	-0.2216	0.0340	-0.1870	0.0355
R=10	-0.2079	0.0357	-0.2023	0.0370
R=9	-0.1418	0.0368	-0.1138	0.0371
R=8	-0.1592	0.0391	-0.1536	0.0389
R=7	-0.0877	0.0400	-0.0832	0.0392
R=6	-0.2946	0.0445	-0.3016	0.0437
R=5	0.0961	0.0403	0.0786	0.0392
R=4	0.1625	0.0424	0.1419	0.0411
R=3	-0.0976	0.0481	-0.1297	0.0468
R=2	0.0133	0.0485	-0.0284	0.0469

Table 5: Continued.

Variables	Perfect foresight Parameter	St.error	System foresight I Parameter	St. error
R=1	-0.0552	0.0516	-0.1070	0.0498
R=0	0.0300	0.0516	-0.0182	0.0498
R=-1	0.2913	0.0521	0.2433	0.0500
R=-2	0.1544	0.0586	0.1078	0.0567
R=-3	0.2960	0.0610	0.2466	0.0590
R=-4	0.2657	0.0665	0.2189	0.0646
R=-5	0.1641	0.0733	0.1186	0.0715
R=-6	0.2006	0.0777	0.1569	0.0758
R=-7	0.3841	0.0791	0.3419	0.0770
R=-8	0.6471	0.0803	0.6080	0.0781
R=-9	0.3189	0.0978	0.2794	0.0959
R=-10	0.3330	0.1051	0.2946	0.1032
R=-11	0.0434	0.1247	0.0041	0.1231
R=-12	-0.6065	0.1743	-0.6481	0.1735
R<=-13	0.0201	0.1214	-0.0366	0.1184
Singl.w.ch.	-0.0002	0.0155	-0.0003	0.0155
Couple w.out.ch.	0.1223	0.0112	0.1247	0.0112
Couple w.ch.	0.1771	0.0094	0.1803	0.0094
Male	0.0627	0.0081	0.0618	0.0081
Secondary	-0.1867	0.0204	-0.1874	0.0204
Upper Secondary	0.0671	0.0095	0.0682	0.0094
Vocat. train.	0.0647	0.0174	0.0665	0.0174
Shorter Univ.d.	0.0856	0.0178	0.0849	0.0178
Bach. degr.	-0.0008	0.0190	-0.0001	0.0190
Grad. degr.	-0.1477	0.0113	-0.1511	0.0113
Entitlement	0.0355	0.0031	0.0117	0.0021
Entitlement 2	-0.0009	0.0001	-0.0002	0.0000
Constant	-1.1713	0.0421	-0.9782	0.0339

Table 6: Hazard estimates of the four expectation models with activation foresight model II.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
t=2	-0.5714	0.0120	-0.5707	0.0120
t=3	-0.6615	0.0132	-0.6598	0.0132
t=4	-0.7890	0.0148	-0.7865	0.0148
t=5	-0.8142	0.0160	-0.8106	0.0160
t=6	-0.9207	0.0178	-0.9159	0.0178
t=7	-0.8654	0.0188	-0.8593	0.0188
t=8	-1.1403	0.0222	-1.1329	0.0221
t=9	-1.1294	0.0235	-1.1203	0.0235
t=10	-1.3772	0.0273	-1.3660	0.0272
t=11	-1.3211	0.0282	-1.3073	0.0281
t=12	-1.3155	0.0298	-1.2980	0.0296

Table 6: Continued.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
t=13	-1.3808	0.0324	-1.3630	0.0322
t=14	-1.4477	0.0351	-1.4245	0.0349
t=15	-1.5181	0.0380	-1.4909	0.0378
t=16	-1.6217	0.0417	-1.5942	0.0414
t=17	-1.5815	0.0430	-1.5496	0.0427
t=18	-1.4400	0.0428	-1.4071	0.0425
t=19	-1.6322	0.0487	-1.5927	0.0482
t=20	-1.5785	0.0499	-1.5291	0.0493
t=21	-1.8834	0.0591	-1.8293	0.0586
t=22	-1.7361	0.0578	-1.6767	0.0573
t=23	-1.6552	0.0587	-1.5912	0.0580
t=24	-1.7757	0.0646	-1.7057	0.0635
t=25	-1.7200	0.0664	-1.6592	0.0653
t=26	-1.7070	0.0690	-1.6282	0.0678
t=27	-1.7323	0.0730	-1.6420	0.0717
t=28	-1.7716	0.0786	-1.6843	0.0770
t=29	-1.6691	0.0812	-1.5620	0.0774
t=30	-1.6799	0.0870	-1.5860	0.0827
t=31	-1.6688	0.0921	-1.5824	0.0875
t=32	-1.9431	0.1048	-1.7918	0.1004
t=33	-1.7929	0.1047	-1.6342	0.1010
t=34	-1.6688	0.1028	-1.4703	0.1007
t=35	-1.6464	0.1093	-1.4497	0.1073
t=36	-1.6462	0.1169	-1.5060	0.1146
t=37	-1.7451	0.1216	-1.6425	0.1213
t=38	-1.7690	0.1353	-1.6641	0.1350
t=39	-2.2127	0.1645	-2.1052	0.1643
t=40	-1.9686	0.1588	-1.8571	0.1585
t=41	-1.4174	0.1431	-1.3017	0.1428
t=42	-1.4789	0.1562	-1.3594	0.1558
t=43	-1.4698	0.1612	-1.3445	0.1608
t=44	-2.0671	0.2013	-1.9413	0.2010
t=45	-1.8665	0.2212	-1.7359	0.2209
t=46	-1.8117	0.2326	-1.6769	0.2323
t=47	-1.5045	0.2487	-1.3652	0.2484
t=48	-0.9693	0.2742	-0.8222	0.2739
t=49	-1.7134	0.3147	-1.5546	0.3143
t=50	-1.5680	0.3172	-1.4090	0.3168
t=51	-1.9574	0.3868	-1.7983	0.3865
t=52	-1.4106	0.3438	-1.2514	0.3435
t=53	-1.0577	0.3384	-0.8985	0.3381
t=54	-1.4706	0.4198	-1.3114	0.4196
t=55	-1.3520	0.4541	-1.1927	0.4539
t=56	-2.1824	0.7396	-2.0231	0.7394
t=57	-2.6668	1.0270	-2.5075	1.0269
R=12	0.1056	0.0424	0.0462	0.0706
R=11	-0.0272	0.0451	-0.0467	0.0756
R=10	0.0640	0.0444	0.0123	0.0769
R=9	0.1162	0.0448	0.1652	0.0754

Table 6: Continued.

Variables	System foresight II Parameter	St.error	No foresight Parameter	St. error
R=8	0.0695	0.0465	0.0939	0.0805
R=7	0.0877	0.0473	-0.0181	0.0887
R=6	0.0520	0.0500	-0.1202	0.0941
R=5	0.0181	0.0531	0.0178	0.0984
R=4	0.1639	0.0526	0.0913	0.1010
R=3	0.1274	0.0565	-0.0943	0.0518
R=2	0.2954	0.0557	0.0474	0.0459
R=1	0.2369	0.0595	-0.0248	0.0489
R=0	0.2182	0.0625	0.0643	0.0489
R=-1	0.4147	0.0495	0.3294	0.0491
R=-2	0.2837	0.0561	0.1958	0.0558
R=-3	0.4325	0.0585	0.3407	0.0581
R=-4	0.4094	0.0641	0.3129	0.0636
R=-5	0.3161	0.0710	0.2146	0.0705
R=-6	0.3640	0.0753	0.2582	0.0747
R=-7	0.5563	0.0765	0.4429	0.0760
R=-8	0.8251	0.0778	0.7113	0.0770
R=-9	0.5070	0.0956	0.3887	0.0949
R=-10	0.5287	0.1030	0.4057	0.1023
R=-11	0.2457	0.1229	0.1181	0.1223
R=-12	-0.3910	0.1734	-0.5264	0.1729
R<=-13	0.2521	0.1189	0.1011	0.1180
Singl.w.ch.	-0.0015	0.0155	-0.0013	0.0155
Couple w.out.ch.	0.1246	0.0112	0.1251	0.0112
Couple w.ch.	0.1790	0.0094	0.1793	0.0094
Male	0.0628	0.0081	0.0634	0.0081
Secondary	-0.1878	0.0204	-0.1882	0.0204
Upper Secondary	0.0664	0.0094	0.0675	0.0094
Vocat. train.	0.0657	0.0174	0.0663	0.0174
Shorter Univ.d.	0.0820	0.0178	0.0841	0.0178
Bach. degr.	-0.0030	0.0190	-0.0013	0.0190
Grad. degr.	-0.1510	0.0113	-0.1507	0.0113
Entitlement	0.0209	0.0021	0.0145	0.0021
Entitlement 2	-0.0003	0.0000	-0.0002	0.0000
Constant	-1.2453	0.0377	-1.1035	0.0382

The identification of incentive effects of benefit exhaustion in unemployment insurance systems

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Abstract

According to economic search theory an unemployment insurance system with finite benefits duration may result in an increase in search for employment and/or reduction in reservation wage just prior to benefits exhaustion, cf. Mortensen (1977, 1986). This effect, which I will call the motivation effect, is created by the prospect of an income drop when benefits run out. The central econometric problem in empirical studies of this effect is how to identify the motivation effect. The variable describing time to benefits exhaustion will often be perfectly colinear with the unemployment duration variable. This colinearity makes it difficult to disentangle the motivation effect from any changes in individuals' employment chances which may occur as the unemployment spell progresses. Different assumptions have been used in order to circumvent this identification problem. Many of which can be questioned.

In this paper I go through the different exclusions restrictions used in the literature in order to identify the motivation effect. Using Danish labour market data from the period 1994-1998 I apply the different exclusion restrictions in order to compare their impact on the estimations of the motivation effect. The data I use makes it possible to identify the motivation effect with very weak exclusion restrictions. It is therefore possible directly to compare the effect of the more strict exclusion restrictions used in the literature with estimation results using the weaker restrictions.

From the estimations I find that some of the most common exclusion restrictions used in almost all studies of motivation effects actually seem to bias the estimation results towards zero, thereby risking to dismiss motivation effects where they might exist.

1 Introduction

When characterising unemployment insurance (UI) systems researchers tend to focus on two parameters, the replacement rate and the maximum duration of benefits. The first parameter, the replacement rate, has received substantial attention in economic research over the last two decades in theory as well as empirical studies. The parameter, however, may not be especially important in explaining the differences in the unemployment rate between countries, particularly the US and Europe. There is only little difference in the replacement rate between countries and it has furthermore stayed unchanged for long periods. The maximum duration of benefits, however, is very different between countries and it is in this parameter we find the biggest difference between the European and the US UI systems. Whereas individuals in the US can normally receive benefits for between 26 and 52 weeks, most European systems have maximum benefits durations which are counted in years, cf. Meyer (1990), Carling et al. (1996), Geerdsen (2002), Layard et al. (1991).

According to economic search theory, a UI system with finite benefits duration may result in an increase in search for employment and/or reduction in reservation wage just prior to running out of benefits, cf. Mortensen (1977, 1986). This effect, which I will call the motivation effect, is created by the prospect of an income drop when benefits run out. Mainly due to the lack of adequate micro data, empirical studies of the motivation effect did not start to emerge until late the 1980s. Most studies have been focused on the US UI system, but there has also been studies on Canada, and for Europe, Great Britain, Germany, Sweden and Denmark, see section 4 for references.

The central problem in these studies is the identification of the moti-

vation effect. Often the variable describing time to benefits exhaustion is a function of variables which all have a direct effect on individuals' duration as unemployed. But identification necessitates that at least one of the variables can be omitted from the modelling of individuals unemployment duration (the exclusion restriction). Examples of exclusion restrictions used in the literature is differences in benefits entitlement over regions or between individuals due to previous unemployment, cf. Ham and Rea (1987), Meyer (1990). In order to use this variation to disentangle the motivation effect from other time varying effects, one has to assume that this variation does not on its own have an effect on individuals' unemployment duration.

In this chapter I will focus on the identification of the motivation effect in UI systems. I will go through the different exclusion restrictions used in the literature in order to identify the motivation effect. Using Danish labour market data from the period 1994-1998 I will apply the different exclusion restrictions in order to compare their impact on the estimations of the motivation effect. The data I use makes it possible to identify the motivation effect with very weak exclusion restrictions. It is therefore possible to directly compare the effect of the stricter exclusion restrictions used in the literature with estimation results using the weaker restrictions.

In section 2, I briefly describe the theory behind the motivation effect which is commonly referred to in empirical studies of the effect. In section 3, I briefly explain the problems behind the identification of the motivation effect and I describe why exclusion restrictions are necessary for identification. This is in section 4 followed by a description of the different exclusion restrictions and data used in the literature. In section 5, I describe the data which I use for the estimations and I present the different models which I will estimate on the data. In section 6,I present the results of the estimations.

Finally, I conclude in section 7.

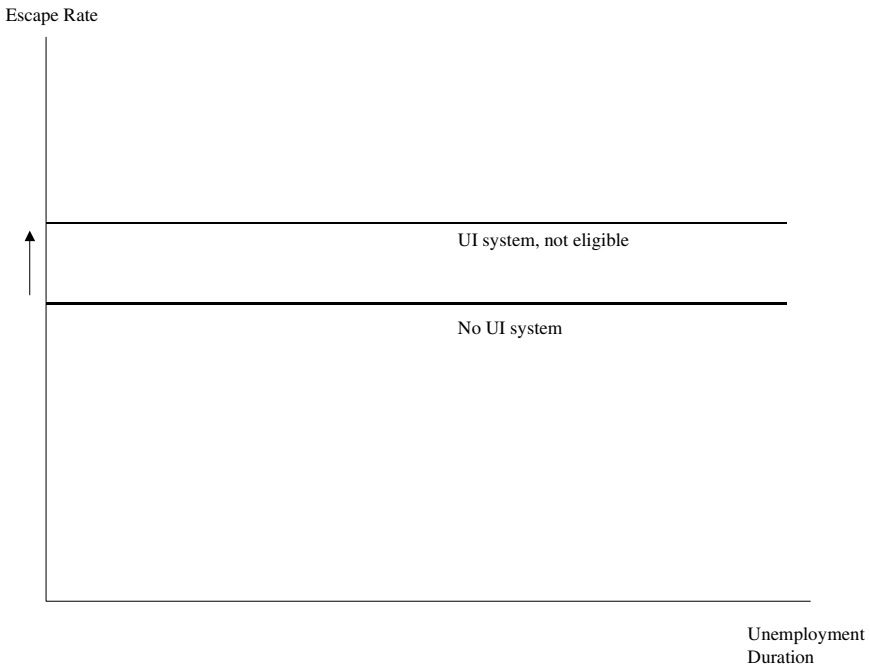
2 The theory of the motivation effect

The standard job search model seems to be a very good framework for the analysis of UI systems. It is used as a theoretical framework in most empirical articles about UI systems and motivation effects, cf. among others Meyer (1990), Rogers (1998). The job search framework gives in its basic form a partial analysis of the labour market focusing on the decision making of unemployed individuals. It is based on a market with imperfect wage information where the job possibilities of an individual worker can be characterised as a distribution on possible wage offers. It is assumed that the distribution is known and that workers search by sampling from this distribution in a sequential manner. The optimal strategy for workers is then to accept the first offer obtained greater than some reservation wage. The reservation wage is the wage that maximises the expected present value of the future earning stream in such a way that the cost of search equals the expected gain in future income attributable to search.

One particular article which is often cited in empirical studies of UI systems is Mortensen (1977). Using standard job search framework with fixed wage offer distribution Mortensen analyses the effects of a UI system where benefits have a finite duration and new entrants or workers who quit jobs do not qualify for UI directly. Mortensen's general finding is that the total effect on the reservation wage and search intensity from the introduction of UI is ambiguous. Still, the analysis gives helpful insight to the behaviour of individuals on the labour market. One important finding is that the introduction of UI splits the labour force into those who do and those who do not have access to benefits, resulting in different labour market behaviour.

For individuals who are not eligible for benefits, the effect of introducing an UI system is clear in this model. Since access to benefits can only be gained through employment, it is profitable for individuals to accept work at a lower wage rate than without the UI system. Individuals outside the system will therefore reduce their reservation wage as well as increase their job search and hence experience an increase in their escape rate out of unemployment, cf. figure 1.

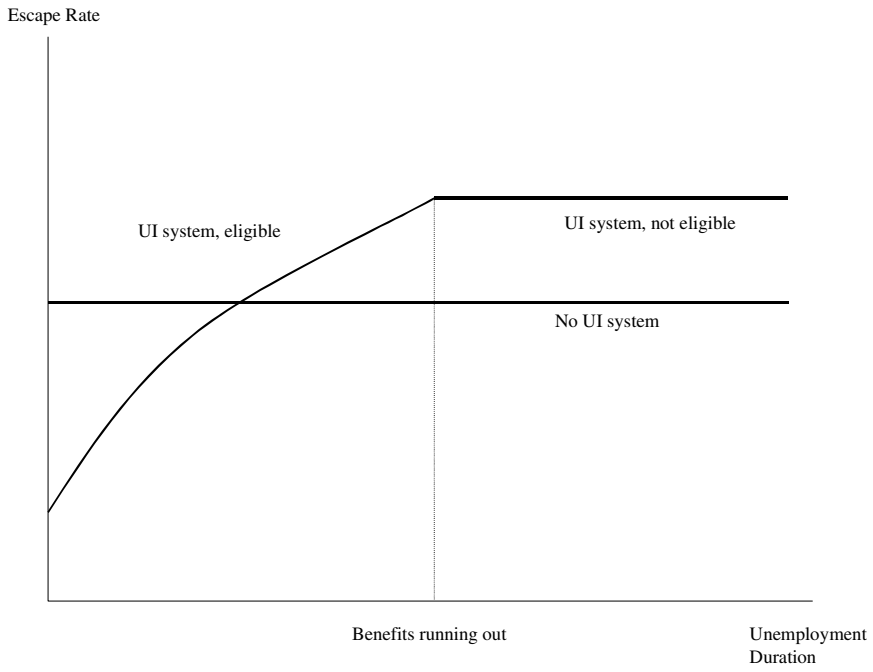
Figure 1: The escape rate out of unemployment for individuals not eligible for benefits when the the UI is introduced.



For individuals who are eligible for benefits, there will be two opposing effects. Access to benefits will have the standard disincentive effect on employment (increase in reservation wage and decreasing search intensity). This is because benefits increase the value of staying unemployed and

thereby makes it less costly to prolong the search for a high wage job. Since benefits can only be received for a finite period, however, the disincentive effect will be dominating in the beginning of the unemployment spell, cf. figure 2. When individuals approach the end of their benefit period, they will gradually reduce their reservation wage and increase their job search. This is due to the prospect of an income drop which makes future search more costly. On top of that, the fact that eligibility to the UI can be regained through employment amplifies the effect on the job search rate and reservation wage as benefits are about to run out.

Figure 2: The escape rate out of unemployment for individuals eligible for benefits when the UI is introduced.



Mortensen finds that individuals' reservation wage goes down and search intensity up as they approach benefit exhaustion. In Mortensen's restricted

model this results in an increasing escape rate which alternatively would have stayed constant. In a more flexible model where job offer arrival rate and wage offer distribution can fluctuate, the escape rate is unlikely to stay constant over the unemployment spell in the absence of finite benefits. It is therefore not possible to predict whether the escape rate will display an increasing trend over the spell when finite benefits are introduced. Mortensen's result, however, does make it clear that finite benefits will result in a higher escape rate prior to exhaustion than in the absence of finite benefits. This difference is exactly the motivation effect which empirical studies are trying to estimate.

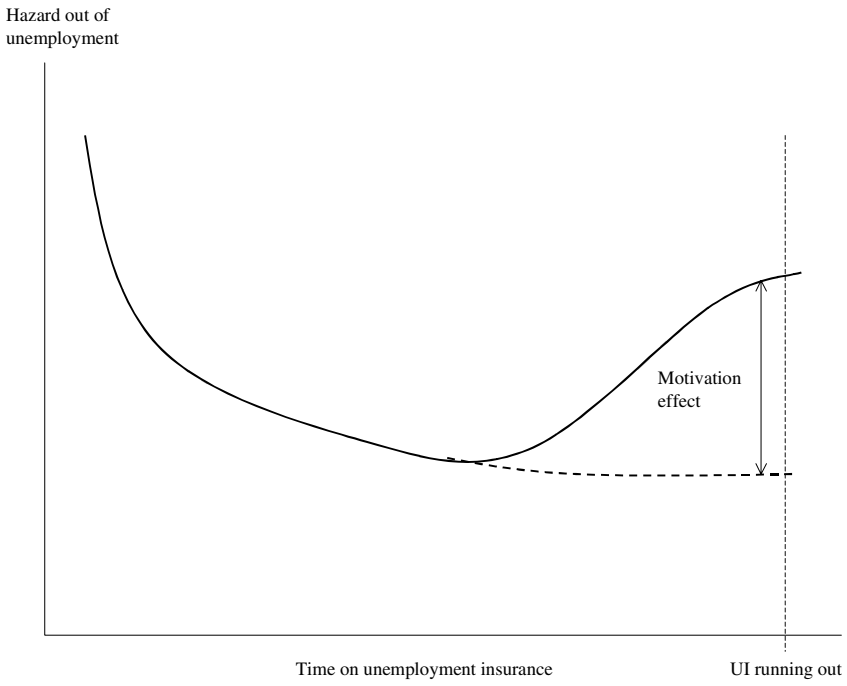
3 Estimating the motivation effect

When estimating the motivation effect of finite benefits, the central question is how individuals would have reacted were they not met with a limited UI duration, cf. figure 3. Comparing the escape rate for individuals prior to benefit exhaustion with the escape rate for identical individuals who are not constrained in their future benefits (the counter factual) will produce an estimate of the motivation effect. This would be possible if identical individuals were met with different benefits durations in the UI system. Only rarely, though, do social researchers have access to social experiments where identical groups are treated differently. It is therefore necessary to use either administrative register data or survey data and apply identifying assumptions in order to create an estimator of the motivation effect.

3.1 Modelling the motivation effect

In order to analyse whether the prospect of running out of benefits do indeed have any effect on individuals we have to use an empirical model which can

Figure 3: The hazard rate out of unemployment with and without the threat of finite benefits duration.



link the theoretical findings with the data we have access to. As described by Mortensen (1977) the prospect of running out of benefits will influence the escape rate out of unemployment. It therefore seems sensible to focus on empirical models which can describe individuals' departure from the UI systems. Most often the movement from unemployment is modelled using the hazard out of unemployment. In this context, hazard means the probability of leaving unemployment in a specific time period given that one has stayed unemployed up until that period. The advantage of this conditional probability is that it only describes the probability of leaving unemployment at any specific point in time only for the individuals who are left in unemployment.

In order to model the motivation effect we need an empirical model which can 1) describe the hazard out of unemployment in a flexible manner 2) describe the specific effect which the remaining benefits have on the hazard (the motivation effect). In the literature two empirical models are commonly used. One model is the discreet logistic model, cf. Ham and Rea (1987), Rogers (1998), Geerdsen (2002).

$$h(t, X_{it}) = \frac{\exp(y(t, X_{it}))}{1 + \exp(y(t, X_{it}))} = \frac{1}{1 + \exp\{-y(t, X_{it})\}}, \tag{1}$$

where h is the hazard at a given spell length t, y is a linear function of t time in spell and X exogenous variables. In this model the duration effects are specified through the modelling of t. It is possible to specify the duration effect very freely, for example with a dummy construct. If the variable component of the model (y) is assumed to be linear, then the effect from both observed and unobserved factors will be constant over the odds ratio of the hazard. This can be seen by differentiating the odd ratio of the hazard,

$$\frac{\delta(\frac{h}{1-h})}{\delta x} = \frac{\delta\left(\frac{\exp(\beta x)}{1+\exp(\beta x)} / \left(1 - \frac{\exp(\beta x)}{1+\exp(\beta x)}\right)\right)}{\delta x} = \frac{\delta \exp(\beta x)}{\delta x} = \beta.$$

Another model which has been used is the continuos Cox proportional hazard model, cf. for instance Meyer (1990), Katz and Meyer (1990);

$$h(t, X_{it}) = h_0(t) * \exp(y(X_{it})),$$

where h_0 is the baseline hazard and y is a linear function of X. In the Cox proportional hazard the baseline hazard is left unspecified. Only the proportional effects on the hazard of X is estimated. The advantage of this model is that one does not have to impose an assumption of functional form on the duration effect. If the variable component of the model ($y(X_{it})$) is assumed to be linear, then the effect of both observed and unobserved

factors on the hazard is constant over the log of the hazard. This can be seen by taking the derivative of the log hazard,

$$\frac{\delta \log h}{\delta x} = \frac{\delta(\log h_0(t) + \beta x)}{\delta x} = \beta.$$

Identification of the motivation effect in these models is done by assuming that any differences we may find in labour market behaviour for individuals who are identical on all other observables are all due to differences in time to benefits exhaustion, or in other words, due to the motivation effect and noise. This is modelled by including a variable which describes individuals' time to benefits exhaustion. In equation 2 and 3, an example is given with the logistic hazard model assuming a simple functional form of the variables. Notice that the motivation effect here is modelled by the inclusion of the variable "benefits remaining" (R) where the parameter δ captures the motivation effect in the model.

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, X_{it})\}} \quad (2)$$

$$y = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + v_{it}, \quad (3)$$

3.2 Identification of the motivation effect

In all empirical studies so far the motivation effect is estimated by including a variable such as remaining months/weeks of benefits (R) in the hazard model. Estimating the motivation effect in this way poses some problems which must be addressed. Remaining benefits (R) can be described with the following accounting equation:

$$R_{it} = E_{it} - t + RJ_{it}. \quad (4)$$

Here E is benefits entitlement at the beginning of the spell, t is the duration of the unemployment spell and RJ is any changes in the maximum benefits

duration which is realised by the unemployed individual while the spell goes on. The variation in remaining benefits (R) will almost always come from one or more of these three right hand side variables. A consequence of this is that identification of the motivation effect necessitates that at least one of the three right hand side variables described above has to be excluded from the hazard model (henceforth denoted the exclusion restriction). If we do not leave at least one of the right hand side variables of equation (4) out of the hazard model, the variable remaining benefits (R) will not contribute anything to the hazard model and will therefore not be identified. However, if we exclude a variable from the hazard model which does have some effect on the hazard out of unemployment, we have the classical "omitted variable" problem as described by among others Heckman and Robb (1985).

Let me give a example. In equation (5), the variable component of the logistic hazard model (equation (1) is described. Notice that we have assumed that duration of unemployment (t) does have an effect on the hazard out of unemployment but individuals' initial entitlement (E) is left out. If entitlement does posses explanatory power, this variable will appear in the error term, cf. equation 6. We know from the accounting equation (4) above that remaining benefits (R) are a function of entitlement (E). Estimating the motivation parameter δ without including entitlement will result in inconsistent estimates since the estimator will include both the true value of δ as well as the part of the effect from E on the hazard which is correlated with R.

$$y = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + v_{it}, \quad (5)$$

$$v_{it} = \log(E_{it}) + \varepsilon_{it} \quad (6)$$

In order to avoid the omitted variable problem we therefore have to be

sure that the variation in the variable "remaining benefits" (R) does not come from some variable which should have been included in the model in the first place. In special cases, however, it may still be possible to estimate the motivation effect even though all the right hand side variables of the accounting equation (4) are included in the hazard model. This is possible if the variables (E, t, RJ) are modelled in the hazard model with a functional form which leaves some explanatory power for the remaining benefits variable (R). Let me explain this with an example.

Let us assume that we have access to panel data where there is no variation in individuals' entitlement (E) or realised jumps over time (RJ). Only the duration in benefits changes over time (t). This means that the accounting equation for the variable remaining benefits (R) looks like

$$R_{it} = E - t.$$

In order to ensure that the motivation effect (from R) is identified we have to either assume that the variation through the duration of unemployment spell (t) does not have any separate effect on individuals' hazard (exclusion restriction) or that this effect follow a specific functional form known to us prior to the estimation. Assuming no separate effect of the duration (t) would imply that we do not believe that there is any duration dependency in the model. A less strict assumption could be to assume that the duration dependency follows an exponential form ($\exp(t)$) which we will do in this example. Let us now model the hazard out of unemployment with a discreet logistic form:

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, E_{it}, X_{it})\}}.$$

We choose to write the variable component of the model as

$$y(t, R_{it}, E_{it}, X_{it}) = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + \varepsilon.$$

Notice the exponential form of the duration component. Next step is to insert the equation (4) for remaining benefits (R);

$$y(t, R_{it}, E_{it}, X_{it}) = \alpha + \beta \exp(t) + \delta(E - t) + \gamma X_{it} + \varepsilon.$$

But since E is constant for all individuals, this gives:

$$y(t, R_{it}, E_{it}, X_{it}) = (\alpha + \delta E) + \beta \exp(t) - \delta t + \gamma X_{it} + \varepsilon$$

where the motivation effect is identified through δt.

4 Exclusion restrictions used in empirical studies of the motivation effect

As described in the previous section, variation in the remaining benefits variable can come from three different variables, entitlement (E), duration (t), and realised shocks (RJ). Different sources of variation in the three variables have been used in the literature, cf. table 1. The main variable of variation is entitlement (E). Almost all studies of the motivation effect[1] have used variation in entitlement in some form as a source of identification. The variation in entitlement can exist for many different reasons in data and not all are equally likely to comply with the exclusion restriction. A common source of variation is different UI history among individuals. Initial entitlement is almost always a function of individuals' employment and unemployment history. If data is sampled without the requirement that all individuals must have gained or regained the right to a full benefit period, then individuals have often already used some of their allotted benefits in previous spells resulting in different entitlements. Another source can be regional differences in the entitlement rules. Or as a variation, the rules can be

[1] All studies to my knowledge except Moffit (1985).

Table 1: Different sources of variation.

		Source of variation
Entitlement	E	1. Previous unemployment
		2. Regional differences in legislation
		3. Changes in legislation over time
Duration	t	4. Remaining benefits diminish as time progresses
Realised jumps	RJ	5. Changes in legislation over time

based on, say, regional unemployment thereby creating regional differences in entitlement with the same rules covering all regions. Entitlement can also vary due to legislative changes over time. If the maximum benefits period is changed, then this will result in a change in entitlement for individuals commencing their unemployment spell after the legislative change.

Variation in the variable realised jumps (RJ) can occur if UI legislation is changed and individuals learn about the changes in benefits duration while they are unemployed. If, for instance, the benefits duration is shortened, individuals have to re-evaluate their expectations about how much time is left until benefits run out.

Finally, the duration of the unemployment spell (t) itself can also be used as a source of variation. Only rarely, though, do researches assume that duration does not in itself have an effect on individuals' hazard out of unemployment. Still, the variation can be used for identification of the motivation effect as explained above. This is possible if researchers are willing to assume that the duration effect follows some specific functional form which is restricted compared to the form of the motivation effect.

In the following I will go through the data used in most studies as well

as the applied exclusion restrictions.

Table 2: Empirical studies of motivation effect

Study	Data	Model	Source of var. in R		Exclusion restrict.
Ham & Rea (1987)	Canada	Logistic	E	over regions, prev. unempl.	over regions, prev. unempl.
			t		param.dur.model.
Meyer (1990)	US (CWBH)	Cox	E	over regions, prev. unempl., per. extend/short.	prev. unempl. per. extend/short.
			RJ	per. extend/short.	per. extend/short.
			t		
Jones (1995)	Canada	Cox	E	grandfathering	grandfathering
			t		
Rogers (1998)	US (CWBH)	Logistic	E	per. extend/short.	per. extend/short.
			RJ	per. extend/short.	per. extend/short.
			t		
Geerdsen (2002)	Denmark	Logistic	E	per. short.	per. short.
			RJ	per. short.	per. short.
			t		

Moffit (1985) Moffit is one of the first to use administrative panel data to analyse the effects of a UI system on individuals' labour market behaviour. The data he uses is UI administrative records assembled in a file called Continuous Wage and Benefits History (CWBH) collected by state UI offices under supervision of the Labor Department in the US. The data contains information on all new male UI recipients in thirteen states in the US from 1978-1980 (depending on the state) to March 31, 1983. Since the

data is drawn from administrative records, exact information is available on individuals' benefits, their benefit entitlements and the number of weeks individuals collect benefits. The data has one problem with regard to analysis of motivation effect. Individuals are not supervised after their benefits run out. It is therefore not possible to see whether individuals stay unemployed after benefits run out.

In this data, there are several sources of variation but Moffit only uses them to a limited extent. First, entitlement (E) varies between states. Also, individuals have different initial entitlement (E) within states, probably due to prior unemployment. In the period analysed by Moffit, supplementary benefits programmes on top of the state insurance programmes also exist. The extended benefits programme (EB) provides up to 13 extra weeks of benefits during cyclical downturn. This also goes for the Federal Supplementary Compensation programme which took effect in the Fall of 1982 and provided up to a total of 62 weeks of benefits. These extra benefit weeks were implemented during the sample period and constitute jumps in the remaining benefits (RJ) when individuals realise that they are eligible for them.

Moffit finds from Kaplan-Meyer estimates clear evidence of motivation effects. He does not, however, have success identifying the motivation effect in his proportional hazard estimates. He does not apply any of the exclusion restrictions as described above.

Meyer (1990) The data used by Moffit is reused by Meyer (1990). Meyer (1990) states (on p. 763) that there is variability in the maximum benefit duration across states (E). Second, benefits were extended through federal programmes in the sample period. This may result in jumps in the duration

of benefits for unemployment spells that are already progressing (RJ) as well as changes in entitlement (E) for individuals who begin their unemployment spell after the extension of the federal programme. Finally, within states, individuals' length of maximum benefits may depend on the individuals' work history (E). Meyer uses almost all of these sources of variation to identify the motivation effect, cf. table 2. The variation between states in entitlement (E) he conditions out for some of the estimations by assuming state fixed effects.

Rogers (1998) Rogers uses the same data as both Moffit and Meyer. Roger's focus is to estimate and test different models for unemployed individuals' expectations regarding maximum benefits duration. Rogers states that it may be more correct to model individuals' expectation as perfect foresight than no foresight if individuals are capable of predicting the changes in benefits duration due to federal extensions and shortenings of the benefits period which follows the fluctuation of the labour market. Rogers only uses fresh spells which means that differences in entitlement (E) due to previous unemployment is omitted from data. Furthermore, Rogers only uses data from one state (Pennsylvania) thereby omitting inter state variation. Rogers uses a 1 per cent sample of all individuals beginning an unemployment spell between July 1980 and March 1986. All the spells are followed until they end. Rogers ends up with two sources of variation, cf. table 2. The first is realised jumps (RJ) in the benefits duration due to federal extensions and shortenings of the benefit period. In the period between 1980 and 1986, the maximum benefit period varies between 26 and 65 weeks and there are 11 jumps in the maximum duration for the period. Second, these jumps in the maximum duration will also inflict on individuals' entitlement. Independent

of expectation model, individuals who begin their unemployment spell at different times within the 1980 to 1986 time frame will most likely have different entitlement (E) due to the federal changes in maximum benefits entitlement over time.

Ham and Rea (1987) Ham and Rea are among the first to identify the motivation effect. Their data consist of a random sample of males drawn from the Canadian Employment and Immigration Longitudinal Labour Force File for the period January 1975 to December 1980. The data are weekly observations on the labour market status of workers based on administrative records. Ham and Rea identify the motivation effect by excluding initial entitlement (E) from the hazard model, cf. table 2. The variation comes from three sources. First, the rules on unemployment benefits in Canada for the specific sample period state that the maximum benefit period is a function of the regional unemployment level. This results in differences in entitlement over regions as a function of regional unemployment. Second, entitlement does also vary as a function of individual previous unemployment. Third, the rules on unemployment benefits duration have been changed several times over the sample period resulting in changes in entitlement. The changes in the rules over time may also have resulted in realised jumps (RJ) in the benefits duration for individuals who are receiving benefits when the changes are implemented. Ham and Rea, however, do not describe whether the changes of rules are implemented for everybody on the UI or only apply to individuals entering unemployment after the changes.

Jones (1995) Jones analyses in his study from 1995 the effect of a labour market reform in Canada which was implemented in April 1993. The reform,

which contained a shortening of the maximum unemployment benefits period, was implemented in order to apply only to individuals who began their unemployment spell after April 1993. This means that the old rules were "grandfathered" for individuals who started their unemployment period before April 1993. The data set is constructed by two subsamples consisting of individuals who started their unemployment spells before the legislative change in the first sample and after the legislative change in the second sample. The sampling periods were between January 31 to March 7 and April 25 to June 5 1993. This data set gives Jones a chance to estimate the motivation effect by using an exclusion restriction which has not been used in the earlier studies. Jones has variation in the initial entitlement (E). The variation only comes from the legislative change and it is only conditional on when individuals started their unemployment spells.

Geerdsen (2002) Geerdsen uses Danish administrative register data to look for possible motivation effects of compulsory activation in the Danish UI system. In Denmark, the duration of benefits is very long (between 4 and 7 years). Therefore, only very few individuals reach the end of their benefits period. Instead, the system is divided into a passive period and an activation period. In the latter period, individuals have to participate in some sort of activation (job training, education, etc.) in order to receive benefits. Geerdsen examines whether the prospect of running out of passive benefits and entering the activation period has a motivating effect on individuals' search effort. In the period covered by data (1994-1998), the passive period has been shortened twice from 4 years to 3 years in 1996 and finally down to 2 years in 1998. These legislative changes both result in variation in entitlement (E) and realised jumps (RJ). Furthermore, individuals may

not have regained their right to a "fresh" benefits period when they begin their unemployment spell. This results in variation in entitlement (E) due to individuals' unemployment history. Geerdsen conditions on individuals' entitlement (E) using a parametric form (log polynomials). The identification of the motivation effect is therefore primarily driven by the realised jumps (RJ), cf. table 2.

5 Data and estimation

5.1 Identification of the motivation effect in the Danish UI system

In Denmark, the duration of benefits is very long compared to almost any other country (4-7 years). Instead the system is constructed with a "passive" and "active" period. During the passive period individuals are free to search for employment and are generally not met with any demands from the labour market system. After the passive period is exhausted individuals enter the activation period. Here they have to participate in labour market training[2] in order to receive benefits. It can be argued that the prospect of forced activation without income increase may have an motivating effect on individuals, which is similar to the motivation effect of an income drop as found by Mortensen (1977), cf. Carling et al. (1996), Geerdsen (2002). In the following, I will regard the passive period in the Danish UI system just as a finite benefits period analysed in other studies mentioned above.[3]

In order to identify the motivation effect we need variation in the remaining benefits variable (R) that does not come from a source which on its

[2]Labour market training can either be education or actual work in either a private or public firm. Individuals can also obtain financial support to start their own firm.

[3]See Geerdsen (2002) for a careful description of the Danish UI system and the data used in this analysis.

own has an effect on the hazard out of unemployment (the exclusion restriction). The data used in this study makes it possible to use different sources of variation in order to identify the motivation effect. In Denmark, the duration of the UI period (the passive period) has since 1994 been shortened twice[4]. Another source of variation is that individuals may have used some of their benefits in previous unemployment spells resulting in different entitlement from the beginning of the spell. Finally, there is always the choice of restricting the duration effect to a given functional form. This gives the following identification sources:

1. Realised jumps (RJ) in entitlement of passive UI while individuals are receiving the UI due to legislative changes in the duration of the passive period in 1996 and 1998.

2. Variation in entitlement (E) of passive UI due to the same legislative changes as described above prior to commencing an unemployment spell.

3. Variation in entitlement (E) of passive UI due to previous unemployment spells.

4. Variation in duration on UI (t)

The many sources of variation in remaining benefits (R) make it possible to estimate the motivation effect using different combinations of exclusion restrictions as they are used in the literature. I will estimate four models using the four different sets of exclusion restrictions starting with the most restrictive restrictions and ending with the least restricted model, cf. table 3. By comparing estimations from a more strict exclusion restriction with

[4]Actually the passive period has been shortened three times. But the last legislative change lies beyond the period covered by data.

Table 3: The exclusion restrictions applied in the four different models.

	Hazard model conditional on:	Exclusion restrictions:	Construct similar to:
Model I	t in log polynomial form	E RJ t	Ham and Rea (1987)
Model II	t dummy construct	E RJ	Meyer (1990) Katz and Meyer (1990) Rogers (1998)
Model III	t dummy construct E in log polynomial form	E RJ	Geerdsen (2002)
Model IV	t dummy construct E dummy construct	RJ	

an estimate created with the weakest possible restrictions, it is possible to analyse whether the different restrictions influence the estimator of the motivation effect as well as the direction of this influence.

Model I: In this model I have only included the duration variable (t) in the hazard model and it has been restricted to follow a log polynomial form. This means that motivation effect estimated in this model is driven by variation in the variables entitlement (E), realised jumps in duration (RJ) and remaining variation in duration (t). This setup is very close to the setup used by Ham and Rea (1987).

Model II: In Model II, the duration dependence is fully flexible. The duration variable (t) is implemented in the hazard model with a monthly dummy construct. Entitlement (E) is still omitted from the hazard model. This model is therefore based on variation in entitlement (E) and realised jumps in duration (RJ). This setup is very close to the setup used by Meyer (1990) and Katz and Meyer (1990). The model is also very close to the model of Rogers (1998). Rogers only uses "fresh" spells which could be used as an argument for explaining why it is unnecessary to make entitlement (E) a condition in her estimations. But since maximum benefits duration changes over her sample period, individuals will experience different entitlement according to when they commence their unemployment period.

Model III: In this model, I have implemented entitlement (E) in the hazard model and modelled it with polynomial form. The duration (t) is modelled fully flexible with monthly dummies. The identification in this model is therefore primarily based on variation in realised jumps in duration (RJ) and remaining variation in entitlement (E).

Model IV: In this last model, I have modelled both duration dependence (t) and entitlement (E) fully flexible (dummy constructs). This means that identification of the motivation effect (R) is primarily based on the variation in realised jumps in duration (RJ).

5.2 Data

The data used in this study consists of variables which are drawn from several merged data sets from Statistics Denmark. The data sets are based on

administrative register data which in Denmark can be linked for all individuals in the country. This is due to the CPR-number[5] which each individual is given either at birth or when immigrating to the country. The unemployment spells are drawn in Denmark from the period 1980 to 1999 from a 10 per cent sample of the population between the age of 16 and 67. When individuals fall out of the sample due to death or emigration, new individuals are randomly drawn from the population in order to retain the representativeness of the sample. Most of the variables used in this study exist on a monthly basis in the data set. There are also variables which exist on weekly basis and yearly basis.

The period of interest in this study is the years after the labour market reform in 1994. I have chosen to use data from the period 1994 to 1998. The unemployment spells have been constructed by adding time in UI activation schemes with time on passive UI. I have assumed that an unemployment spell is broken if individuals are not on UI for more than 2 weeks in a month. Only a small proportion of individuals in the sample reach the activation period after only one spell. This is due to the long duration of passive UI in Denmark compared to other countries. In order to analyse the motivation effect, it is therefore necessary to include all spells for each person in the given period. I have only included unemployment spells for individuals who in 1994 are between the age of 25 and 48. I have done this in order to avoid mixing up the motivation effect with effects from some of the programmes targeted at the very young and old on the labour market[6].

The two primary variables used in the estimations are individuals' use

[5] CPR stands for civil register number.

[6] For individuals under 25 year of age, a rule change was introduced in 1997 which resulted in a much stricter UI system for this group than for older individuals on the labour market. In the same period, individuals over 50 years were not included in the active labour market policy as such and it is therefore very unlikely that this group will display any motivation effects.

of the UI and use of activation schemes. The first variable has been created using a Statistics Denmark data set named The Coherent Social Register (SSHS)[7]. The purpose of the SSHS is to give a coherent view over the number of people who each year receive one or several forms of income replacement benefits. Information on activation is collected from a register called Register on Labour Market Measures (AMFORA). This register is primarily used for labour market surveillance by municipalities and ministries. The construction of these administrative registers is described in Geerdsen (2002).

In order to estimate whether activation motivates unemployed individuals it is necessary to have reliable information on the timing of the activation period. We need this in order to calculate the number of months of passive UI that individuals are entitled to when they begin their unemployment spell. In general, the more activation the more UI, and the less employment indviduals have had prior to 1994, the shorter time the unemployed individual is granted in the passive period after 1994. The rules are described in detail in Geerdsen (2002).

5.3 Model

In order to test for the motivation effect, I have modelled the hazard out of unemployment. I have assumed that data can be represented by a discreet logistic model,

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, E_{it}, X_{it})\}},$$

where h is the hazard at a given spell length t, y is a linear function of t time in spell, R time remaining until passive UI exhaustion, E passive benefits entitlement and X other exogenous variables. In the estimation, I condition

[7] In the following I will translate the name of the different registres but use the Danish abbreviations, hence the obvious disproportion between the two.

on gender, family composition and level of education using dummies. The variable capturing the motivation effect, remaining benefits (R) have been modelled with a dummy construct describing [18,13] months to benefits exhaustion, monthly dummies for between 12 months to benefits exhaustion and 12 months into the activation period, and one dummy covering the remaining period in the activation period. The duration of UI spell (t) and initial passive benefits entitlement (E) is modelled according to the four models described in the subsection above.

Rogers (1998) argues that the choice of model used to describe individuals' expectations regarding time to passive benefits exhaustion may have an impact on the results when the motivation effect is estimated. In Geerdsen (2002) different expectation models have been tested on data. The model which seems to give the best description of individuals' expectations is a specific variant of no foresight. The variant is called "system foresight II". In this model, individuals are assumed not to know about any legislative changes before they are implemented. In other words, individuals ignore announcements of legislative changes and do only react to the actual implementation of legislative changes. Individuals' expectations regarding remaining passive benefits will be modelled according to this expectation model, cf. Geerdsen (2002) for estimation results of different expectation models.

6 Empirical results

In table 4, the estimated parameter values of the demographic variables are presented. The four different exclusion restriction models have been applied. It appears that the four models produce relatively similar results.

Table 4: Estimation values of demographics using the four diffierent exclusion restriction models.

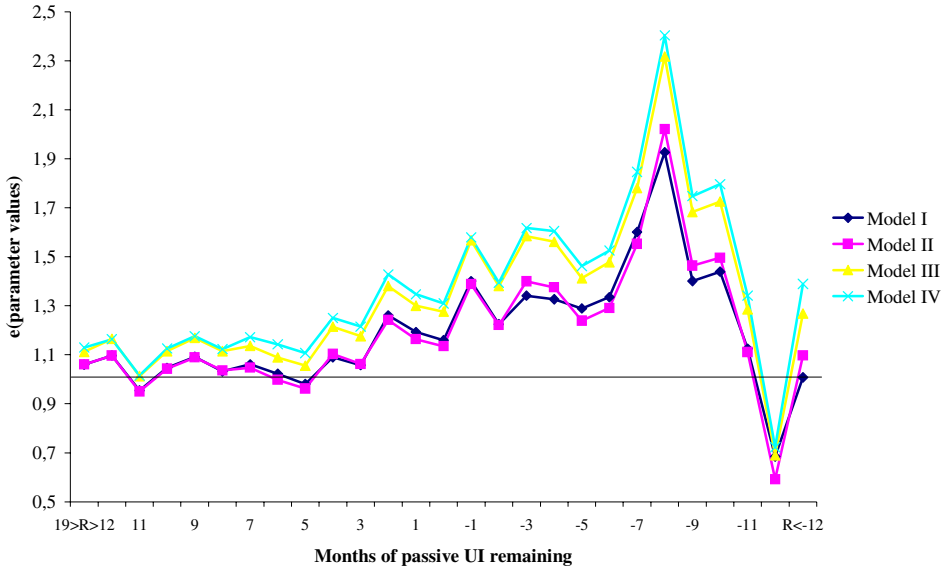
	Model I	Model II	Model III	Model IV
Single no children	-0.1208	-0.1209	-0.0041	-0.1170
	(0.0111)	(0.0111)	(0.0153)	(0.0111)
Single w. children	-0.1167	-0.1168	0.1151	-0.1199
	(0.0155)	(0.0155)	(0.0155)	(0.0155)
Fam.w. children	0.0559	0.0559	0.1710	0.0523
	(0.0100)	(0.0100)	(0.0140)	(0.0100)
Male	0.0690	0.0691	0.0706	0.0707
	(0.0080)	(0.0080)	(0.0080)	(0.0080)
Primary	0.1862	0.1866	0.0140	0.1820
	(0.0203)	(0.0203)	(0.0188)	(0.0203)
Vocational	0.2523	0.2525	-0.1720	0.2427
	(0.0199)	(0.0199)	(0.0257)	(0.0199)
Shorter univ.	0.2504	0.2502	0.0787	0.2390
	(0.0246)	(0.0246)	(0.0184)	(0.0246)
Bachelor	0.2700	0.2701	0.0762	0.2570
	(0.0248)	(0.0248)	(0.0234)	(0.0249)
Master	0.1744	0.1745	0.0962	0.1625
	(0.0257)	(0.0257)	(0.0236)	(0.0258)
No educ.inf.	0.0393	0.0398	-0.1316	0.0396
	(0.0208)	(0.0208)	(0.0194)	(0.0209)

The estimation results are generally as one would expect. The hazard out of unemployment is lower for single individuals than for individuals with families, and families with children have higher hazard out of the UI than families without children. When it comes to the effect from education, the estimations indicate that the more education, the higher the hazard out of unemployment. One exception is individuals with a master degree.

In figure 4, the parameter values of the dummies for remaining benefits (R) are described for the four exclusion restriction models. The motivation effect kicks in approximately 5 months prior to the end of the passive period and increases from there on. The peak in the motivation effect is found 8 months into the activation period. The effect starts with a hazard increase somewhere between 10 and 30 per cent and peaks with a hazard increase between 110 and 140 per cent. At first sight it may seem odd that the motivation effect does not peak before well into the activation period since it is supposed to be the motivating factor. The reason for this is that individuals, when they enter the activation period, in many cases do not enter an activation programme directly. First, they have to have made an action plan which in detail describes the activation programmes they will participate in. Second, the case worker has to find an opening for the person. These things often take time, and it is therefore most likely that the large majority of individuals do not face compulsory activation before at least 8 months into the activation period. In Geerdsen (2002) findings indicate that it is not before 10 months into the activation period that full activation has been reached.

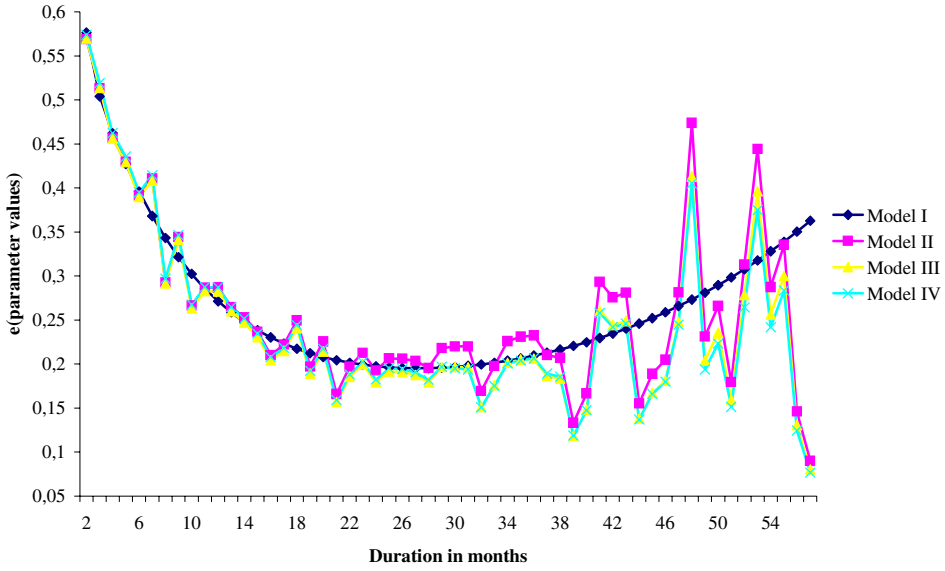
The four different exclusion models in figure 4 seem to produce results which place the models in two groups. Model I and II produce very similar estimation results which are smaller than the estimation values from

Figure 4: Estimation results of remaining benefits using four different exclusion restrictions.



model III and IV. The difference between model I and II and model III and IV, respectively, is that the first two models have excluded entitlement (E) from the hazard estimation. Apparently, this exclusion restriction results in weaker estimation results of the motivation effect. One reason for this could be that 1) entitlement does indeed have an effect on individuals' hazard out of unemployment, and 2) individuals who have short time to benefits exhaustion due to a history of long-term unemployment may react less to the prospect of entering the activation period. The estimation results indicate that it is not of great importance whether the variables entitlement (E) and duration (t) are modelled freely with dummy constructs or parametrically. In model I, the duration variable (t) has been modelled with a log polynomial and in model II, it has been modelled with a dummy construct. The results are almost similar. The same goes for model III and

Figure 5: Estimation results of duration variables using the four different exclusion restriction models.

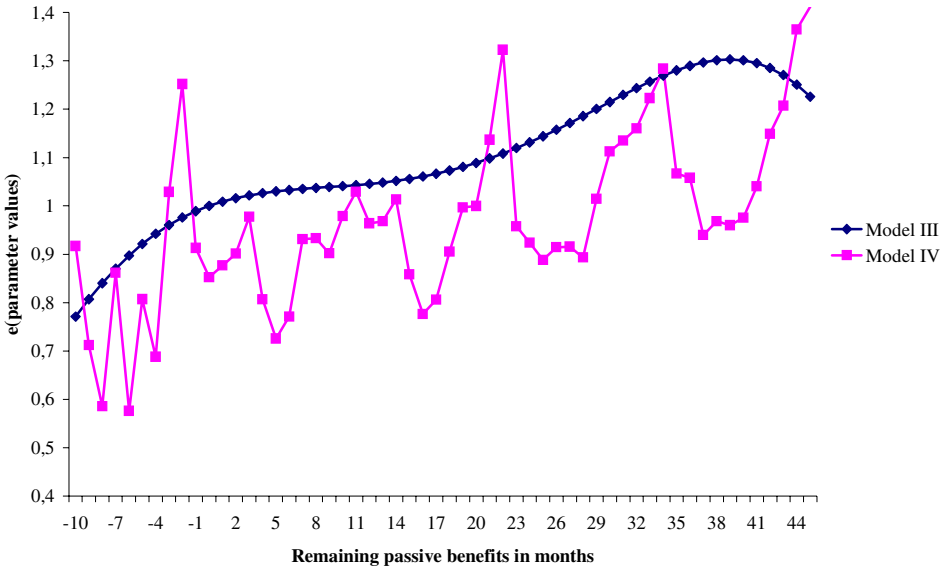


IV where entitlement (E) has been modelled with polynomials in model III and with a dummy construct in model IV. It is interesting to note that the model with the weakest exclusion restrictions, model IV, also estimates the strongest motivation effects. This indicates that applying stronger exclusion restrictions may result in an underestimation of the motivation effect.

In figure 5, the estimation results of the duration variable (t) is presented for the four models. The parametric form used in model I gives a relatively good fit of the duration effect up to about 38 months into the unemployment spell. Thereafter the effect becomes very volatile. Still, the parametric form seems to catch the trend of the duration effect overall and from these results it does seem plausible that a parametric modelling of the duration effect is not problematic for the estimation of the motivation effect.

In figure 6, the estimation values of the entitlement variable (E) is pre-

Figure 6: Estimation results of entitlement using the two exclusion restriction models which are conditional on this variable.



sented. The parametric form of this variable does not seem to fit as well as with the duration variable. The dummy values reveal a lot of fluctuation peaking close to the months which have been a common entitlement (E) for individuals who have gained or regained the right to a "fresh" UI period. The parametric form does indicate that there is an increasing trend where individuals with higher entitlement also have a higher hazard out of unemployment. This supports the finding that omitting entitlement (E) from the hazard estimation actually bias the estimated motivated effect downwards.

7 Conclusion

In this paper I have examined the different assumptions which have been applied in the literature in order to identify the motivation effect of benefits

exhaustion. And I have tested the different assumptions on a common data set. Two aspects seem to be important when estimating the motivation effect in a UI system:

1. Assuring identification by excluding entitlement from the hazard model seems to bias the estimation results towards zero. Thereby risking to dismiss motivation effects where they might exist.

2. Polynomials or log polynomials appear to give a sufficiently flexible form when it comes to model duration and entitlement. In cases where degrees of freedom are limited it may therefore be a better solution to use these parametric forms instead of modelling the variables fully flexible with dummies.

A large share of the literature in this field have chosen to omit entitlement from their hazard models of unemployment, cf. Meyer(1990), Katz and Meyer (1990) Rogers (1998). According to the estimation results presented above this may result in underestimation of the motivation effect[8]. Benefits exhaustion may therefore actually have an even stronger motivating effect on individuals' hazard out of unemployment than found in these studies.

[8]Rogers (1998) only uses "fresh" spells which means that all individuals have regained the right to a full benefits period when they enter unemployment. Still, the entitlement period changes in the sample period and may therefore influence individuals' hazard out of unemployment.

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A Estimate results from the 4 models

Table 5: Estimation results from Model I.

Variables	Parameter	St.error		Parameter	St.error
ln(t)	-1.3664	0.0438	R=1	0.1764	0.0548
$\ln(t)^2$	1.1312	0.0625	R=0	0.1482	0.0576
$\ln(t)^3$	-0.4903	0.0290	R=-1	0.3366	0.0449
$\ln(t)^4$	0.0690	0.0043	R=-2	0.2033	0.0516
18>R>12	0.0578	0.0173	R=-3	0.2937	0.0540
R=12	0.0929	0.0411	R=-4	0.2824	0.0592
R=11	-0.0471	0.0438	R=-5	0.2540	0.0649
R=10	0.0454	0.0430	R=-6	0.2892	0.0689
R=9	0.0883	0.0432	R=-7	0.4710	0.0698
R=8	0.0313	0.0446	R=-8	0.6556	0.0719
R=7	0.0595	0.0444	R=-9	0.3373	0.0886
R=6	0.0215	0.0467	R=-10	0.3642	0.0951
R=5	-0.0196	0.0496	R=-11	0.1176	0.1120
R=4	0.0863	0.0489	R=-12	-0.3789	0.1527
R=3	0.0564	0.0525	R<-12	0.0073	0.0936
R=2	0.2318	0.0511	Constant	-1.0899	0.0215

Table 6: Estimation results from Model II.

	Parameter	St.error		Parameter	St.error
t2	-0.5637	0.0118	t44	-1.8632	0.1998
t3	-0.6671	0.0131	t45	-1.6672	0.2197
t4	-0.7837	0.0146	t46	-1.5858	0.2311
t5	-0.8449	0.0158	t47	-1.2683	0.2473
t6	-0.9384	0.0176	t48	-0.7468	0.2732
t7	-0.8898	0.0186	t49	-1.4646	0.3129
t8	-1.2290	0.0219	t50	-1.3251	0.3153
t9	-1.0666	0.0234	t51	-1.7164	0.3853
t10	-1.3227	0.0272	t52	-1.1617	0.3421
t11	-1.2490	0.0281	t53	-0.8112	0.3365
t12	-1.2485	0.0296	t54	-1.2470	0.4178
t13	-1.3289	0.0321	t55	-1.0926	0.4530
t14	-1.3753	0.0348	t56	-1.9235	0.7389
t15	-1.4413	0.0377	t57	-2.4076	1.0265
t16	-1.5602	0.0413	18>R>12	0.0583	0.0173
t17	-1.5047	0.0426	R=12	0.0920	0.0412
t18	-1.3883	0.0423	R=11	-0.0509	0.0439
t19	-1.6245	0.0479	R=10	0.0426	0.0432
t20	-1.4896	0.0492	R=9	0.0856	0.0434
t21	-1.7960	0.0584	R=8	0.0355	0.0450
t22	-1.6245	0.0570	R=7	0.0458	0.0457
t23	-1.5477	0.0577	R=6	-0.0023	0.0482
t24	-1.6470	0.0634	R=5	-0.0386	0.0512
t25	-1.5777	0.0652	R=4	0.0982	0.0504
t26	-1.5799	0.0676	R=3	0.0604	0.0542
t27	-1.5916	0.0716	R=2	0.2168	0.0531
t28	-1.6315	0.0771	R=1	0.1518	0.0569
t29	-1.5229	0.0794	R=0	0.1264	0.0599
t30	-1.5139	0.0851	R=-1	0.3283	0.0460
t31	-1.5142	0.0900	R=-2	0.1999	0.0530
t32	-1.7756	0.1030	R=-3	0.3361	0.0553
t33	-1.6202	0.1027	R=-4	0.3188	0.0610
t34	-1.4879	0.1007	R=-5	0.2144	0.0682
t35	-1.4652	0.1073	R=-6	0.2556	0.0724
t36	-1.4586	0.1149	R=-7	0.4400	0.0735
t37	-1.5597	0.1197	R=-8	0.7039	0.0746
t38	-1.5747	0.1335	R=-9	0.3808	0.0929
t39	-2.0159	0.1631	R=-10	0.4029	0.1003
t40	-1.7916	0.1571	R=-11	0.1053	0.1205
t41	-1.2261	0.1412	R=-12	-0.5243	0.1722
t42	-1.2879	0.1542	R<-12	0.0927	0.1151
t43	-1.2701	0.1592	Constant	-1.0889	0.0215

Table 7: Estimation results from Model III.

	Parameter	St.error		Parameter	St.error
t2	-0.5657	0.0119	t45	-1.8009	0.2228
t3	-0.6684	0.0131	t46	-1.7369	0.2343
t4	-0.7844	0.0147	t47	-1.4185	0.2511
t5	-0.8470	0.0159	t48	-0.8744	0.2793
t6	-0.9437	0.0177	t49	-1.5807	0.3204
t7	-0.8953	0.0187	t50	-1.4397	0.3229
t8	-1.2353	0.0220	t51	-1.8306	0.3915
t9	-1.0767	0.0236	t52	-1.2753	0.3491
t10	-1.3362	0.0274	t53	-0.9242	0.3436
t11	-1.2632	0.0283	t54	-1.3602	0.4236
t12	-1.2656	0.0298	t55	-1.2053	0.4583
t13	-1.3505	0.0325	t56	-2.0361	0.7422
t14	-1.3982	0.0352	t57	-2.5200	1.0289
t15	-1.4706	0.0381	18>R>12	0.0802	0.0197
t16	-1.5923	0.0418	R=12	0.1377	0.0427
t17	-1.5388	0.0431	R=11	0.0027	0.0454
t18	-1.4277	0.0430	R=10	0.1037	0.0449
t19	-1.6665	0.0487	R=9	0.1568	0.0453
t20	-1.5410	0.0502	R=8	0.1165	0.0470
t21	-1.8525	0.0594	R=7	0.1406	0.0480
t22	-1.6851	0.0582	R=6	0.1060	0.0507
t23	-1.6137	0.0590	R=5	0.0792	0.0539
t24	-1.7215	0.0648	R=4	0.2283	0.0536
t25	-1.6547	0.0667	R=3	0.1961	0.0575
t26	-1.6609	0.0692	R=2	0.3492	0.0568
t27	-1.6779	0.0733	R=1	0.2576	0.0613
t28	-1.7234	0.0789	R=0	0.2675	0.0664
t29	-1.6349	0.0817	R=-1	0.4068	0.0528
t30	-1.6357	0.0875	R=-2	0.3044	0.0595
t31	-1.6411	0.0926	R=-3	0.4449	0.0621
t32	-1.9069	0.1054	R=-4	0.4370	0.0678
t33	-1.7540	0.1052	R=-5	0.3680	0.0744
t34	-1.6182	0.1034	R=-6	0.4041	0.0794
t35	-1.5822	0.1100	R=-7	0.5974	0.0802
t36	-1.5920	0.1179	R=-8	0.8539	0.0818
t37	-1.6579	0.1224	R=-9	0.5215	0.1008
t38	-1.6891	0.1361	R=-10	0.5678	0.1074
t39	-2.1320	0.1653	R=-11	0.2709	0.1283
t40	-1.9145	0.1596	R=-12	-0.3877	0.1846
t41	-1.3710	0.1442	R<-12	0.2173	0.1339
t42	-1.4294	0.1573	E	-0.0328	0.0035
t43	-1.4164	0.1623	ln(E)	-0.4544	0.0824
t44	-2.0032	0.2025	$\ln(E)^2$	0.2189	0.0271
			Constant	-0.8852	0.0856

Table 8: Estimation results from Model IV.

	Parameter	St.error		Parameter	St.error
t2	-0.5555	0.0119	R=-1	0.4570	0.0512
t3	-0.6556	0.0131	R=-2	0.3321	0.0577
t4	-0.7716	0.0147	R=-3	0.4810	0.0599
t5	-0.8309	0.0159	R=-4	0.4728	0.0654
t6	-0.9287	0.0177	R=-5	0.3802	0.0722
t7	-0.8808	0.0188	R=-6	0.4226	0.0765
t8	-1.2144	0.0220	R=-7	0.6134	0.0776
t9	-1.0604	0.0235	R=-8	0.8771	0.0791
t10	-1.3192	0.0274	R=-9	0.5584	0.0967
t11	-1.2462	0.0283	R=-10	0.5859	0.1040
t12	-1.2476	0.0298	R=-11	0.2936	0.1236
t13	-1.3293	0.0325	R=-12	-0.3250	0.1738
t14	-1.3808	0.0352	R<-12	0.3288	0.1211
t15	-1.4501	0.0381	E-9	-0.0867	0.6752
t16	-1.5705	0.0418	E-8	-0.3391	0.4699
t17	-1.5218	0.0432	E-7	-0.5346	0.3996
t18	-1.4096	0.0431	E-6	-0.1485	0.3281
t19	-1.6486	0.0488	E-5	-0.5515	0.2687
t20	-1.5260	0.0503	E-4	-0.2144	0.2227
t21	-1.8380	0.0595	E-3	-0.3740	0.1971
t22	-1.6703	0.0583	E-2	0.0284	0.1621
t23	-1.5974	0.0591	E-1	0.2246	0.1341
t24	-1.7015	0.0649	E0	-0.0910	0.1010
t25	-1.6348	0.0668	E1	-0.1595	0.0976
t26	-1.6391	0.0693	E2	-0.1312	0.0939
t27	-1.6583	0.0735	E3	-0.1038	0.0932
t28	-1.7039	0.0791	E4	-0.0229	0.0824
t29	-1.6250	0.0818	E5	-0.2146	0.0856
t30	-1.6342	0.0876	E6	-0.3205	0.0752
t31	-1.6402	0.0927	E7	-0.2599	0.0740
t32	-1.8917	0.1054	E8	-0.0713	0.0723
t33	-1.7419	0.1052	E9	-0.0693	0.0689
t34	-1.6064	0.1034	E10	-0.1030	0.0687
t35	-1.5895	0.1099	E11	-0.0214	0.0645
t36	-1.5772	0.1175	E12	0.0286	0.0642
t37	-1.6652	0.1222	E13	-0.0364	0.0599
t38	-1.6831	0.1358	E14	-0.0323	0.0595
t39	-2.1303	0.1649	E15	0.0134	0.0581
t40	-1.9130	0.1591	E16	-0.1530	0.0555
t41	-1.3549	0.1436	E17	-0.2531	0.0535
t42	-1.4188	0.1566	E18	-0.2156	0.0551
t43	-1.4031	0.1614	E19	-0.0996	0.0527
t44	-1.9879	0.2015	E20	-0.0033	0.0540
t45	-1.7950	0.2213	E21	-0.0001	0.0522
t46	-1.7161	0.2327	E22	0.1280	0.0461
t47	-1.4075	0.2487	E23	0.2797	0.0348
t48	-0.9038	0.2745	E24	-0.0431	0.0515

Table 8: Continued.

	Parameter	St.error		Parameter	St.error
t49	-1.6413	0.3155	E25	-0.0791	0.0474
t50	-1.4989	0.3179	E26	-0.1183	0.0462
t51	-1.8877	0.3873	E27	-0.0893	0.0410
t52	-1.3302	0.3445	E28	-0.0880	0.0382
t53	-0.9814	0.3390	E29	-0.1126	0.0359
t54	-1.4198	0.4198	E30	0.0145	0.0353
t55	-1.2606	0.4549	E31	0.1066	0.0333
t56	-2.0829	0.7400	E32	0.1265	0.0305
t57	-2.5667	1.0273	E33	0.1484	0.0279
18>R>12	0.1220	0.0208	E34	0.2012	0.0234
R=12	0.1519	0.0441	E35	0.2495	0.0138
R=11	0.0153	0.0467	E36	0.0646	0.0364
R=10	0.1182	0.0460	E37	0.0561	0.0338
R=9	0.1617	0.0464	E38	-0.0622	0.0310
R=8	0.1158	0.0481	E39	-0.0321	0.0293
R=7	0.1583	0.0488	E40	-0.0407	0.0252
R=6	0.1334	0.0513	E41	-0.0248	0.0240
R=5	0.1019	0.0545	E42	0.0393	0.0232
R=4	0.2234	0.0546	E43	0.1388	0.0225
R=3	0.1948	0.0583	E44	0.1882	0.0204
R=2	0.3564	0.0574	E45	0.3110	0.0199
R=1	0.2981	0.0613	E46	0.3447	0.0173
R=0	0.2698	0.0645	Constant	-1.1602	0.0221

MARGINALISATION PROCESSES IN THE DANISH LABOUR MARKET

In the Ph.D. Thesis, the author examines whether there is a tendency that unemployed individuals choose to leave the unemployment insurance system when they are faced with the threat of active labour market policy.

The results presented in the thesis do indicate that unemployed individuals' probability of obtaining work increase when they enter the compulsory labour market period. That is, before they actually participate in labour market training. This incentive effect decreases about 10 months into the period, during which almost all unemployed individuals participate in labour market training.

The analysis is based on 10 % of the Danish population between 25 and 45 years extracted from Danish Labour market data during the period 1994-1998.

The report contains also two other analyses: an analysis of unemployed individuals' behaviour in connection with the termination of the unemployment insurance system and an analysis of unemployed individuals with a marginal connection to the labour market.

The Ph.D. Thesis was defended in January 2003 at the University of Copenhagen, Institute of Economics.

The Danish National Institute
of Social Research
03:24
DKK 140,00
ISSN 1396-1810
ISBN 87-7487-737-2