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A spike at benefit exhaustion: Still possible after four years of unemployment?

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Abstract:

European policymakers wonder whether the long-term unemployed can still find jobs if the benefit period is shortened. We investigate this question by analysing how long-term unemployed react to the threat of running out of unemployment insurance (UI) after receiving it for almost four years. The empirical analysis is based on very precise administrative records of men's unemployment spells. To identify the effect of UI exhaustion, we exploit a legislative change in the duration of benefits that progressively reduced UI entitlement from five to four years. Our results show a spike 3-6 months before benefit exhaustion for long-term unemployed.

JEL classification: C41; J65

Keywords: Unemployment duration; benefit entitlement; unemployment insurance; UI exhaustion; shortening of UI

1 INTRODUCTION

With the problem of long-term unemployed workers growing throughout Europe, the question remains whether activation measures of any kind can return these workers to the labour market. In Denmark some long-term unemployed have received unemployment insurance UI for several years (up to 5 years until 1998). These workers have lower possibilities of job matching relative to other unemployed individuals and therefore have a higher risk of structural problems in the labour market. Since 2002, the number of individuals running out of UI is about 2,000-2,300 (about 2% of the unemployed in 2002) (*Velfærdskommissionen* 2006). The persistence of long-term unemployed workers is problematic for two reasons: First, given unfavourable demographic developments, most welfare states cannot financially afford to have any potential workers not working. Second, some workers appear to be unwillingly long-term unemployed, because they state that they desire work but remain without a job offer.

Implications of UI systems with time-limited benefits have been investigated in the theoretical search literature (e.g. Mortensen, 1977; Burdett 1979 and van den Berg, 1990). The rationale for setting limits is that reducing the potential UI will increase the job search of the unemployed worker whilst UI exhaustion is approaching, because the worker will not want to risk running out of income. Empirically the 'spike' in the exit rate from unemployment at the exhaustion of the UI is a well-established result in labour economics (see, e.g. Moffitt, 1985; Katz & Meyer, 1990; and Meyer, 1990). For a systematic review of unemployment benefit exhaustion as an incentive effect on job finding rate, see Filges et al. (2013). Their meta-analysis − pooling seven different European countries, the US and Canada − finds a statistically significant exhaustion effect. Thus shortening the potential benefit durations (PBD) may reduce the share of long and unproductive job searches. However, these studies refer to short-term unemployed.

The presence of means-tested social assistance (SA) is a common factor in many European countries. For example Pellizzari (2006) shows for the EU that UI recipients eligible for other welfare schemes are less sensitive to changes in the level and duration of their benefits. Indeed, comparing the US and European UI systems shows that the main differences are the length of PBD and the existence of other benefits such as SA. Whilst eligibility for UI is counted in weeks in the US, it covers years in Europe.

Given that, in the Scandinavian countries, unemployed workers losing their unemployment insurance (UI) may become eligible for other benefits, this paper investigates whether the shortening of PBD can influence the exit out of unemployment for the long-term unemployed. Finding a spike at UI exhaustion for long-term unemployed in a system providing other benefits will indicate that economic incentives are still working after a long period of unemployment and that shortening the PBD is one way of returning these workers to the labour market. However, this result may not carry over to Denmark because the unemployed can receive other social benefits (some unlimited in time) and Denmark, together with the Netherlands, had the longest finite benefit period in Europe − about four years – until 2010.

To analyse the effect of UI exhaustion in a benefit system that allows for a long PBD and provides SA and other welfare schemes to some recipients, we use Danish register panel data on weekly UI observations for the entire population. Our data allow us to check what happens to the long-term unemployed when they stop receiving UI and whether the shortening of the PBD increases their willingness to leave unemployment. As we use detailed administrative records showing whether the person is receiving other benefits, as well as whether the person has emigrated or died, previous criticism about the lack of measuring whether a person finds a job or leaves the labour market (see (Card, Chetty, & Weber, 2007)) therefore does not apply. Indeed, in Denmark the number of persons not receiving any support whilst they are searching for job is almost zero.

Moreover, we have administrative records on all other subsidies a person can receive from the state (e.g. student grant, sickness benefit, disability pension) [1]. Thus we can conclude with confidence that the persons exiting unemployment and not receiving any other benefits are employed. To estimate the conditional probability of existing unemployment into employment or all other exit states (including emigration or death), we use a competing risk model.

To identify the effect of UI exhaustion, the analysis exploits the credible independent source of PBD variation induced by a 1999 reform. The Danish UI system remained almost unchanged from 1970 to 1994, and the UI period was in practice unlimited. In 1994, however, the UI period became finite, with different legal changes shorting this period to two years by 2010. The 1999 reform was progressively implemented between 1999 and 2001, and reduced the PDB by 20 per cent, i.e. from five to four years. The reform applies not only to the UI spells starting after 1 January 1999 but also to spells that started earlier. Whilst the purpose of the reform was to progressively reduce the potential unemployment period from five to four years for all unemployed, this shortening of the PDB was not expected to increase the number of people receiving other social benefits.

The paper is structured as follows. Section 2 outlines the theoretical framework and the empirical existing evidence. Section 3 describes the relevant institutional background in Denmark and our identification strategy, Section 4 presents the data and provides a descriptive analysis, and Section 5 introduces the econometric model. Section 6 presents our results, and Section 7 concludes.

[1] Persons who are not in a juridical sense searching for work receive at least one of the following subsidies: unemployment subsidy for not-labor-market-ready unemployed (including special courses, workplace experiences), social assistance for not-labor-market-ready unemployed (including special courses, workplace experiences), sabbatical leave, disability pension, early retirement, student subsidy, *flexjob* subsidy, rehabilitation and sickness benefit.

2 THEORY AND PREVIOUS STUDIES

From a theoretical point of view UI provides a disincentive−assuming that work is a 'bad'− for looking for a job. This disincentive depends both on the PBD and on the level of UI compared to the expected wage. We therefore expect that the combination of a long PBD and a generous social system like that in Denmark and other Scandinavian countries will decrease job matching possibilities and increase the number of long-term unemployed who leave unemployment for other benefits.

2.1 Theory

Mortensen (1977) shows that within a search theoretic framework, a fixed benefit period has important incentive effects. The individual's reservation wage (i.e. the wage at which individuals are indifferent between being employed or unemployed) decreases whilst search intensity increases as they approach UI exhaustion. By both reducing their reservation wage and increasing their search intensity at the time of exhaustion, individuals increase their escape rate, which would otherwise remain constant. With a finite benefit period, the disincentive effect dominates the beginning of the unemployment spell; approaching UI exhaustion, individuals gradually reduce their reservation wage and increase their job search. When the UI runs out, a future search becomes more costly and the value of unemployment decreases. This framework can easily be extended to the case of individuals who expect to be eligible for other social schemes, such as SA. Changes from one scheme to another simply create 'jumps' in the time profile of benefits. For such individuals the threat of UI exhaustion may be attenuated or postponed.

Mortensen (1977) assumes that individuals know the duration until their benefits run out. Since 1994, many reforms have shortened the PBD in Denmark. As these reforms have been applied

differently, individuals may be uncertain about the number of months they have left. Nevertheless, Mortensen's (1977) results hold both for a known or an expected shortening of the remaining UI.

However, the choice of the expectation model remains important for estimating the UI exhaustion empirically (Rogers, 1998). Geerdsen (1996) reports that the comparison of the hazard estimates across specifications of an individual's expectations shows that a system in which individuals learn about the changes when they are introduced applies well to Denmark.

2.2 Previous empirical studies

As previously mentioned, a 'spike' in the exit rate from unemployment at the exhaustion of the UI is a well-established result in labour economics (e.g. Moffitt, 1985; Katz & Meyer, 1990; Meyer, 1990 and Filges et al., 2013). However, even if many empirical studies have established the spike in the exit rate from unemployment, only few are able to clearly establish its causality, and none have investigated this effect for a long PBD (i.e. more than 2 years). Research in the US finds a strong positive relationship between the maximum duration of benefits and the length of an individual's spell of unemployment (e.g. Moffitt, 1985; Katz and Meyer 1990 and Meyer, 1990). To empirically identify this relationship, these studies use differences in the maximum duration that occur across states and over time by controlling for determinants (e.g. the insured unemployment rate) of the extension of the program.

For Sweden, Carling et al. (1996) investigate whether the incentive effects of time-limited benefits are lost when temporary public jobs are available as the employment of last resort. They take the non-receivers as the reference group and examine whether the hazard for UI recipients rises in the neighbourhood of benefit exhaustion. They find some (marginally significant) evidence that the escape rate to employment increases around the UI exhaustion despite the Swedish generous benefit system. For Spain, Jenkins and García-Serrano (2004) find that the re-employment exit hazard increases as UI exhaustion approaches but that the effect is relatively small. In addition,

extensions to SA eligibility lowered the re-employment probability. Using a regression discontinuity design, Lalive (2008) shows that extending the PBD increases unemployment duration, whilst Rothstein (2011) and Schmieder et al. (2012) find that PBD extensions may have macroeconomic benefits and do not necessarily increase unemployment duration during recession. In particular, Schmieder et al. (2012) show that the effective moral hazard effect of UI extensions is significantly lower in recessions than in booms.

Some studies have exploited political reforms to identify the causality of the relationship between PBD and the exit to unemployment. Fortin et al. (2004) use the fact that the reform affected only individuals under 30 years of age, the treatment group, whilst individuals over 30 years constitute the control group. Card and Levine (2000) use a politically motivated extension of unemployment unrelated to market conditions, and van Ours and Vodopivec (2006) use another source of variation in the potential benefit duration (PBD). Lalive et al. (2006) analyse changes in both the replacement rate and the PBD. These changes affect unemployed workers differently depending on their age, their work experience and their income. The findings of these studies show very small and insignificant effects prior to exhaustion but a spike at exhaustion. Moreover, Card and Levine (2000) find a spike in exit rates in the 25th week of benefit, irrespective of the UI length (26 or 39 weeks). They attribute this finding to the short-term (6 months) application of the 1996 New Jersey employment benefit program in the US.

For Denmark most of the empirical studies have focused on the effect of the Activate Labour Market Programme (ALMP) − Geerdsen (2006), Rosholm and Svarer (2008) and Graversen and Larsen (2012). They all find an incentive for avoiding the ALMP through a more aggressive search at the end of the passive period, although, Graversen and Larsen (2012) show a lower effect of the ALMP than Geerdsen (2006). Thus the ALMP increases the hazard rate out of unemployment.

This paper identifies the effect of UI exhaustion through the variation in entitlement generated by a 1999 reform. This reform shortens the maximum duration of UI benefit (entitlement) from five years to four, and no other new reforms has been implemented in our analysis period. In contrast to Meyer (1990), Card and Levine (2000) and Lalive et al. (2006), our data include also information for periods compensated by other benefits and information on migration and death. Moreover, none of the previous literature has analysed the effect of UI exhaustion for UI recipients who have been unemployed for such a long period (i.e. up to four years), as is the case in Denmark. Thus analysing whether the results from Jenkins and García-Serrano (2004) apply to Denmark and the group of long-term unemployed may yield useful results. Hence, our analysis will shed light on the behaviour of the long-term unemployed at UI exhaustion and show whether economic incentives such as shortening the PBD can lead the long-term unemployed to finding a job.

3 The Danish Labour Market and UI

We describe the Danish unemployment system and the economic situation during 1998-2003 to better contextualize the reform, i.e. the shortening of the UI periods announced on 16 December 1998 and gradually implemented between 1 January 1999 and 1 January 2001 for all unemployed.

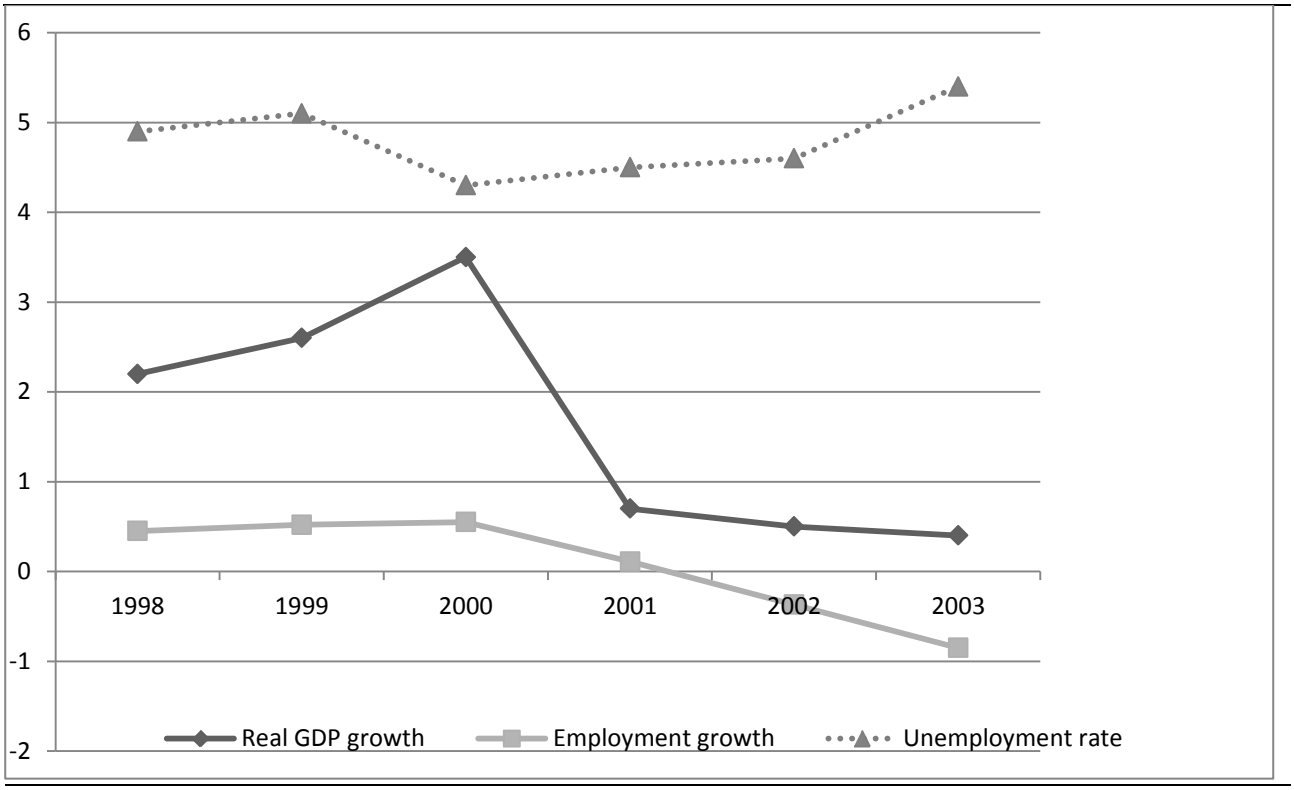
3.1 The Danish labour market in 1998-2003

The Danish labour market is characterised by a flexicurity model: the labour market is flexible because both firing and hiring employees is relatively easy (as in the US), yet the model is secure because of the existence of a well-developed social security system (as in the other Scandinavian countries). The system is also called ‘a golden triangle’. The first side of the flexicurity triangle consists of flexible rules for hiring and firing. The second side guarantees insured wage earners (regardless of the spouse’s income) a legally specified payment at a relatively high level if they become unemployed. The active labour market programme (ALMP) which offers guidance and

provides information to the unemployed about job openings or education possibilities, constitutes the third side of this triangle. Hence, Denmark is a surprising combination of a very secure system and low unemployment. As Figure 1 shows, from 1998 to 2003 the macro-economic environment was relatively stable, implying that our study is not subject to endogenous policy bias as described in Lalive and Zweimüller (2004).

FIGURE 1

The Danish labour market 1998-2003. Percent



Source: OECD

3.2 The Danish UI system

Denmark has two types of unemployment benefits: unemployment insurance (UI) and social assistance benefits (SA). The Danish system distinguishes between insured and uninsured unemployed persons. UI is a voluntary scheme administered by the Unemployment Insurance

Funds (UIF).[2] According to Statistics Denmark, in 1999 the insurance rate for the five largest UIF was larger than 80%.

Eligibility criteria for receiving UI (i.e. being insured) when one becomes unemployed are as follows: having been a member of a UIF for a minimum of one year, registering as unemployed at the Public Employment Service Office on the first day of unemployment, having contacted the UIF, and having worked a total of 52 weeks during the previous 3 years. However, special rules apply to the part-time insured, the self-employed, people outside the 25-50 age group, and students who have just completed their studies.

If workers become unemployed without being insured, they may be entitled to SA. Eligibility criteria for receiving SA are that the individual is suffering from a 'social event' (e.g. divorce, long-time sickness, unemployment), without being eligible for any other supports and that his or her household wealth is less than 1,300 EUR if single and 2,600 EUR if married (in 2012). [3] As SA is administered by the municipalities, the individual must contact the local municipality office to receive it. For individuals complying with SA eligibility criteria, SA is also available at UI exhaustion. Whilst SA is means- tested and corresponds to 80 per cent of UI, the level of UI is related to previous earnings with an upper cap. The replacement rate in the UI system is 90 per cent but with a very low ceiling (e.g. 18,650 EUR per year in 1998). This low ceiling means that the majority of unemployed persons have a lower replacement rate than 90 per cent. [4] In the Danish system the individual can take a holiday whilst unemployed, with the average holiday period lasting 5-6 weeks. Thus Denmark has a generous social system resembling those in other Scandinavian countries.

[2] The UIFs are private associations of employees or self-employed persons organised solely to ensure economic support in the event of unemployment. However, UI is largely financed by the state.
[3] 1 EUR=7.45 DKK
[4] Employment on the side, refusal of job offers, cheating or lock-out can lead to UI reduction.

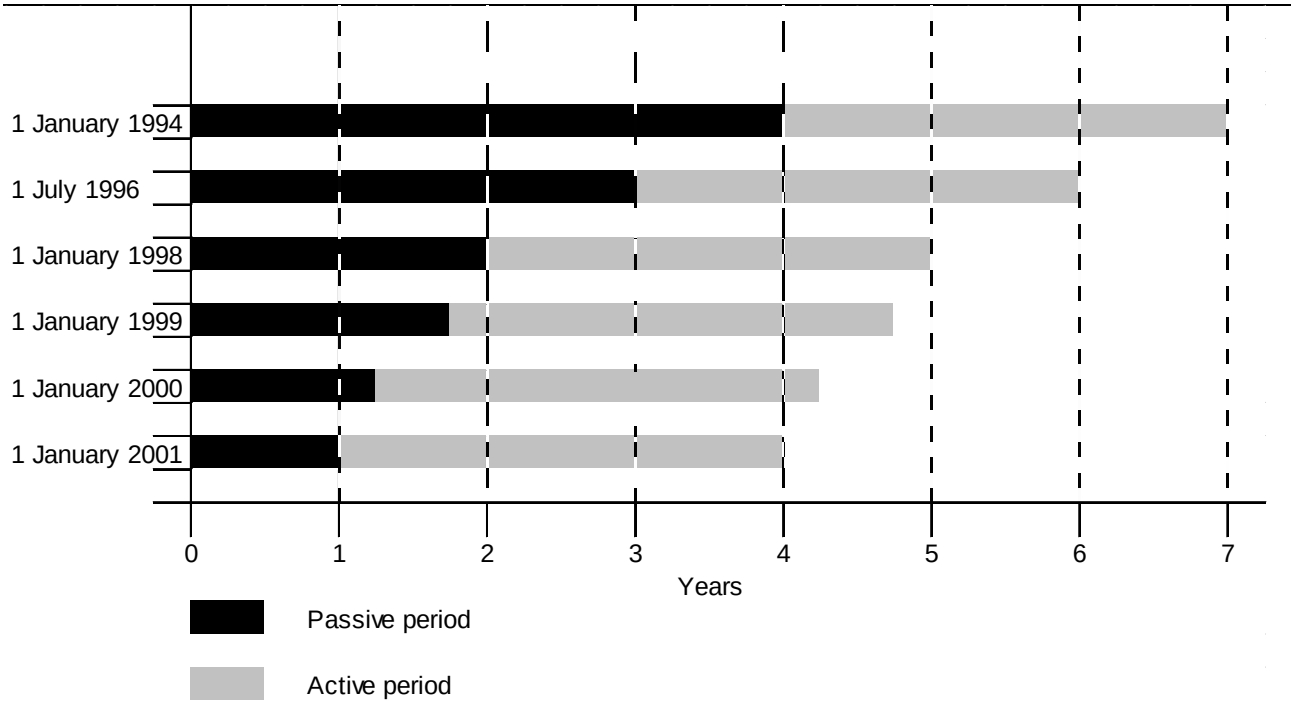
3.3 Changes in the Danish's UI system

The UI system remained almost unchanged from 1970 to 1994, during which time the UI period was in practice unlimited. In 1994 the UI period became finite, and the insurance period was divided into two periods: 'passive' and 'active'. During the passive period unemployed individuals receive UI without having to participate in ALMP, whilst during the active period the receipt of UI is contingent on ALMP participation. The amounts received during the active and passive period are equal as long as the unemployed fulfils the activation restrictions.

Figure 2 illustrates the different legislative changes that reduced the PBD in Denmark between 1994 and 2001, all of which affected only the length of the passive period. In 2007 a new reform reduced the passive period, but the maximum duration of UI benefit remains unchanged. Only in 2010 did a new reform change the maximum duration of UI from 4 years to two years. Thus this paper analyses the reduction of one year in the passive period as gradually implemented between 1 January 1999 and 1 January 2001 (law no. 897 of 16 December 1998). Because no new reforms changed the maximum duration until 2010 (i.e., a twelve-year period with no new reforms affecting the PBD), this reform is very useful for examining the effect of UI exhaustion.

FIGURE 2

The UI reforms in Denmark 1994-2003



The UI eligibility criteria before and after 1999 remain the same, i.e. membership in a UIF for a minimum of one year and having worked 52 weeks within the preceding 3 years. Until 1 January 1999 an unemployed worker who fulfilled the UI eligibility had the right to 24 months of passive UI, whilst from 1 January 2001 the period was reduced to 12 months. As previously mentioned, this passive period was followed by 36 months of activation. Hence the shortening occurs only at the beginning of the UI spell. Moreover, the shortening of UI duration affected not only new unemployment spells starting after 1 January 1999 but also spells already started. The reduction in the passive period was gradually implemented for all UI receivers as follows:

- Between 1 January 1999 and 31 December 1999 the right to 21 months (91 weeks) of passive UI

- Between 1 January 2000 and 31 December 2000 the right to 15 months (65 weeks) of passive UI
- From 1 January 2001 the right to 12 months (52 weeks) of passive UI

For example, a person starting a fresh unemployment spell (i.e. being eligible for full entitlement) in 1998 is entitled to a 24-month passive period; then, from 1 January 1999, to 21 months, and from 1 January 2000, to 15 months. Finally, from 1 January 2001 the person is entitled to a maximum of 12 months of passive period. Thus the person receives one year less UI in total.

The Danish system relies on new records of unemployment length (i.e. the number of months an individual has been unemployed without regaining the right to a fresh spell). Thus if a person became unemployed between January and April 1998 and was starting a new spell, his or her entitlement was 57 months (21 passive months and 36 active one), whilst someone starting a fresh unemployment spell in October 1998 receives only 51 months (15 passive months and 36 active one).

Since 1994, a number of amendments have changed the UI period. However, the 1999 change was implemented on very short notice (two weeks between publication and application) and was progressively implemented. Thus this short notice provides us with a sample of individuals who experienced different cuts in their UI entitlement depending on the time they entered the UI system. As this legal change introduces a variation in entitlement, it therefore constitutes an appropriate framework for investigating the effect of shortening the PBD. Furthermore, as previously mentioned, no new reforms affect the maximum duration period of UI in our analysis period, 1998-2003. By focusing on the 1999 reform and on newly unemployed individuals starting a fresh spell in 1998, we do not need to account for the previous changes affecting the maximum duration of UI

(see figure 2). Hence, the 1999 reform that reduces the maximum duration of UI by one year is a good candidate for investigating the effect of UI exhaustion for long-term unemployed.

4 DATA AND EMPIRICAL ANALYSIS

Investigating the effect of UI exhaustion requires both reliable information about the exit states of the individuals and precise computations of individuals' unemployment seniority. This paper has both reliable administrative data and an identification strategy through a Danish legal UI reform that affects people differently depending on the month in which they become unemployed. As socio-demographics characteristics may influence the transition from unemployment to employment, we control for both observed and unobserved heterogeneity.

4.1 Data set based on administrative records

Our primary data source is the DREAM[5] database of the Danish Labour Market Authority. This data set includes event history information from July 1991 for all public transfer incomes received by all the persons having a Danish civil registration number (i.e. all Danish citizens and residents). The DREAM database currently includes more than 100 different codes for transfer income registered weekly. The event history of the DREAM database allows the determination not only of the unemployment spells but also of the exit states (e.g., other benefits). To obtain reliable unemployment lengths, we select people starting a new unemployment spell in 1998 (fresh spells), i.e. people not unemployed during the twelve months preceding 1998. We follow this group of unemployed for the entire period under investigation, 1998-2003. To obtain information about the social background of the unemployed, we merge the DREAM database with various databases from Statistics Denmark.

[5] 'Administrative recorded evaluation of the extent of marginalisation; in Danish *Den Registerbaserede Evaluering Af Marginaliseringsomfanget*, hence *DREAM*.

Because of missing information, previous studies have had to make assumptions about the total length of UI entitlement or the exact number of UI spells (e.g. Jenkins and García-Serrano, 2004) or on the exit states (e.g. Fortin et al., 2004; Geerdsen, 2006; Ham and Rea, 1987; Rosholm and Svarer, 2008; and Graversen and Larsen, 2012). However, we can reasonably make assumptions about employment because all other exit states ending in receiving some kind of social transfer, death or emigration are clearly identified in our data. Furthermore, as Geerdsen (2006) points out, the number of individuals who neither work nor receive income-substituting transfers in Denmark is so low that it does not even appear in the data from Statistics Denmark.[6] Thus to identify the possible exit states, especially UI spells ending in employment, we assume that an exit from UI of more than 5 weeks (the official holiday duration in Denmark for the period) not ending in other social support assistance, death or emigration means that the person found work.

To illustrate this fact, we have looked at the correspondence between registered unemployed men receiving UI and men defined as searching for job in the Danish Labour Force Survey (*Arbejdskraftundersøgelsen*, AKU)) following the ILO definition.[7] The number of registered unemployed men receiving UI is usually higher than that of men defined as unemployed following ILO definition. Hence, we do not underestimate the number of men being unemployed.[8] Furthermore, Geerdsen (2006) illustrates that a substantial group of people work whilst receiving transfers, indicating that we may actually underestimate the number of people finding a job, because we exclude them from the employment exit when they receive some form of support. Finally, we

[6] In 2004, 75% of the Danish population aged 30- 66 years was working, while 30% of the same population received some sort of public transfer income. In other words, some people actually work while receiving transfers.

[7] The unemployed comprise all persons above a specified age who during the reference period were:
- without work, i.e. were not in paid employment or self-employment during the reference period;
- currently available for work, i.e. were available for paid employment or self-employment during the reference period; and
- seeking work, i.e. had taken specific steps in a specified recent period to seek paid employment or self-employment. These specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance from friends or relatives; looking for land, building, machinery or equipment to establish an enterprise; arranging for financial resources; or applying for permits and licences.

[8] The comparison of UI register data contra UI survey data is available upon request

stress that the UI rules and SA rules have become much more restrictive over the years, so that the picture could be different if we analyse the situation today.

4.2 Sample construction

The purpose of the analysis is to determine the effect of running out of UI. To help us identify the effect of UI exhaustion, we use the progressive one-year reduction of the UI entitlement that started 1 January 1999 and was fully implemented in January 2001. Figure 2 shows the changes in UI entitlement occur amongst unemployed people starting their unemployment periods in 1998. We select newly UI recipients between 1 January 1998 and 31 December 1998, i.e. those beginning their unemployment period with a 'clean unemployment record' in the UI benefit system and thus eligible for the full UI entitlement. We follow those starting a fresh UI spell in 1998 until the end of 2003. For each individual, an unemployment spell starts in the month in which he or she became unemployed, and the spell continues until the individual stops receiving UI for five consecutive weeks. As previously mentioned, we accept a 'break' of fewer than 5 weeks corresponding to the Danish holidays, because accepting a holiday as an exit from unemployment would be misleading. As individuals have to go at least five weeks without UI to generate an exit from unemployment, no exits from unemployment spells occur during the last five weeks of the observed period.

To avoid the application of specific rules for younger (under 25 years old) and older people (above 50 years old), we select individuals aged 25-44 years in 1998. Studies show that men and women have different unemployment histories and react differently to economic incentives (especially women aged 25-44, who have a higher risk of leaving employment or unemployment for maternity leave) (e.g. Geerdsen 2006). We thus restrict our analysis to all men aged 25- 44 years who began a fresh unemployment spell between 1 January 1998 and 31 December 1998.

The socio-demographic variables included in the analysis are: marital status (single or not), ethnicity (Native Danes, first- and second-generation immigrants[9]), age and education (basic education, vocational education, further education, no information).

[9] The definition native Danes and immigrants is based on Statistics Denmark's classification of the population into three groups: native Danes, immigrants, descendants of immigrants. Native Danes are defined as individuals born in Denmark and having at least one parent who is not only a Danish citizen but was also born in Denmark. Immigrants (first generation) are defined as foreign-born individuals with foreign-born parents or parents with foreign citizenship. Descendants (second generation) of immigrants are defined as individuals born in Denmark to foreign-born parents or parents with foreign citizenship.

TABEL 1
Descriptive statistics for men with UI spells from 1998-2003

		Percent	Mean	Std. Dev.
Spells ending in employment				
Spell length			3.9973	3.8147
Remaining UI months			45.5898	12.8164
Age			35.7784	5.8590
Marital status	Married	55.84		
	Single	44.16		
Ethnicity	Dane	90.26		
	Immigrant	9.74		
Education	Basic	38.42		
	Vocational education	4.65		
	Further education	56.18		
	No information	0.75		
Spells ending into other benefits				
Spell length			5.3090	5.6554
Remaining UI months			41.2800	14.7381
Age			35.1180	5.9376
Marital status	Married	51.65		
	Single	48.35		
Ethnicity	Dane	82.09		
	Immigrant	17.91		
Education	Basic	47.65		
	Vocational education	5.91		
	Further education	44.80		
	No information	1.63		

Note:. The sample encompasses 35,369 men aged 25-44 starting a new UI spell in 1998. These men have had a total of 89,171 UI spells (equal to 443.841 UI months) from 1998 to 2003. Of the total, 22,515 spells end in employment and 66,656 end in other social benefits (including 4,073 right-censored UI spells that are not finished at the end of 2003).

Source: DREAM data. Men aged 25-44 in 1998.

The sample comprises 35,369 men aged 25-44 starting a new UI spell in 1998. These men have had a total of 89,171 UI spells (average spell length around 5 months) from 1998 to 2003. Of the total, 22,515 spells end in employment and 66,656 end in other social benefits (including 4,073 right-censored UI spells that are not finished by the end of 2003). Table 1 shows that spells ending in employment are shorter and that these men are more likely to be married and native Danes. In contrast, spells ending in other benefits are longer, and these men are more likely to be single, immigrants and have no registered education (either missing or no education).

To investigate the impact of the 1999 reform on unemployment period, we also describe the hazard out of employment (disregarding the exit state) for all fresh spells starting in 1998, 1999 and 2000 and observed from 1998-2003. Figure 3 shows that the shortening of the initial entitlement

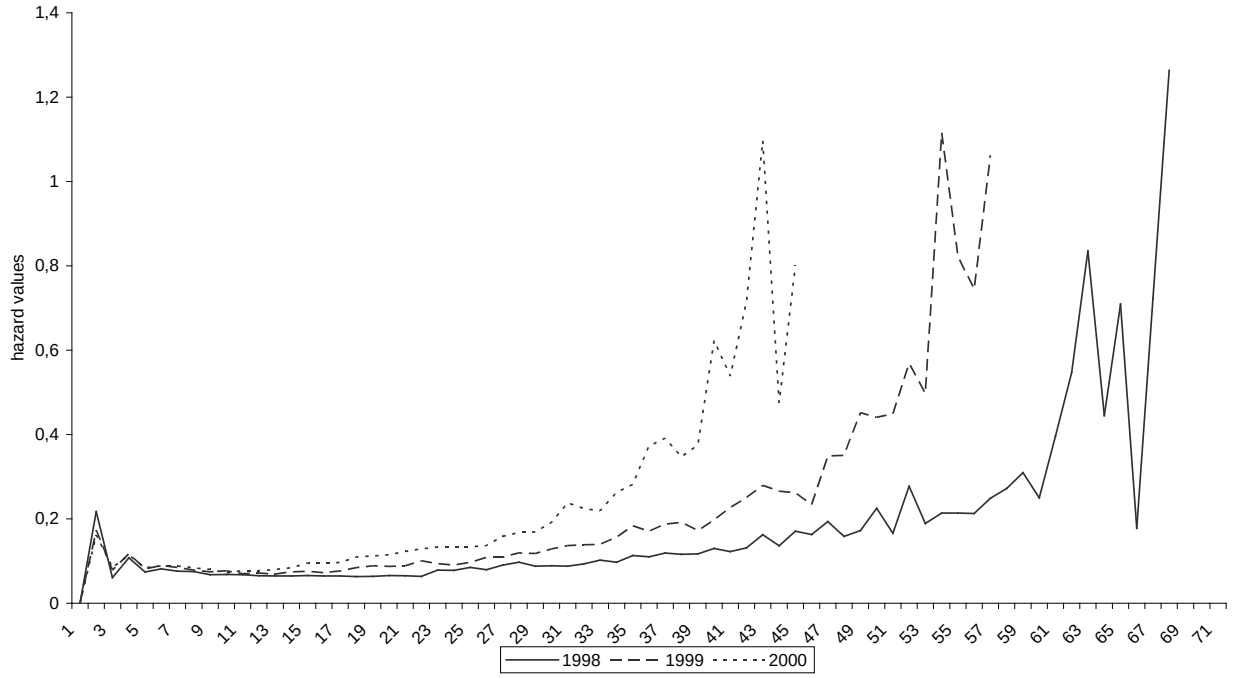
should result in a shift in the hazard curve before UI exhaustion. Figure 3 also shows that the hazard rate increases drastically around the expected UI exhaustion and that this period varies for fresh spells starting in 1998, 1999 and 2000.[10] Figure 3 illustrates an 'inward' shift of the hazard rate out of unemployment from 1998 to the end of 2000.

We investigate whether this tendency reflects the different reduction in UI entitlement in the passive period occurring in Denmark from 1998 to 2000. The observed shift for the spells starting in 2000 actually occurs earlier (43rd month) than expected (48th month). A positive economic business cycle from 1998 and onwards could explain these observed changes in the hazard rates. According to Blanchard and Diamond's (1994) ranking model − assuming that employers, when receiving applications for a vacancy, hire the worker with the shortest duration of unemployment − a reduction of aggregate unemployment will primarily benefit to the long-term unemployed. However, Rosholm (2001) who tested this assumption on Danish data finds no support for the ranking behaviour amongst Danish employers. Furthermore, Figure 1 shows both a positive business cycle from 1998-2000 and a negative cycle from 2000-2003. As the Danish economy does not necessarily favour the unemployed during the analysis period, it cannot completely explain the inward shift of the hazard rate.

[10] The increase in the hazard rates (out of unemployment) is expected after 57 months for 1998, 51 months for 1999 and 48 months for 2000.

FIGURE 3

Kaplan-Meier estimates for fresh spells beginning in 1998, 1999 and 2000nmark 1994-2001



Source: DREAM data. Men aged 25-44.years and starting a fresh spell in 1998

The following presents our econometric model for testing the effect of UI exhaustion on exit rate into employment. In the estimation we only use our sample of men starting a fresh spell in 1998.

5 The econometric model

To analyse the effect of UI exhaustion on the exit to employment, we use a competitive risk model. In other words we estimate the probability of leaving unemployment in a given period by using a multinomial logit specification to account for three possible outcomes: staying unemployed, becoming employed or entering other social benefits. We model unobserved heterogeneity as a random effect in a non-parametric framework (Heckmann and Singer 1982, 1984). The threat of the UI exhaustion for the unemployed is identified through a variable identifying the number of

remaining UI months for each individual in the system, *R*. The model can be illustrated in the following way:

$$R = E - t + RJ \text{ , for } R > 36 \text{ and} \qquad (1)$$

$$R = E - t \text{ , for } R \leq 36$$

R describes the number of remaining months until UI exhaustion at each period. *E* is the individual entitlement at the beginning of the spell, *t* is the duration of the unemployment spell, and *RJ* is the realised jumps in the total duration (these jumps occur only in the passive period, as the active duration remains unchanged for all 36 months). Variations in *R* can result only from the variation in *E*, *t* or *RJ*.

R diminishes as the spell progresses. *E* is constant within a spell and varies across spells as a result of the unemployment lengths of the individual (if they do not regain the right to a new entitlement) and the cut of their passive period resulting from the legislative change. Even though realised jumps occur only in the passive period of the UI recipient, the implementation of the law generates different entitlement periods according to the timing of the recipients' entrance in the UI system. We use this variation in entitlement to identify the effect of UI exhaustion.

For the individual expectation about time to exhaustion (more than four years) we assume, similarly to Geerdsen (2006), that individuals learn about the cuts in their UI once the cuts are implemented. Nonetheless, the active period remains unchanged, giving the long-term unemployed time to learn about the cut implementation that will affect the entire UI entitlement. We use the variation in the *R* to identify how individuals starting fresh spells in 1998 with the same initial entitlement are influenced in their exit out of unemployment. When these unemployed approach UI

exhaustion they have been unemployed for at least three years and experienced different cuts depending on the time they had entered the UI system with full entitlement.

For identification purposes, we exclude the realised jumps variable, *RJ*, in the hazard model. The underlying assumption for this choice is that individuals are sensitive only to the overall decreasing of their UI period, i.e. *R*. In our sample all individuals have started their spells in 1998 and will experience at least one realised jump if they are remain unemployed or become unemployed again after 1 January 1999. The hazard is modelled as the probability of leaving UI unemployment in a given month conditional on the unemployment spell up to this month. Thus we have enough variation in the expected time to UI exhaustion. Data are represented by a discrete logistic specification (similar to Jenkins, 1995).

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

where *h* is the hazard at a given spell length *t. y* is a linear function of *t*, the duration in spell; *R* is the time remaining until UI exhaustion; *E* is the initial entitlement at the beginning of the spell*;* and *X* is some background variables. *X* includes marital status, education, ethnicity, age and age squared. All variables except age are modelled with dummies. Using dummy variables imposes fewer restrictions on the parametric form of the model. The duration dummy variables go from 1 month to 72 months (span of our sample: 1998-2003, by 3 months intervals-17 dummies).

Furthermore, μ represents the individual's unobserved characteristics, which we assume are independent of *X* and follow a discrete distribution with two points of support. We allow for correlation between the two points of support by assuming that the unobserved heterogeneity components follow a discrete distribution with two points of support (i.e. two mass points). The identification of mass points and their associated probability follows the assumption that each

individual's unobserved part of the hazard model is constant both within and between spells (see Ham and Rea, 1987, for a similar approach).

6 Results

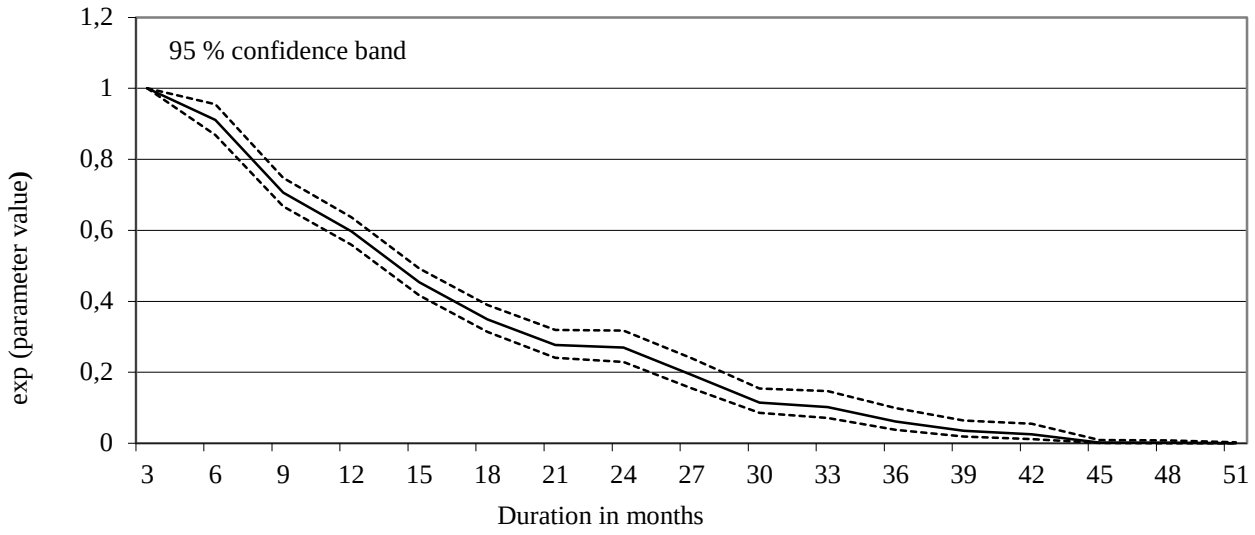
To examine how UI exhaustion affects the exit rate from long-term unemployment into employment, we first present our main results on the transition into employment when individuals approach UI exhaustion. Then we discuss the effect of UI exhaustion and the transition into other social benefits. Finally, we discuss the effect of socioeconomic factors on employment outcomes.

6.1. Employment transition

The results of the empirical probability model of leaving unemployment support the theory that the longer a person is unemployed, the lower the probability of his or her finding a job (Moffitt, 1977). Figure 4 shows the baseline hazard (average duration of unemployment). Overall, the employment hazard decreases over time, and this decrease is drastic during the first 12 months.

FIGURE 4

The estimated duration effect of staying unemployed, presented as odds ratio of getting a job (compared to the first 3 months as unemployed)



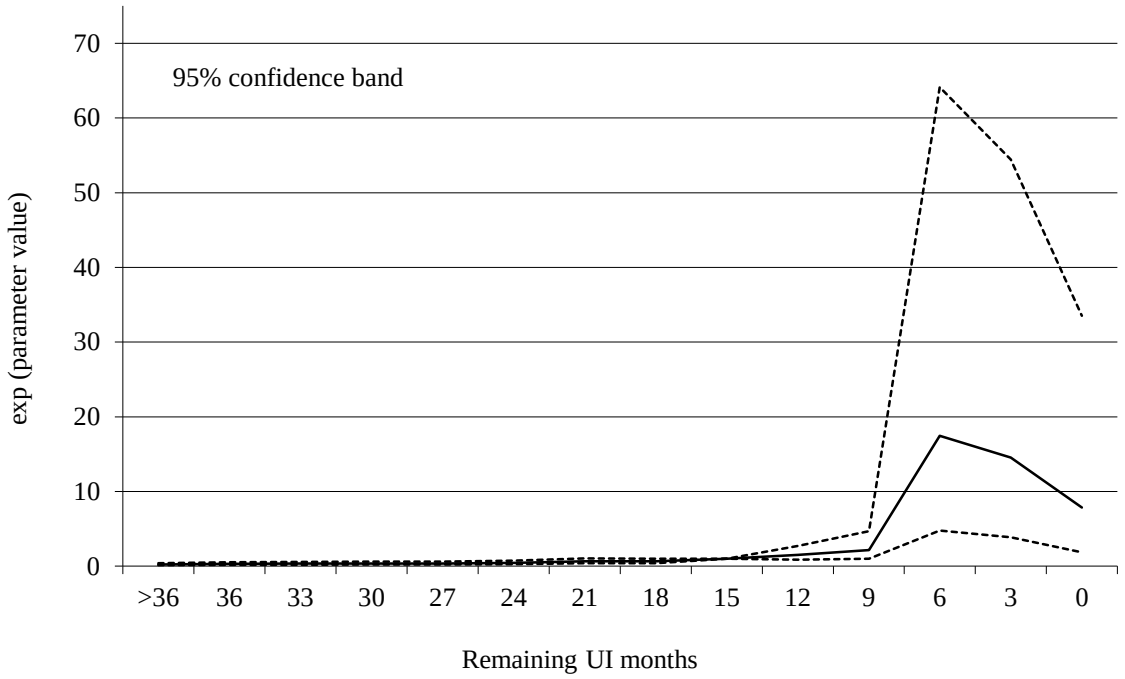
Source: DREAM data. Men aged 25-44 years and starting a fresh spell in 1998.

Figure 5 shows the results on remaining UI (*R*). The figure shows clear jumps in the hazard rate out of unemployment into employment when the unemployed are close to UI exhaustion. The exit into employment reaches its maximum around three to six months before exhaustion. At its peak (3-6 months UI left) the odds of finding employment is increased by 1700 per cent , compared to the reference category of 12 to 15 months left before exhaustion. However, Figure 5 shows that the confidence interval for the unemployed individuals having less than a year left on UI is large. Thus a conservative estimate of the effect of UI exhaustion is that the odds of finding employment increase by nearly 500 per cent, when compared to the reference category. The size of the effect depends on the reference category. In addition to the size of the effect the fact that UI exhaustion still has a positive effect on entering employment − even after more than three years as UI

recipients in a welfare generous country − is surprising. Thus one would expect that for other countries having shorter PBD the effect should still be present.

FIGURE 5

The estimated effect of UI exhaustion on the transition into employment, presented as odds ratios (12 to 15 months left is the reference odds)



Source: DREAM data. Men aged 25-44 years and starting a fresh spell in 1998.

6.2. Transition into other benefits

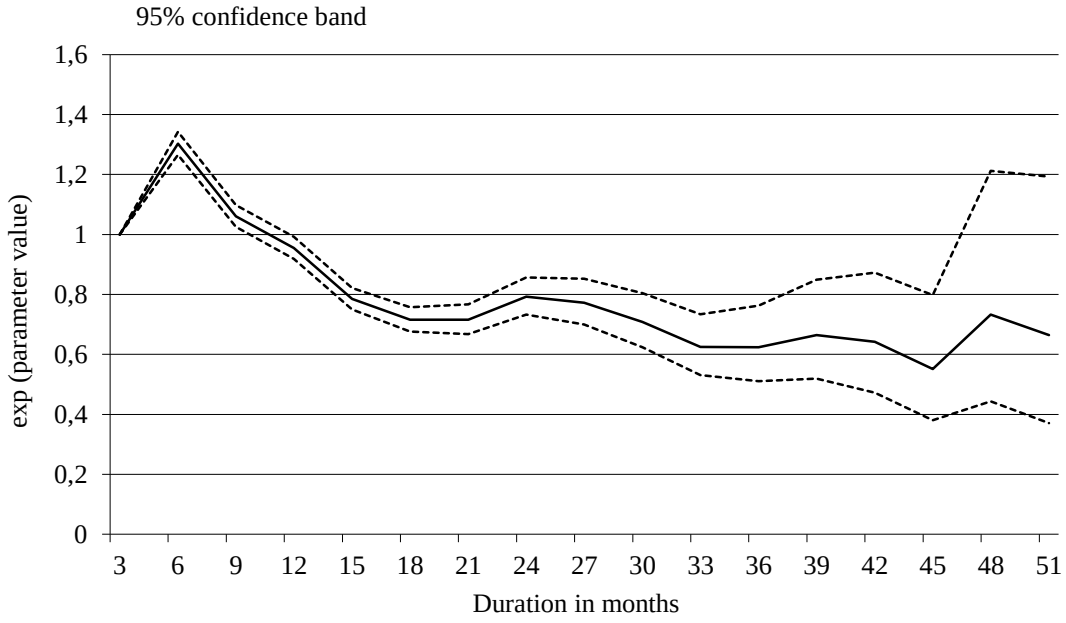
Figures 6 and 7 show, respectively, the duration and the hazard for unemployed people exiting to other benefits (e.g. social assistance, sickness benefit or disability pension,). The two figures are very different from the figures of exits to employment (figures 4 and 5). Within the first 6 months,

the probability of exiting to other benefits increases significantly, whilst after this 6-month period the longer the unemployment duration, the lower the probability of exiting into other benefits.

Figure 7 shows that the transition into other benefits is significantly higher when individuals have between 15 to 36 months left of UI compared to individuals having more than 36 months or less than 15 months to UI exhaustion. An explanation of the lack of influence of UI exhaustion on the hazard rate into other benefits is that people exiting to other benefits are sick and therefore use their unemployment period for applying for sickness leave, early pension, or other such social schemes. This process starts usually long before the UI exhaustion and may explain why we find no increase in the hazard rate into other benefits close to UI exhaustion.

FIGURE 6

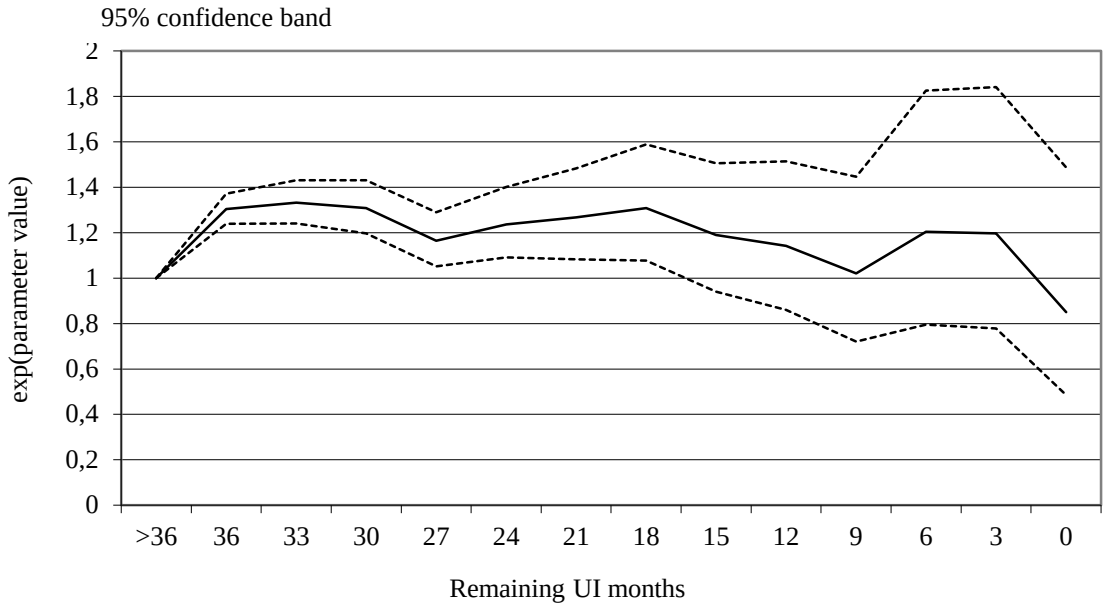
The estimated duration effect of staying unemployed, presented as odds ratio of exiting to other support (compared to the first 3 months as unemployed)



Source: DREAM data. Men aged 25-44years and starting a fresh spell in 1998.

FIGURE 7

The estimated effect of UI exhaustion on the transition into other benefits, presented as the odds ratios (more than 36 months UI left is the reference odds)



Source: DREAM data. Men aged 25-44 years and starting a fresh spell in 1998.

6.3. Socioeconomic factors

Table 2 summarises for our sample, the probability of starting a job or receiving other benefits (exit to other benefits) compared to staying unemployed. Individual socioeconomic characteristics largely influence the employment rates amongst UI recipients, confirming previous empirical findings (Weatherall, 2008; Geerdsen, 2006; and Graversen and Larsen 2012). The coefficient for UI entitlement at the beginning of each spell is significant for exit into employment. The lower the entitlement (*E*) at the beginning of the spell, the higher the hazard for exit into employment. In other words, the exit into employment is more likely to occur when the entitlement is small at the beginning of the spell. In contrast, the transition into other benefits is slightly higher when the entitlement in the beginning of the spell is 6 to 23 months, as opposed to less than 6 months.

TABEL 2
Hazard estimates of demographics and entitlement. Men 25-44 years and starting a fresh spell in 1998.

		Into employment			Into other benefits		
		E(parameter)		Std. Error	E(parameter)		Std. Error
E	0-5	1			1		
	6-11	0,563	**	0,23	1,372	***	0,113
	12-23	0,43	**	0,23	1,3	**	0,111
	24-35	0,35	***	0,237	1,187		0,114
	36-47	0,275	***	0,241	1,093		0,116
	48-59	0,236	***	0,242	1,18		0,116
	>59	0,221	***	0,242	1,012		0,117
Education	Basis	1			1		
	Vocational	1,15	***	0,046	1,071	***	0,023
	Further	1,104	***	0,018	1,115	***	0,01
	No info	0,742	***	0,115	0,983		0,042
Age	Age	1,016		0,017	0,953	***	0,01
	Age*2	0,9998		0,0002	1,000	***	0,0001
Status	Single	1			1		
	Non-single	1,282	***	0,017	1,243	***	0,01
Ethnicity	Danes	1			1		
	Immigrant	0,489	***	0,034	0,745	***	0,015
Mass point 1		0,008		0,088	4,7899		
P(mass point 1)		0,645		0,013			
Log likelihood		-247239,540					
Number of observations (UI months)		443841					

Note.: *Significant 10%** significant at 5%***significant at 1%. P(mass point) = exp(b)/[1+exp(b)].
E stands for initial entitlement (remaining months at the beginning of the spell).
Source:: : DREAM data.. The sample used includes 89.171 spells

Results also show that being married increases the probability of finding a job or exiting to other benefits at an earlier stage of the unemployment spell. Moreover, native Danes have a significantly higher probability than immigrants of finding a job. Having higher or vocational education (as compared to having basic or no education) increases the chance of finding employment or exiting into other benefits earlier in the unemployment spell. The probability of exiting to other benefits decreases with age. The socio-demographic profile of the men exiting to employment or other benefits while they are approaching UI exhaustion is similar to previous findings from approaching the ALMP (e.g. Geerdsen 2006).

6.4. Discussion of the model and unobserved heterogeneity

The findings of our empirical competing risk model rely on the assumption that the independence of irrelevant alternatives (IIA) is fulfilled. If, for example, one of the transition states were removed from the model, the relative probability between exiting to employment and staying unemployed should not change if the IIA is fulfilled. We therefore re-estimate the model without the transition state 'other benefits' and perform a Hausman-McFadden test against the full model. As the test did not reject the IIA assumption, it therefore supports our model.

Table 2 shows that unobserved characteristics influence the transition from unemployment into employment or other benefits. Thus some unobserved characteristics that we have not accounted for with our socioeconomic characteristics influence the exit from unemployment. The modelling of unobserved heterogeneity, as section 5 explains, results in two mass points, with one point fixed at 0 (see table 2). Thus the unemployed can be divided into two groups. A smaller group (35 per cent) has a relatively strong attachment to the labour market and a lower use of other benefits. Thus, compared to the rest of the unemployed, this smaller group has some unobserved characteristics that increase their probability of entering employment.

7 CONCLUSION

This paper investigates whether UI exhaustion influences the exit rate to employment for 25-to-44 years-old men who have been receiving UI up to four years. It offers the first study of the effect of UI exhaustion in a context for which not only the PDB is very long (up to four years) but also, as in other Scandinavian countries, where Denmark provides other benefits for persons running out of UI. To estimate the conditional probability of entering employment or receiving other social benefits, we use a competing risk model. We identify the effect of UI exhaustion by exploiting the 1999 legislative change in the duration of benefit, a change that progressively reduced regular UI

entitlement from five to four years. As no other reforms have been introduced during our analysis period, this reform is very suitable for analysing the effect of UI exhaustion for long-term unemployed. We found three important results. First, the threat of running out of UI − even for individuals having a PDB of four years − significantly increases the probability of entering employment from 9 months before the expected exhaustion. Second, running out of UI does not significantly increase the transition into other benefits. Third, unobserved heterogeneity plays an important role in the transition into employment and other benefits amongst the unemployed.

Hence, building on a unique Danish panel data and a UI reform, this paper shows that even for the long-term unemployed (men), the UI exhaustion has a large significant effect on the transition into employment. Thus the combination of a long PBD and a generous social system like that in Denmark and other Scandinavian countries does not necessarily prevent the long-term unemployed of finding a job. Although our results indicate that shortening the PBD from five to four years increases the exit into employment when approaching UI exhaustion, a larger group of the long-term unemployed still has a weak attachment to the labour market and ends up having a high usage of other benefits.

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