

Jahn, Elke J.; Rosholm, Michael

Working Paper

Looking beyond the bridge: How temporary agency employment affects labor market outcomes

IAB-Discussion Paper, No. 9/2010

Provided in Cooperation with:

Institute for Employment Research (IAB)

Suggested Citation: Jahn, Elke J.; Rosholm, Michael (2010) : Looking beyond the bridge: How temporary agency employment affects labor market outcomes, IAB-Discussion Paper, No. 9/2010, Institut für Arbeitsmarkt- und Berufsforschung (IAB), Nürnberg

This Version is available at:

<https://hdl.handle.net/10419/57462>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Institute for Employment
Research

The Research Institute of the
Federal Employment Agency

IAB

IAB-Discussion Paper

9/2010

Articles on labour market issues

Looking Beyond the Bridge: How Temporary Agency Employment Affects Labor Market Outcomes

Elke J. Jahn
Michael Rosholm

Looking Beyond the Bridge: How Temporary Agency Employment Affects Labor Market Outcomes

Elke J. Jahn (IAB, Aarhus School of Business, Aarhus University, IZA)

Michael Rosholm (Aarhus School of Business, Aarhus University, IZA)

Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

The “IAB-Discussion Paper” is published by the research institute of the German Federal Employment Agency in order to intensify the dialogue with the scientific community. The prompt publication of the latest research results via the internet intends to stimulate criticism and to ensure research quality at an early stage before printing.

Contents

Abstract.....	4
Zusammenfassung.....	4
1 Introduction.....	5
2 Empirical Evidence	8
3 Temporary Agency Employment in Denmark.....	9
4 Econometric Strategy.....	11
4.1 The Timing-of-Events Approach	11
4.2 Modeling Heterogeneous Effects.....	14
4.3 Modeling Post-Unemployment Outcomes.....	14
5 Data Sources and Descriptive Statistics.....	16
6 Results	19
6.1 Empirical Hazards and Selection into Treatment	19
6.2 Unobserved Heterogeneity and Treatment Effects	21
6.3 Effects of Labor Market Tightness and Treatment Intensity	23
6.4 Post-Unemployment Wages, Job Stability, and Employment Stability	25
7 Conclusion.....	27

Abstract

We perform a comprehensive analysis of the stepping-stone effect of temporary agency employment on unemployed workers. Using the timing-of-events approach, we not only investigate whether agency employment is a bridge into regular employment but also analyze its effect on post-unemployment wages and job stability for unemployed Danish workers. We find evidence of large positive treatment effects, particularly for immigrants. There is also some indication that higher treatment intensity increases the likelihood of leaving unemployment for regular jobs. Our results show that agency employment is even more effective in tight labor markets, where firms use agency employment primarily to screen potential candidates for permanent posts. Finally, our results suggest that agency employment may improve subsequent match quality in terms of wages and job duration.

Zusammenfassung

Im Rahmen des „timing-of-events“ Modells wird umfassend untersucht, ob Zeitarbeit eine Brücke in reguläre Beschäftigung für Arbeitslose in Dänemark ist. Auch wird gefragt, wie sich Beschäftigungsdauer und Entlohnung nach dem erfolgreichen Verlassen der Arbeitslosigkeit entwickeln. Es zeigt sich, dass Zeitarbeit eine Brücke in reguläre Beschäftigung sein kann. Hiervon profitieren vor allem Immigranten. Darüber hinaus finden wir Hinweise, dass die „treatment“ Intensität die Übergangswahrscheinlichkeit aus Arbeitslosigkeit in reguläre Beschäftigung erhöht. Die Sprungbrett-Funktion der Zeitarbeit ist vor allem in angespannten Arbeitsmärkten ausgeprägt, in denen Firmen Zeitarbeit nutzen, um Arbeitslose zu testen und offene Stellen zu besetzen. Schließlich zeigt sich, dass die Matching-Qualität zunimmt, aber nur dann, wenn der vormals Arbeitslose direkt im Anschluss an einen Leiharbeits-einsatz eine reguläre Beschäftigung findet.

JEL classification: C41, J64, J30, J40

Keywords: temporary agency employment, stepping stone, employment stability, wages, Denmark

Acknowledgements: The authors are grateful to Bernd Fitzenberger, Barbara Hofmann, Anton Nivorozhkin, Gesine Stephan, the participants of the CIM workshop in Aarhus, August 2009 and the ZEW workshop on Flexibility in Heterogeneous Labour Markets in Mannheim, March 2010 who provided valuable comments. The authors gratefully acknowledge financial support from Danish Social Science Research Council.

1 Introduction

In this paper, we perform a comprehensive analysis of the stepping-stone effects of temporary agency employment on unemployed workers in Denmark in the period 1997-2006. Using duration models and the “timing-of-events” approach, we investigate whether agency employment generally acts as a bridge to regular employment, and also look for heterogeneous effects of temporary agency jobs. Moreover, we investigate how the treatment intensity affect our results, and how temporary agency employment affects post-unemployment job quality.

The question whether temporary agency employment is a springboard into regular employment has become increasingly important since temporary agency employment has increased in most European countries during the past decade: in 2007, temporary agencies employed about 2 percent of the EU working population (CIETT 2009). Until recently, however, Denmark has been the exception, with an almost nonexistent temporary help sector. This has changed fundamentally. Although the temporary help sector is still small compared to the European average, it is far from being a negligible source of labor turnover and net employment growth today. In the past five years, the sector has increased almost fourfold, accounting for 1.7 percent of the total workforce in 2007 (Windelin and Hansen 2007). This marked increase comes as something of a surprise since the Danish labor market is relatively flexible and hardly any employment protection exists. Moreover, until late 2008, the Danish unemployment rate was low and the labor market was considered to be tight. Since temporary agency jobs in Denmark usually provide less social benefits than other jobs do, one might surmise that workers had no incentive to take temporary agency jobs, such that the labor supply side may have rationed the market for temporary help services. However, the rapid growth of this sector may be the result of the intensified activation policies of the Danish public employment service. Pedersen et al. (2003) and Oxford Research (2003) present evidence that the unemployed are increasingly seeking and accepting jobs with temporary agencies as a route back into regular employment.

As in other European countries, there are concerns in Denmark whether temporary agency work traps workers in poor-quality jobs, or whether it might act as a bridge into regular employment – especially for individuals otherwise at risk of marginalization. Up to the present day, little research has been done on temporary agency employment in Denmark. The aim of this paper is to fill this gap.

The theoretical impact of agency employment on the employment outcomes of the unemployed is not clear a priori. On the one hand, temporary work may improve workers’ human capital and also provide them with labor market contacts that can later lead to stable employment (e.g., Houseman et al. 2003, Jahn & Ochel 2007).¹

¹ To ease readability, we sometimes use the terms “temp job” and “agency work” interchangeably with “temporary agency employment”.

In this case, temporary agencies may reduce the time job-seekers spend looking for a new job and may facilitate rapid entry into regular employment. This holds the more if client firms use temporary staffing arrangements to screen workers to fill open posts.

On the other hand, it can be argued that any human capital effects arising from temp work cannot be strong due to the primarily short-term, low-skilled nature of temp jobs, which are often below the worker's qualifications (Segal & Sullivan 1997). These jobs may even be dead-ends since firms may not plan to fill these jobs permanently, thus limiting the temp worker's regular employment prospects (Heinrich et al. 2005). Consequently, temporary agency work might not provide significant opportunities to develop productive job search networks, and it may even crowd out direct job search, inhibiting longer-term labor market advancement. Which hypothesis holds remains an open empirical question (see Section 2).

Our study contributes to the literature in several ways. First, we take a comprehensive look at the stepping-stone effect of temporary agency employment in Denmark for the period 1997-2006. Second, we take into account the different possible motivations for unemployed people to work as a temp. Although the majority of job-seekers probably accept temp work to avoid or escape unemployment, there may be also unemployed job-seekers who choose temporary agency employment as a career choice, to obtain or prolong eligibility for unemployment benefits, or to combine family responsibilities with labor market participation (CIETT 2002). Since the motivation to pursue temp work is usually not observable, it is important to separate the treatment effects from time-invariant unobserved variables affecting both the selection into temporary agency employment and the transition out of unemployment. The timing-of-events approach developed by Abbring & Van den Berg (2003) is ideal for taking selection based on observed and unobserved heterogeneity into account. To the best of our knowledge, this is the first study to employ this approach to model the in-treatment effect and post-treatment effect of taking a temporary agency job during a phase of unemployment.²

In tight labor markets, companies have more job openings, fewer qualified job applicants, and they may find it too costly to assess the productivity of the workers still in the pool of unemployed job-seekers. As temp agencies face lower hiring and firing costs than conventional direct-hire employers do, they may choose to hire individuals, who would otherwise have difficulties finding regular employment. By this means, job-seekers can overcome the negative stigma associated with an extended unemployment period or certain educational or cultural backgrounds (e.g., Autor &

² De Graaf-Zijl et al. (2010) investigate, within the same framework, whether temporary employment acts as a stepping stone into regular employment in the Netherlands. Gagliarducci (2005) does the same for Italy and Göbel & Verhofstadt (2008) for Belgium, focusing on school leavers. However, none of these studies have been able to distinguish between temporary agency employment and direct-hire temporary employment.

Houseman 2002, Jahn 2010a, Katz & Krueger 1999). In order to investigate whether agency employment might work particularly well for some subgroups, we contribute to the literature, third, by estimating heterogeneous treatment effects.

It is a well-known fact that the demand for temp workers moves pro-cyclically. If the labor market tightens, client firms use temp agencies not only to screen potential candidates to fill vacancies but also to buffer core workers in case demand declines in an economic downturn (e.g., Abraham 1990, Booth et al. 2002). Consequently, agency workers are the first to be laid off in a recession. We therefore test, fourth, whether the stepping-stone effect depends on the tightness of the labor market.

Fifth, this is the first paper to shed light on the human capital hypothesis outlined above by investigating whether conditioning on the number and cumulative duration of past treatments during the current unemployment spell affects the results. If workers can indeed increase their human capital or build up productive job search networks during different assignments, we would expect that the hazard rate for non-temp jobs would increase with treatment intensity.

Finally, we are interested not only in the causal effect on the job-finding rate for regular jobs, but also in the post-unemployment job and employment duration and in post-unemployment wages, i.e., whether temporary agency employment might improve several aspects of subsequent employment quality.

We find no evidence of a lock-in effect during treatment (i.e., while holding a temp job), and we find a fairly high positive post-treatment effect, increasing the transition rate into non-temp employment by about 19 percent for men and 7 percent for women. Moreover, our results indicate that both the in-treatment and the post-treatment effects are stronger in regions and periods with tight labor markets. In addition, we find that temporary agency employment has particularly large impacts on non-western immigrants and their descendants.

We provide also some evidence that the intensity of treatment affects the likelihood of finding a regular job; a larger number of weeks in treatment during the present unemployment spell decreases the job-finding rate during the current treatment, but increases the post-treatment job-finding rate. A similar result is found when we condition on the number of distinct temp jobs earlier in the unemployment spell.

Finally, we show that in Denmark, agency employment is a means to improve the quality of post-unemployment jobs, in terms of subsequent hourly wages, the duration of the first non-temp job after unemployment, and the total (uninterrupted) employment duration after unemployment.

The results of this paper may be of interest to policy makers, since temporary agency employment shows potential as an instrument of active labor market policy. Some US states have already experimented with such instruments. While some researchers have advocated the involvement of temporary agencies in job place-

ment programs (Lane et al. 2003, Andersson et al. 2009), the study by Autor & Houseman (2005) argues that such a policy recommendation may be premature. Our results may be taken as an indication that temporary agency employment could be used successfully as an instrument of active labor market policy if targeted at the right treatment groups at the right times.

The paper is organized as follows. A brief review of the empirical literature is provided in Section 2. Section 3 highlights key facts about the temporary help sector in Denmark. Section 4 presents the estimation strategy. Section 5 introduces the data set and presents the main descriptive statistics. In Section 6, we discuss the results, and in Section 7 we draw conclusions and provide a policy discussion.

2 Empirical Evidence

As outlined in the introduction, the theoretical impact of agency employment on the unemployed's employment outcomes is not clear-cut. As a result, a growing literature has emerged, attempting to identify the effects of agency employment on subsequent labor market outcomes. Yet even the empirical evidence is contradictory. No evidence of temporary work acting as a springboard into regular employment has been found so far for Germany (Kvasnicka 2009) or Spain (Amuedo-Dorantes et al. 2008). Malo & Muñoz-Bullón (2008) show that temp work tends primarily to affect married women, and García-Pérez & Muñoz-Bullón (2005) show that temp work only affects young, short-term unemployed workers in Spain. In Italy, the effect on labor market outcomes depends on the region in question (Ichino et al. 2008). In general, it seems that rigid European labor market institutions do not facilitate successful transitions from temp work into permanent work. The American evidence is somewhat more promising. However, due to the different institutional background there, most US studies concentrate on the earnings and employment stability of low-wage earners or recipients of income subsidies who enter the temporary help service sector. Overall, most studies suggest that temporary agency employment at least does not have any long-run negative effects on the outcomes of temp workers.³

To identify the causal effects of agency employment on the likelihood of obtaining a permanent job, the vast majority of studies use variants of the conditional independence assumption (CIA), and concerns remain about selection on variables that are unobservable (Autor 2009). The debate on whether the CIA may be violated has intensified since the study by Autor & Houseman (2005). Using a quasi-experimental setting, they show that moving participants into temporary help jobs increases their short-term earnings. However, these effects are offset by lower earnings, less frequent employment, and higher welfare recidivism over the subsequent two years.

³ For example, Lane et al. (2003), Andersson et al. (2005, 2009), Hamersma & Heinrich (2008) and Heinrich et al. (2009). The results of these studies are discussed thoroughly in Autor (2009).

Our study contributes to this debate by employing the timing-of-events approach to model the causal effect of temporary agency employment on various labor market outcomes. The advantage of this approach is that it exploits the random variation in the timing of the treatment to separate the time-varying treatment effects from the (assumed) time-invariant unobserved variables affecting both selection into temporary agency employment and the transition into regular employment.

3 Temporary Agency Employment in Denmark

Until 1990, the Danish temporary help sector was subject to comprehensive regulation. Since 1990, more or less all regulations on establishing and operating a temporary employment agency have been removed. Consequently, there is free market access for all agencies except those serving the health care and transportation sectors. In the latter two cases, agencies need authorization to operate and are required to employ staff with a medical background or a vocational degree in the transport sector, respectively.

Collective bargaining at the industry, agency, and user-firm level also plays an important role in determining the conditions for temporary agency employment in Denmark, often replacing legal regulations.⁴ About 80 percent of Danish temp workers are members of unemployment insurance funds, which are operated by unions. Generally, standard labor law applies when hiring a temp worker. Nevertheless, agency workers who are employed for less than six to nine months at the same job are not protected by the act governing the legal relationship between employer and employee (*Funtionærloven*) and are usually not eligible for employment benefits such as maternity benefits, vacation pay, leave to care for a sick child, or disability pensions, or the right to at least one month's notice of termination, which may adversely affect agency workers on shorter contracts.

Until recently, the temporary help sector was very small in Denmark. Temporary agency workers were mainly used to adapt the size of the workforce to fluctuations in demand and to temporarily replace permanent staff members who were on leave or sick. On the labor supply side, a lack of employment and income security, and frequent changes of working conditions, were among the reasons why most workers did not consider agency jobs to be attractive when alternative job offers were available.

This has changed dramatically. Since 1997, the temporary help sector has undergone impressive growth. The share of temporary agency workers (full-time equivalent) increased more than five-fold, from 0.2 percent in 1997 to 1.1 percent in 2007. This may be only the bottom line. If the share of temp workers is calculated as the

⁴ A comprehensive and detailed description of the system of collective bargaining in the Danish temporary help service sector can be found in Arrowsmith (2008).

number of persons who accepted a temp job, it totaled 1.7 percent of the workforce in 2007 (Windelin and Hansen 2007).

Despite the fact that large agencies dominate the temporary help market, the number of registered agencies has increased considerably, from 305 in 2005 to 623 in 2007 (Mølgaard and Hansen 2008). Until 2002, the health care sector dominated the temp industry, but since then, it has been overtaken by the manufacturing, construction, and transport sectors (Kudsk-Iversen & Andersen 2006). In 2007, the health care sector was responsible for 32 percent of total turnover in the temp industry; the industrial sector was responsible for 35 percent and the transport sector for 10 percent (Statistics Denmark 2009). As agency jobs have opened up in blue-collar occupations, the temporary help industry has become an increasingly important employer of less-skilled workers.

There are several reasons responsible for the spectacular growth of the Danish temporary help service sector: First, the deregulation of temporary agency employment in 1990 may have increased incentives to enter the market. Second, the temporary help sector may serve as a stepping stone into the Danish labor market, not only for the unemployed but also for groups such as East European immigrants: 13 percent of the “work and stay” permits issued since 2004 have been granted to East Europeans hired by temporary agencies (Andersen 2007). The growing pool of immigrants available for temporary agency employment may have attracted employers’ interest and demand in many sectors.

Third, as a consequence of the tight labor market in Denmark, client firms often faced bottlenecks when recruiting new workers. In response, temporary agencies specialized in identifying agency workers’ skills and matching them with the staffing needs of firms. This offers employers the advantage of reducing the effective hiring costs associated with hiring new employees, and also enables them to screen workers for direct-hire positions and improve subsequent match quality. The screening device hypothesis may play a particularly important role on the Danish labor market: during our observation period, the pool of unemployed comprised many workers who would have difficulties to find employment through normal search channels.

Fourth, temporary agency work is attractive to workers in the health care sector. According to anecdotal evidence, agency employment allows workers in the public health sector – especially nurses and doctors – not only to better determine their own working hours but also to bargain for higher wages. Jahn (2010b) shows that nurses employed through temp agencies indeed receive considerably higher wages than nurses employed in non-temp firms.

Finally, recent research has refuted the assumption that most Danish temporary agency workers are accepting temp jobs by choice. According to Pedersen et al. (2003) and Oxford Research (2003), most of the temp workers interviewed in their field studies had chosen this form of employment out of financial need or a desire to

escape unemployment. These findings, in combination with the increased share of low-skilled workers in this sector, have fueled the debate on whether temporary agency work improves or worsens unemployed people's labor market chances.

4 Econometric Strategy

The aim of this study is to investigate whether taking up a temporary agency job may be a bridge from unemployment to employment. Hence, our population of interest is individuals who have lost their jobs or who have otherwise become unemployed. Thus, we sample workers at the point in time when they enter unemployment and analyze how long it takes them to find non-temp work and whether having worked for a temp agency while they were unemployed accelerates this process. The duration modeled is therefore the time from becoming unemployed to finding a non-temp job. The take-up of temporary work during this period is considered the treatment, the effect of which we want to estimate.

As unemployed workers do not take up agency jobs at random, we have to distinguish the causal effects of temporary agency employment from selection effects. As outlined in Section 2, most European studies use the Conditional Independence Assumption (CIA) when analyzing the stepping stone effect of temporary agency employment. However, if there are unobserved variables influencing the selection process as well as the potential outcomes, the CIA approach will result in biased estimates. Albeit the data set at hand is quite detailed, it may be questionable whether the CIA holds as the motivation why unemployed workers would take up an agency job is a priori not obvious, as the discussion above shows.

An alternative econometric approach may therefore be a duration model, analyzing the time from inflow into unemployment until non-temp employment is obtained, taking into account the endogenous choice of workers to accept agency work. Such an analysis aims at estimating the causal effect of working in the temporary help sector on the duration of unemployment, or alternatively, on the exit rate from unemployment to regular employment. This is done by exploiting the timing-of-events approach formalized by Abbring and Van den Berg (2003). Exploiting random variation in the observed moment of transition from (full-time) unemployment to temporary agency employment, this approach is ideal for separating selection effects from causal effects.

4.1 The Timing-of-Events Approach

We consider being employed by a temporary agency during a spell of unemployment to be the treatment, and we then want to estimate the effect of this treatment on the exit rate from unemployment to employment, both during and after the treatment. Let T_u be a continuous random variable measuring the time from becoming unemployed to being hired into non-temp employment. Data on T_u are censored for those who remained unemployed until the last week of the observation period and

for those making transitions out of the labor force. The hazard rate into a non-temp job is assumed to be a Mixed Proportional Hazard (MPH):

$$\theta_u(t|x, d_1(t), d_2(t), v_u) = \lambda_u(t) \exp[x\beta_u + d_1(t)\gamma_1 + d_2(t)\gamma_2 + v_u] \quad (1)$$

The hazard function is specified as the product of a baseline hazard, $\lambda_u(t)$, depending on the elapsed unemployment duration, and a scaling function depending on observed variables, x , unobserved heterogeneity that accounts for possible selectivity in the exit process v_u , and two time-varying indicators, one for being in treatment, $d_1(t)$ (i.e., being employed by a temp agency at time t), and one for having been in treatment earlier, $d_2(t)$ (i.e., having been a temp during the current unemployment spell before t but not a temp at t). The coefficients γ_1 and γ_2 thus capture the in-treatment and post-treatment effects of temp jobs on the hazard rate into non-temp employment, respectively.

In the case of active labor market programs, one often observes that γ_1 is negative, i.e., that there is a lock-in effect. However, in the case of temporary agency employment, the sign of γ_1 is not obvious. On the one hand, while on assignment, the temp worker has less time to search for a job outside the temp sector. On the other hand, it is well known that client firms also use temporary agency employment as a screening device. This may be particularly true in Denmark, where the labor market is considered to have been tight during most of the observation period. In this case, agency workers who possess the relevant skills may receive an offer for a permanent job faster than comparable individuals conducting their job search from open unemployment.

If γ_2 is positive, it means that the skills or the network obtained during a temp job increases the subsequent chances of finding non-temp employment. On the other hand, a negative effect would normally be interpreted as some type of stigma. If temporary agency employment is to act as a bridge into non-temp employment, then either γ_1 or γ_2 (or both) should be positive.

We model the baseline hazard using a flexible, piecewise-constant specification:

$$\lambda_u(t) = \exp \left[\sum_l (\lambda_{u,l} I_l(t)) \right] \quad (2)$$

where $l = 0, \dots, 11$ is a subscript for the (11) time intervals measured in weeks and $I_l(t)$ are time-varying indicator variables for elapsed duration t . We split the analysis period during the first six months into monthly intervals. From the seventh month on, we split the time axis into quarterly intervals up to two years, after which the exit rate is assumed to be constant.

In order to allow an interpretation of γ_1 and γ_2 as causal effects, we have to take into account the potential endogeneity of temporary agency employment. Let T_p denote the time from becoming unemployed until the person finds a temporary agency job.

Note that we consider temp periods to be part of the unemployment spell, hence, if T_p is observed, it is shorter than T_u . Following the notation used above and specifying once again an MPH function, the transition rate into temporary agency jobs is specified as:

$$\theta_p(t|x, v_p) = \lambda_p(t) \exp[x\beta_p + v_p]$$

The unobserved random variables, v_u and v_p , are allowed to be correlated, which implies a correction for the potential endogeneity of the treatment status.

Note that random variation in the timing of the beginning of the treatment identifies the causal effect of the treatment under the assumption that unobserved characteristics are time-invariant and that there is no anticipation of treatment.⁵ Their distribution is approximated non-parametrically by a bivariate discrete distribution with M mass points (Heckman & Singer 1984 and Gaure et al. 2007). Moreover, note that due to the random variation in the timing of treatment, no exclusion restriction is necessary to identify the parameters of this model non-parametrically. The only assumption necessary, beyond the assumption of mixed proportionally hazards, is one of non-anticipation; that is, the individual is not supposed to know in advance the exact starting date of the agency job, only its probability distribution. This assumption is crucial to rule out changes in behavior before the actual treatment takes place. As long as the individual does not know the exact starting date too long in advance, this is generally not perceived as a problem. In the case of temporary agency jobs, where workers are often called the same morning that the job begins, this is hardly a large problem.

Let C_i be a non-censoring indicator that takes the value of 1 if spell i was completed by a transition into a non-temp job before the end of the observation period, and zero otherwise. The likelihood function for individual j with N unemployment spells is specified as,

$$L(v_u, v_p) = \prod_{i=1}^N L_i(v_u, v_p)$$

where

$$L_i(v_u, v_p) = \theta_p[t_{pi}|x_i, v_p]^{I[t_{pi} < t_{ui}]} \theta_u[t_{ui}|x_i, d_1(t_{ui}), d_2(t_{ui}), v_u]^{C_i} \\ \times \exp \left\{ - \int_0^{t_{pi}} \theta_p[s|x_i, v_p] ds - \int_0^{t_{ui}} \theta_u[t|x_i, d_1(t), d_2(t), v_u] dt \right\}$$

⁵ With multi-spell data, identification does not depend completely on the proportionality assumption when we assume the unobserved heterogeneity term to be constant over time for each individual (Abbring & Van den Berg 2003). Furthermore, the proportionality assumption is not needed for identification provided that we observe a sufficient amount of variation in covariates over time and across observations (Brinch 2007, Gaure et al. 2007).

In all estimations performed, we first estimate the model without unobserved heterogeneity, and then we proceed by adding additional points of support to the distribution of unobservables until the likelihood does not improve enough to satisfy the Akaike Information Criterion. This procedure typically results in about six support points in the final estimation. Parameter estimates of treatment effects typically start to stabilize after the third or fourth support point has been added.

4.2 Modeling Heterogeneous Effects

We estimate heterogeneous effects by allowing the effects to depend on the observable characteristics, and we assume that all heterogeneity is captured in this way. Conditional on observables, the effects are assumed to be homogenous, and hence, we do not have to distinguish between the average treatment effect on the treated and the average treatment effect as long as we condition on observable characteristics (Heckman et al. 1999).

To estimate heterogeneous effects of temporary agency employment, we augment the set of characteristics by including interaction terms between a subset of the characteristics, x^s , and the two treatment indicators $d_1(t)$ and $d_2(t)$. This implies that the effect of agency employment is allowed to vary with these characteristics. Apart from a larger set of parameters, the estimation procedure is as before, and the hazard function out of unemployment to employment can be written as

$$\theta_u(t|x, d_1(t), d_2(t), v_u) = \lambda_u(t) \exp[x\beta_u + (1 x^s)d_1(t)\gamma_1 + (1 x^s)d_2(t)\gamma_2 + v_u] \quad (2)$$

Where $(1 x^s)$ is a $(K+1)$ vector of characteristics, and γ_1 is a $(K + 1)$ parameter vector, and similarly for γ_2 .

Moreover, we test whether the treatment is more effective when labor markets are tight, as we have hypothesized. This is done by interacting the treatment dummies with the local unemployment rate.

Finally, we investigate how the treatment effects depend on the treatment intensity. We construct two measures of treatment intensity; the first is a time-varying variable, which measures, at elapsed duration t , the number of temp jobs held during the unemployment spell up until time t . The second variable is also time-varying, and it measures the accumulated number of weeks spent in treatment until time t .

4.3 Modeling Post-Unemployment Outcomes

In the next step, we extend the basic timing-of-events model by looking beyond the unemployment spell at some indicators of job quality. We want to investigate whether holding a temp job affects the hourly wages in the subsequent job and the duration of that job spell and employment spell, where an employment spell is defined as a sequence of non-interrupted job spells.

For wages, we try two different approaches; first, we distinguish between transitions into employment that pay better than the pre-unemployment job and transitions to regular jobs that pay worse or the same as the pre-unemployment job. To do so, we separate the transition rate to employment into (1) the hazard rate into a better-paying job (than the one held before unemployment) $\theta_b(t|x, d_1(t), d_2(t), v_b)$ and into (2) the hazard rate into a worse or equally paying job $\theta_w(t|x, d_1(t), d_2(t), v_w)$. For some individuals, we do not observe the pre-unemployment wage, and in this case, the exit rate from unemployment to employment used in the likelihood function is the sum of $\theta_b(\cdot)$ and $\theta_w(\cdot)$. These two destination specific hazard rates are both specified as MPH's as in equation (1) above. The treatment parameters in $\theta_b(\cdot)$ provide information on how the probability of leaving unemployment for a better-paying job is affected by a temp agency spell, that is, if treatment improves the chances of obtaining a better-paying job when compared to non-treatment.

An alternative approach is to model the post-treatment wage explicitly by specifying a log-normal distribution for the post-unemployment wage, that is,

$$f(w|x, v_w) = \frac{1}{\sigma} \cdot \varphi\left(\frac{\ln w - x\beta_w - v_w}{\sigma}\right),$$

where $\varphi(\cdot)$ denotes the pdf of the standard normal distribution. The parameters of this model are then estimated jointly with those of the model specified in section 4.1, extending the distribution of unobservables to be trivariate. The advantage of this specification is that we are able to present estimates of the size of the wage advantage or disadvantage compared to the control group as well.

Moreover, within the same framework we evaluate the effects of temporary agency employment on subsequent job and employment stability. First, we analyze the impact of temporary agency employment on the duration of the first non-temp job, starting immediately after unemployment exit. A job spell is defined as the number of consecutive weeks in employment with the same employer. Second, we perform the same analysis with respect to the employment stability, analyzing the duration of uninterrupted employment, which may consist of a sequence of job spells. Denote by T_j and T_e the job and employment duration, respectively. The hazard rate out of job or employment is also specified as an MPH:

$$\theta_i(t|x, d_1, d_2, v_i) = \lambda_i(t) \exp[x\beta_i + d_1\gamma_{1i} + d_2\gamma_{2i} + v_i], \quad i = e, j$$

Note that here the two treatment indicators d_1 and d_2 are time-invariant, since they measure whether the person made a transition into a non-temp job directly from a temp job ($d_1 = 1$) or from open unemployment following a temp job ($d_2 = 1$). Once again, the model of the likelihood function in section 4.1 is extended to include the contribution to the likelihood function from the job or employment duration model, that is, we jointly estimate employment (or job-) duration, unemployment duration,

and the duration until a temp job (the treatment). Unobserved variables in all hazard rates are allowed to be correlated, as in the basic model.

5 Data Sources and Descriptive Statistics

Our empirical analysis is based on two rich sets of Danish register data. Our primary data set is an extract from a matched employer-employee data set, which contains weekly information on all persons aged 16 to 75 living in Denmark. The data set is compiled from a variety of sources maintained by Statistics Denmark. It records all transitions between employment, unemployment, participation in programs of active labor market policy, and being outside the labor force, and it also provides accurate information on the establishment in which the worker is employed and the hourly wages in the current job. To this data set, we match additional socio-economic information available from the Integrated Database for Labour Market Research (IDA), which is also maintained by Statistics Denmark. As the combined data set allows us to construct the (un-)employment careers of workers, which is exact to the week, it is especially suitable for performing duration analyses. Due to its administrative nature, the data set can be considered highly reliable.

Nevertheless, the data set has one minor limitation: we can identify employment spells in temporary help agencies only by an industry classification code. This implies that temp workers cannot be distinguished from the permanent administrative staff of temporary employment agencies. However, we do not expect that this affects our estimations, since the absolute number of the permanent staff members in the data set is likely to be small, and we concentrate our analysis on temp workers who were unemployed before accepting the temp job.⁶

For the analysis, we use all individuals aged 16 to 60 who were employed by a temp agency at least once during an unemployment spell starting in the period 1997 to 2006, and a two percent random sample of all other individuals aged 16 to 60 starting an unemployment spell during the same period. There is also information available for the period 1994 to 1996, and this is used to construct the previous employment history of the job-seekers.

An unemployment spell is defined as a sequence of weeks during which a person receives either UI benefits, is in some type of active labor market policy program, or is employed at a temp agency. Thus, agency employment is treated as a part of the unemployment spell in order to enable the counterfactual analysis. Unemployment spells continuing until the end of the sample period are treated as independently right-censored observations (about 3.9 percent of all spells).

⁶ For Germany, Antoni and Jahn (2009) provide evidence that permanent agency staff members account for about 7 percent of the stock of all workers identified as temp workers via the industry classification code. In the inflow to temp jobs from unemployment, this ratio is likely to be considerably lower, since the staff of temp agencies obviously experience fewer transitions into and out of jobs than the temp workers themselves.

The dependent variable is the unemployment duration measured in weeks. The two explanatory variables of interest are the time-varying indicator of being employed as a temp worker, and the time-varying indicator of having been employed as a temp worker at a previous time during the current unemployment spell. We define the destination “regular employment” as non-temp employment and self-employment.⁷

In order to concentrate on workers who accept an agency job because of a lack of alternatives outside the sector, the following selection decisions are made. First, our treatment group only includes temp workers who received unemployment insurance benefits or unemployment assistance before entering temp employment.⁸ Second, we only include temp spells if the temporary agency job is the primary job. By making this selection, we are able to exclude those who take temp work to increase their income. Third, unemployed job-seekers often try to escape unemployment by upgrading their education, but do temp work at the same time to augment their income. Since their motivation might not be primarily to find employment outside the sector, we exclude all previously unemployed temps who are attending formal education. Fourth, as mentioned earlier, there is some evidence that the reason for accepting a temp job in the health sector may be driven mainly by income motives. Therefore, we exclude all individuals who are educated as nurses or as medical doctors.

Finally, we exclude temp workers who hold top management positions, as it is likely that they belong to the permanent staff of the agency. For the same reason, we exclude temp workers with a temp spell lasting more than one year. After this sample selection, the sample consists of 75,632 individuals experiencing a total of 260,672 unemployment spells.

We present all results separately by gender, as the kind of jobs vary considerably between these two groups. While men are mainly assigned to the construction and manufacturing sector, women are more likely to be found in the trade and service sector.

In addition, the following socio-demographic variables are used: age (5 categories), single or not, ethnic origin (5 groups), child in the household, child below age of 7 in the household, and a dummy variable that indicates whether the partner is employed. In addition, we have five educational variables, information on the UI fund (nine occupation/industry-related funds), and a dummy variable that indicates whether or not the worker is a member of a UI fund, which implies that the worker receives unemployment assistance.

⁷ One might argue that self-employment (out of unemployment) is often as precarious as temporary agency jobs. We therefore estimated the model defining the destination only as salary or wage employment. The results are nearly identical to those reported in Table 1 and are available upon request.

⁸ This decision is also motivated by the fact that the model implemented cannot deal with selection at time zero.

As a proxy for the human capital of the worker, we use the employment history of the past three years: previously employed (in the temporary help sector, self-employed, or in regular employment, the latter of which is the reference category), sick, or out of the labor force. Moreover, we control for the total fraction of time spent in employment during the past three years, the number of temp and regular jobs held, and the number of programs of active labor market policy that the worker attended during the past three years. Finally, we include dummies for the year and quarter of entry into the current unemployment spell as well as the regional unemployment rate (based on 14 counties). All controls, except for the two main explanatory variables, are measured at the beginning of the unemployment spell and will be treated as time-invariant regressors, which are fixed for each single spell but can vary over different spells for the same person.

Table 1: Overview of events and outcomes

	Men		Women	
	Temp	Non Temp	Temp	Non Temp
Number of unemployment spells	11,224	112,205	14,249	122,994
Number of persons	3,824	31,810	5,557	34,441
Share right-censored spells	2.82	4.07	2.92	3.86
Median unemployment duration in weeks	33.00	10.00	32.00	9.00
Median duration of agency spell	6.00		5.00	
Median time until first accepting a temp job	11.00		10.00	
Mean number of agency spells	1.43		1.74	
Share of workers with more than one treatment	24.79		32.62	
Percent of unemployment spells ending in employment	76.67	61.18	78.80	65.97
Mean wage before unemployment (DKK)	122	129	121	122
Mean wage after unemployment (DKK)	126	132	120	125
Median job stability in weeks (completed)	22	11	32	7
Median employment stability in weeks (completed)	36	25	52	14

Table 1 presents an overview of events and outcomes for the treated and the untreated group separated by gender. As there are only small differences between men and women, we report in the following the results for the pooled sample. The observations refer to unemployment spells, not to individuals. Of the 260,672 unemployment spells, 25,473 involve at least one temporary agency work spell. Clearly, there are strong differences in the median duration of unemployment. Median search for a regular job lasts about 10 weeks for the untreated group and 33 weeks for individuals who experienced a temp spell during unemployment. The median (mean) time until first accepting an agency job is about 10 (21) weeks. The median (mean) duration of a temp spell is about 5 (9) weeks and the average number of separate temp spells (separated by unemployment) during a given unemployment spell is 1.6; 7,430 or about 29 percent of the unemployment spells of the treated group experienced more than one temp job during the unemployment spell. Table 1 also shows that 77 (79) percent of the male (female) treated group ultimately ended

up in regular employment. This is only the case for 61 (66) percent of the comparison group.

The sample statistics reveal that there are only minor differences in terms of background characteristics between the treated and the untreated.⁹ Women are more likely to experience a temporary agency spell during unemployment and they are slightly older (36 years of age) than their male counterparts (33 years of age). The treated are on average about one year younger than the untreated, and are more often single (76 vs. 73 percent for men and 62 vs. 56 percent for women). Among the immigrants, only the first-generation non-western immigrants appear underrepresented among the treated. However, compared to the national average, immigrants are overrepresented in the pool of unemployed. During the observation period, the mean regional unemployment rate was about 5.9 (standard deviation 1.4). As a consequence of the tightness of the Danish labor market, the educational attainment of the unemployed is low. On average, 47 percent of workers do not have any vocational training or further education. Compared to the untreated, the treated group is slightly better qualified, indicating that some qualifications might be an advantage in finding even temp jobs.

Regarding the previous employment history of the unemployed, the differences are more pronounced. The treated group held on average 0.8 temp jobs during the past three years before becoming unemployed, while the untreated held on average only 0.4 temp jobs. About 51 percent of the untreated were previous to the unemployment spell regular employed, while this was only the case for 37 percent of the treatment group.

6 Results

6.1 Empirical Hazards and Selection into Treatment

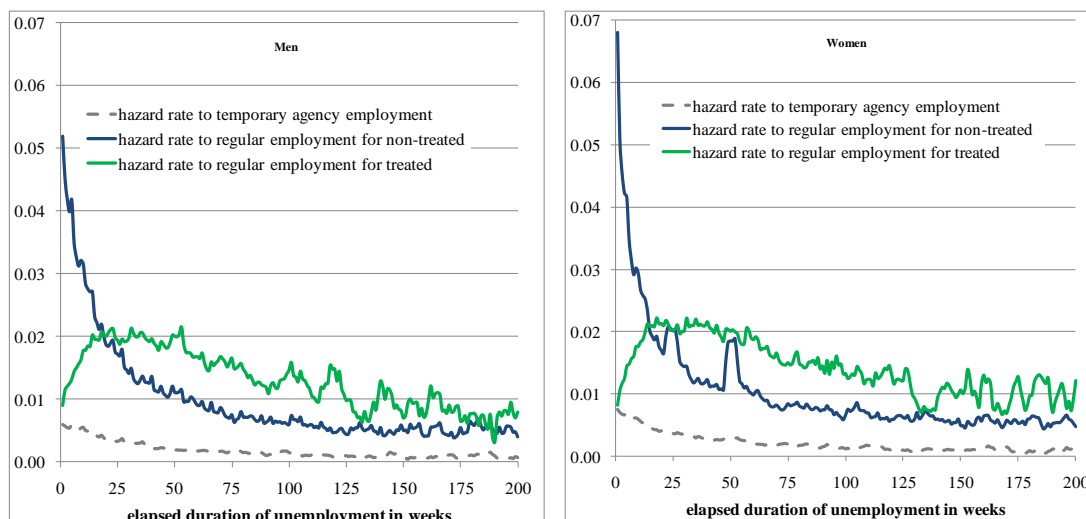
Figure 1 shows, first, the Kaplan-Meier estimates of the transition rate from unemployment to temporary agency employment as a function of elapsed unemployment duration; second, the hazard rate from unemployment to regular employment for unemployed who did not hold a temp job during unemployment (the untreated); and third, the hazard rate to regular employment for the treated individuals. All durations are measured from the time of unemployment entry in weeks.

The hazard rate to temporary employment measures the probability of entering temporary employment in the next week for those who are unemployed at the beginning of each week. As stated in Section 4, a key identifying assumption is that we observe some exogenous variation in the time until being treated. Figure 1 shows that there is indeed a great deal of variation in these durations. The hazard rate to

⁹ The sample statistics can be found in Table A1. Table A2 informs about the number of cases excluded for the above-mentioned reasons. Basically, we could not find major differences between the selected and the full sample.

agency employment for men starts at about 0.6 percent per week and decreases over the first year of unemployment to a level of around 0.2 percent. The hazard rate to agency employment for unemployed women starts at a slightly higher level (0.7 percent) and, similarly to the hazard rate for the men, decreases gradually during the first year of unemployment to 0.3 percent.

Figure 1: Smoothed Kaplan Meier hazard rates out of unemployment to employment and temp jobs



The hazard rates to regular employment for the untreated start at a level of 5 percent for men and 7 percent for women and gradually decrease thereafter. Interestingly, the hazard rate to employment jumps up after one year for women, with an additional bump after 6 months. One reason may be that Denmark uses instruments of active labor market policy quite intensively. After one year (26 weeks for young workers and workers above 60), participation in active labor market programs becomes compulsory.

Finally, Figure 1 displays the hazard rates to employment for the treated unemployed. The exit rate for the treated starts, by construction, very low (since they have a treatment period before leaving unemployment), peaks at about 2 percent after 26 weeks of job search have elapsed, stays constant for another 6 months, and tapers off gradually to the original value of just 1 percent per week after 120 weeks of elapsed unemployment duration. Moreover, after six months, the exit rate for the treated lies well above the hazard rate for the non-treated. This pattern suggests that the dynamics of the job search process are important, as conditioning on unemployment duration is obviously crucial when estimating treatment effects - the treated are found among those who did not find a regular job shortly after becoming unemployed. Moreover, it suggests that taking into account the dynamics of the selection process is important as well. It also implies that either there is a fairly strong treatment effect, or that the treated and untreated differ considerably in observable or unobservable ways.

Results of the selection equation (time until a temp job) and the main equation (time until ordinary employment) are shown in appendix Table A3 for the model with homogenous treatment effects and six support points. For the sake of brevity, we will not report these in any detail, but we will briefly mention the main patterns in the selection equation.

First of all, duration dependence in the selection equation is slightly hump-shaped, with a peak at 12-16 weeks for men and at 8-16 weeks for women. Young workers below the age of 24 have a much higher transition rate to temp jobs than older workers. Workers aged 45 or more have a considerably lower transition rate into temp jobs than those between 25 and 44. Living with a working partner in the household (married or not) is associated with a higher probability of receiving treatment compared to all other family status categories. Women with children have a lower transition rate into treatment, especially if there is a child below seven years of age in the household.

The transition rate into temp jobs for non-western immigrants is considerably lower than for Danes and western immigrants. Moreover, we find that the least skilled workers, without any formal educational qualifications, are much less likely to take temp jobs than those with vocational or short academic education. Unemployed workers with a master's degree or higher are the least likely to take temp work. Finally, the transition rate into temporary work increases with the fraction of time the person was employed during the past three years.

6.2 Unobserved Heterogeneity and Treatment Effects

In order to estimate homogenous treatment effects across individuals, we proceed as follows. We first estimate a basic duration model with flexible baseline, no unobserved heterogeneity, no selection, and only the two main explanatory variables (in-treatment and post-treatment). Second, we estimate the same model but adding the covariates described in Section 5. Third, we estimate the full timing-of-events model, starting from a two point distribution of unobservables. These first three models indicate that there are significant positive in-treatment effects as well as post-treatment effects.¹⁰

We proceed, next, by estimating the same model, allowing sequentially for extra mass points as described in section 4.1, freeing up the correlation structure of the unobservables. We add mass points as long as the Akaike Information Criterion improves (see, e.g., Gaure et al. 2007). It turns out that the in-treatment and post-treatment coefficients barely change after adding three to four mass points. The results after adding approximately six support points, which is most often the optimal number, are in Table 2.

¹⁰ The results are provided in Table A4.

There are no significant in-treatment effects, which mean that currently working for a temp agency does not significantly affect the transition rate to non-temp employment on average, when compared to a similar person in open unemployment. On the other hand, having worked for a temp agency at least once earlier in the same unemployment spell causes a significant increase in the hazard rate to ordinary employment of almost 20 percent for men and about 7 percent for women. Since this is a multiplicative effect, and since the expected duration of remaining unemployment duration after completion of a temp job is a probability-weighted average (over all possible exit times) of the inverse of the exit rate to ordinary employment, the implication is that the remaining unemployment spells are shortened by about 20 percent for men, and by about 7 percent for women.¹¹

Table 2: Treatment effects

	Men				Women			
	In-treatment coeff.	Post-treatment se	coeff.	se	In-treatment coeff.	Post-treatment se	coeff.	se
Homogenous Treatment Effects	-0.015	(0.015)	0.178	(0.022)	-0.007	(0.014)	0.065	(0.019)
Heterogeneous Treatment Effects								
Foreigner								
Treatment (ref: natives)	-0.025	(0.015)	0.165	(0.023)	-0.014	(0.015)	0.057	(0.019)
Treatment* west 1st	0.047	(0.084)	0.037	(0.107)	-0.002	(0.086)	0.192	(0.103)
Treatment* west 2nd	0.370	(0.130)	0.460	(0.207)	0.324	(0.164)	0.452	(0.226)
Treatment* non west 1st	0.131	(0.063)	0.225	(0.078)	0.229	(0.452)	0.346	(0.112)
Treatment* non west 2nd	0.379	(0.130)	0.450	(0.201)	0.433	(0.172)	0.440	(0.237)
Education (edu)								
Treatment (ref: low edu)	0.087	(0.021)	0.203	(0.029)	0.026	(0.022)	0.062	(0.027)
Treatment*vocational edu	-0.225	(0.027)	-0.050	(0.040)	-0.054	(0.027)	0.003	(0.032)
Treatment*short academic edu	-0.012	(0.056)	-0.002	(0.082)	0.074	(0.044)	0.097	(0.055)
Treatment*medium academic edu	0.003	(0.073)	-0.006	(0.097)	-0.190	(0.048)	-0.020	(0.063)
Treatment*long academic edu	0.012	(0.128)	0.019	(0.171)	0.009	(0.075)	0.094	(0.097)

Notes: Bold coefficients are statistically significant at least at the 5 percent level. The distribution of the unobservables is approximated non-parametrically by a bivariate discrete distribution with six mass points. In addition, the model includes indicators for the year and quarter of entry into unemployment, for the number of temporary agency jobs (1, 2, 3-4, more than five), the number of regular jobs (1, 2, 3-4, more than five) during the past three years, indicators on how often the worker participated in programs of active labor market programs during the past three years (1, 2-3, more than 4), the yearly regional unemployment rate (based on 14 regions), dummy variable indicating whether the workers was previously out of the labor force, or sick, and parameters for the distribution of the unobserved characteristics.

Table 2 also presents results for the models with heterogeneous treatment effects, providing a deeper analysis of how in-treatment and post-treatment effects vary among unemployed job-seekers from different ethnic and educational backgrounds.¹²

Turning first to the results on immigrant status, Table 2 shows that treated immigrants, especially those of non-western origin, leave unemployment considerably

¹¹ As a robustness check, we run the model on the full sample as well. The exclusion of nurses, students, and top managers in the baseline model does not fundamentally affect our results. The lock-in effect becomes significant and the hazard rate shifts up. As described in Section 3, this result is somewhat expected because of the peculiar role the temporary help service industry plays in the health sector in Denmark.

¹² Results for further subgroups can be found in the appendix, Table A5.

faster than the untreated, with exit rate increases between 15 and 85 percent. This is the case both during and after treatment.

As for the educational groups, we observe that for most male groups, the in-treatment effect is actually positive, increasing the exit rate to ordinary employment by around 9 percent, the exception being men with vocational training who have a lock-in effect of 13 percent.¹³ For women, significant lock-in effects are observable for unemployed with medium academic education (17 percent), while there are no significant in-treatment effects for the rest of the educational groups. The post-treatment effect appears significantly positive for all educational groups.

To sum up, the considerable positive in-treatment effects, in particular for the immigrants and the least-skilled men, are an indication that firms use temp employment as a screening device in a tight labor market, where high-ability workers are costly to spot. In general, the post-treatment effects for women are somewhat lower than those for men. It would certainly seem valid to conclude that temporary agency employment does no harm to unemployed workers, neither during nor after the temp job. Conversely, it seems that for most subgroups, temporary agency employment significantly reduces the remaining time spent in unemployment and thus serves as a stepping stone to employment. Only for very few groups is the evidence mixed in the sense that temporary agency work has a lock-in effect while doing temp work, reducing the transition rate into ordinary jobs, but also has a positive post-treatment effect.

6.3 Effects of Labor Market Tightness and Treatment Intensity

Why is temporary agency work in Denmark such a successful strategy for escaping unemployment, while it hardly works at all in other European countries? One explanation could be that the tightness of the Danish labor market is “responsible.” As outlined in Section 3, the unemployment rate during our observation period was rather low. Consequently, firms had difficulties finding qualified workers. According to anecdotal evidence, there was fierce competition between firms to find qualified workers, and firms even lured qualified workers away from competitors by offering generous fringe benefits. Therefore, it is plausible that agencies specialized in identifying job-seekers in the pool of unemployed in order to meet the staffing needs of user firms. At the same time, user firms employed these workers first as temporary agency workers in order to screen them before hiring them to take permanent positions. Despite the rather lax employment protection in Denmark, this might be an optimal strategy since it allows firms to avoid both large turnover costs and negative reputation effects if these workers do not prove to match the requirements or if demand declines.

¹³ Calculated as $(\exp(0.0870 - 0.2252) - 1)$.

In order to examine whether the labor market tightness or the business cycle might have some explanatory power, we included an interaction term in the basic model between the time-varying treatment indicators and the deviation of the local unemployment rate from the mean unemployment rate of 5.7 during our observation period. The results are reported in Table 3.

Table 3: The effect of labor market tightness and repeated treatments

	Men				Women			
	In-treatment coeff.	se	Post-treatment coeff.	se	In-treatment coeff.	se	Post-treatment coeff.	se
Unemployment rate								
Treatment (ref: mean u-rate)	0.002	0.015	0.185	0.022	0.002	0.015	0.195	0.023
Treatment* (urate - mean urate)	-0.073	0.010	-0.032	0.014	-0.069	0.010	-0.030	0.014
Accumulated duration of agency jobs in weeks								
Treatment	0.010	0.015	0.168	0.028	0.030	0.014	0.138	0.023
Treatment* (weeks in agency jobs)	-0.009	0.002	0.007	0.002	-0.013	0.002	0.004	0.002
Number of treatments								
Treatment (ref. one treatment)	0.142	0.050	0.098	0.042	0.024	0.046	0.171	0.039
Treatment*(two treatments)	-0.087	0.087	0.091	0.068	-0.055	0.070	0.124	0.056
Treatment*(three treatments)	-0.180	0.100	0.118	0.090	-0.055	0.070	-0.042	0.058

Notes: Bold coefficients are statistically significant at least at the 5 percent level. In addition the model includes the same indicators as described in Table 2.

Table 3 reveals that there is indeed a significant lock-in effect visible in regions and/or periods with above-average unemployment rates and positive in-treatment effects in low-unemployment regions (or periods). An unemployment rate one percentage point above the average implies a lock-in effect of about 7 percent. Low unemployment rates, on the other hand, lead to similar positive in-treatment effects. In addition, the post-treatment effect falls by about 3 percent if the regional unemployment rate is one percentage point above-average. This result may be taken as additional evidence for the screening device hypothesis and/or as evidence that the stepping-stone function of agency work is strongly procyclical.

According to the proponents of the stepping-stone effect of agency work, job-seekers can improve their human capital while being on assignment, while critics point out that the human capital effect may be low. Whether there are human capital effects responsible for the successful transition into employment cannot be tested directly. However, one way to approach this question is to investigate whether the number of treatments earlier in the unemployment spell or the cumulative duration of treatment might increase the likelihood of finding ordinary employment. Table 3 reveals that the hazard rate into ordinary employment while in treatment decreases with the total number of weeks in treatment in the past (during the current unemployment spell), while the post-treatment hazard rate increases with the (accumulated) number of past weeks in treatment. This could suggest that some individuals like their temp jobs and therefore tend to stay. At the same time, the positive treatment effect might indicate that longer treatments might indeed improve the human capital and therefore increase the likelihood of exiting unemployment to permanent jobs.

Conditioning instead on the number of distinct temp job spells earlier in the unemployment spell reveals that there are no significant effects for men, but it seems that the hazard rate increases considerably for women with at least two treatments. Considering both results together it seems that apparently the (accumulated) duration of the temp spells may be more decisive than the number of treatments. One possible explanation could be that human capital can only be accumulated if the worker is employed for a longer period, but that experience in different firms - which expands the worker's professional network - is advantageous primarily for female temps.

Summing up, we find strong procyclical treatment effects, suggesting that labor market tightness may be decisive not just for the size but also for the sign of the impact of taking a temp job during unemployment. Moreover, we find some suggestive evidence of human capital effects or network effects of taking a temp job.

6.4 Post-Unemployment Wages, Job Stability, and Employment Stability

Despite the positive results presented until now, one might still worry that subsequent job quality, as measured by job or employment stability or by the level of hourly wages, is worse for the treated unemployed who found a regular job after leaving unemployment. One reason might be that having held a temp job may be interpreted as a negative signal by prospective employers, causing them to offer lower wages or less stable jobs. In this section, we investigate the effect of temporary agency employment on the quality of jobs found. In order to investigate the effect on post-unemployment wages, we proceed in two ways. First, we define that a worker experiences upward mobility if the job found after leaving unemployment pays more than the job prior to entering unemployment. If the job pays the same or less, then the worker experiences downward mobility. As job-seekers enter unemployment from a different labor force status, we only consider pre-unemployment wages if the worker has been employed at least three weeks before entering unemployment and if the job-seeker found wage and salary employment three weeks after leaving unemployment.¹⁴ As noted in Section 4, addressing this issue with the timing-of-events approach requires specifying a competing risks model that takes into account the joint determination of experiencing a temporary agency employment spell and the hazards of leaving unemployment for a better or worse-paid job compared to the wages before entering unemployment. Second, we specify a log-normal wage equation for the post-unemployment wage, as described in Section 4.

Table 4, which reports the results for post-unemployment wages, shows that unemployed persons who found a job while working for an employment agency are much

¹⁴ Employers report the gross earnings of their employees for the period the worker has been employed, but at least once a year. The wage refers to the average hourly wage during the notification period. Note that the data set does not report income of the unemployed that leave unemployment for self-employment.

more likely to earn a higher wage and much less likely to earn a lower wage. The hazard rate into better jobs increases by 56 percent for men and by 53 percent for women. Presumably, this reflects, at least to some extent, a screening mechanism by which temps are hired into permanent jobs by the firms where they are temping.

If the unemployed job-seeker finds a job after having completed a temp job, then they are not less likely to get a job paying a higher wage but more likely to get a job paying a lower wage (59 percent for men and 45 percent for women) than those who did not previously hold a temp job. The upward shift in the hazard rate into worse-paid jobs after the worker has left the employment agency suggests that treated job seekers are becoming less selective in terms of the jobs they are willing to accept than they were before unemployment. There may be two reasons for this result: first, the reservation wages might decrease if the treated do not receive a job offer from the client firm immediately. A second interpretation may be that leaving a temp job unsuccessfully, that is, without a permanent job offer, may be interpreted by employers as a signal of low productivity. It could be, therefore, that future employers offer these individuals lower wages than other workers would receive.

Table 4: Temporary agency employment and post-unemployment wages (immediately after unemployment)

	Men		Women		Men		Women	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Better wages:								
In-treatment effect	0.443	(0.022)	0.425	(0.021)				
Post-treatment effect	0.059	(0.033)	-0.008	(0.029)				
Lower wages:								
In-treatment effect	-0.316	(0.025)	-0.200	(0.023)				
Post-treatment effect	0.461	(0.039)	0.371	(0.031)				
Wage increase:								
In-treatment effect					0.060	(0.010)	0.039	(0.009)
Post-treatment effect					0.010	(0.015)	-0.012	(0.012)
Mean log-likelihood	-2.912		-2.793		-3.137		-3.007	
N	146,987		176,316		146,987		176,316	

Notes: Bold coefficients are statistically significant at least at the 5 percent level.

Moreover, we estimated the effect of the treatment on the post-unemployment wage directly. Here, we did not control for the previous wage, as this is only observed for those who were employed immediately before becoming unemployed. All variables included in the hazard rates, however, were also included in the wage regressions. The results in the lower part of Table 4 repeat, first of all, the results found in the competing risks model: only workers who exit unemployment while in treatment are able to increase their wages, while there is no significant effect for workers who find employment after treatment (the post-treatment effect). The results indicate that female workers receive on average wages that are about 4 percent above the wages of comparable untreated workers. For men, the effect is even more pronounced: their jobs pay 6 percent more than those of the untreated.

In a final step, we analyze the causal effect of having had a temporary agency employment spell during the unemployment spell on the subsequent job and employ-

ment duration. First, as a short-term indicator, we use the stability of the subsequent job immediately after leaving unemployment. As with post-unemployment wages, this variable again may be taken as an indicator of whether the match quality in the first job improves.

As a long-term outcome, we use, second, employment stability, measuring the number of weeks a person is employed after leaving unemployment, defined as the number of weeks employed without interruption after leaving successful unemployment - that is, unemployment terminating in a job offer. In this case, workers are allowed to switch jobs.¹⁵

Table 5: Temporary agency employment and job and employment stability

	Employment stability				Job stability			
	Men		Women		Men		Women	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
In-treatment	-0.002	(0.028)	-0.052	(0.025)	-0.029	(0.027)	-0.048	(0.024)
Post-treatment	0.021	(0.042)	0.062	(0.035)	-0.013	(0.040)	0.028	(0.033)
Mean log-likelihood	-3.869		-3.779		-3.808		-3.737	
N	146,987		176,316		146,987		176,316	

Notes: Bold coefficients are statistically significant at least at the 5 percent level

Table 5 reports results from a set of models where the basic model is extended to include either subsequent employment or job duration. The results show that having had a temp job during unemployment has only negligible impacts on subsequent employment and job stability. Only the coefficient for the in-treatment effect for unemployed women is significant, implying that women who find a job while in treatment have longer job and employment durations. This picture confirms the results of the post-unemployment wages. The reason may be that client firms often use temporary agency employment as a screening device. If the temp worker proves to be productive, then the client firm may hire the former agency worker directly. As the client firm already knows the true productivity of the worker, theory would predict that the worker-job match is of higher quality and, consequently, that subsequent job duration is longer for those who received a job offer during or directly after the temp job.

To sum up, those who find a job while in treatment increase their post-unemployment wages and also experience longer post-unemployment job and employment durations; that is, temp jobs tend to improve subsequent job quality.

¹⁵ The employment career is considered as uninterrupted as long as there are no gaps lasting longer than three weeks. The reason for this decision is that there may be reporting gaps if a worker ends or starts a new job in the middle of the week. Moreover, the data reveal that reporting gaps increase during the summer vacation period. The likely reason is that workers with job changes during the summer often have a period of vacation typically lasting three weeks before they start a new job. As a robustness check, we allowed a reporting gap of only one week, which did not change the general results.

7 Conclusion

The rapid growth of temporary agency employment in Denmark has led to doubts as to whether this form of employment is a desirable way of increasing labor market flexibility, as employment protection in Denmark is already low and flexibility is high. This holds the more as agency jobs do provide lower social and employment benefits than other jobs. Nevertheless, temporary agency work may have potential as a means of integrating workers who would otherwise have problems finding employment on their own. On the other hand, there is a risk that these are dead-end jobs. Answering this question for workers who enter agency employment after a period of unemployment is of special interest, since this group might be the most vulnerable with respect to their future employment prospects.

We use the timing-of-events model to estimate causal effects of temporary agency employment by taking selection based on observed and unobserved variables into account. First, we do not find any evidence of a lock-in effect. On the contrary: estimating heterogeneous effects reveals that for some groups, temporary agency employment even speeds up the transition out of unemployment benefits. In addition, we find a positive post-treatment effect of having experienced at least one temporary agency spell during the unemployment spell across individuals. The groups that benefit most from temporary agency employment are non-western immigrants, second generation non-western immigrants, and unemployed job-seekers with a low educational background, groups which are usually considered hard to integrate into the labor market. It seems that they are able to build up their human capital or enlarge their professional networks, and, ultimately, improve their labor market and career prospects. Moreover, we found evidence that the likelihood of exiting unemployment successfully increases with the duration of the treatment and to some extent with the number of treatments.

Why is temporary agency employment such a successful path into regular employment in Denmark when the evidence is much less promising in other European countries? The positive in-treatment effects found for groups that are often at risk of being excluded from the labor market due to stigma effects may indicate that employers facing labor shortages used temporary agency employment to screen candidates for permanent jobs. In a downturn, when the pool of highly qualified job-seekers swells again, employers might return to traditional (and cheaper) direct-hire strategies. To test this assumption, we investigated whether the stepping-stone effect depends on the tightness of the labor market. Our results indeed confirm that the stepping-stone effect reacts strongly to the unemployment rate in a procyclical manner, i.e., the effects are more positive when unemployment is lower. We therefore believe that one reason for the positive stepping-stone effect of temporary agency employment in Denmark is the tight labor market there.

Even if temp work may be a bridge to regular employment, it is crucial to know what happens to the quality of a job match once a worker leaves unemployment. Research evidence on this question is of high policy relevance and entirely missing for

the continental European countries. A worsening of post-unemployment job quality would be a reason to be cautious about promoting temporary agency employment in an economy that is already highly flexible. Our results suggest that unemployed job-seekers not only gain in terms of employment probability; women who leave unemployment while in treatment tend to enjoy longer and more stable employment than the control group. Moreover, those exiting unemployment while in treatment gain in terms of wages as well. The latter results may again support our assumption that the screening of workers may have played an important role for employers using agency workers.

As temporary agency employment has features of an ALMP instrument, the question naturally arises whether public employment offices should consider utilizing temporary help services more often as part of their overall job placement strategies. Denmark is spending about 2 percent of its GDP on ALMPs (OECD 2009). Despite these tremendous expenses, studies have generally shown that the effects of most such programs are modest and sometimes even negative (e.g., Card et al. 2009). In Denmark, activation policies that involve some real working experience for unemployed workers seem to be most effective (see, e.g., Kyyrä et al. 2009, Rosholm & Svarer 2008, Jespersen et al. 2008). Almost all other program types show remarkably large lock-in effects. This may be a consequence of the fact that these instruments prolong benefit periods and discourage workers from searching for a regular job while in activation. Our findings suggest that temporary agency employment may be a useful alternative instrument of active labor market policy, since it also speeds up the exit from unemployment for some groups. This would offer an important source of cost savings since actively involving temporary agencies in the job placement strategies of the public employment service would come at almost no cost.

References

- Abbring, J.; Van den Berg, G. (2003), "The Nonparametric Identification of Treatment Effects in Duration Models," *Econometrica* 71(5), 1491-1517.
- Abraham, Katharine G. (1990), "Restructuring the employment relationship: The growth of market-mediated work arrangements." In Katharine G. Abraham and Robert B. McKersie, eds., *New developments in the labour market: Toward a new institutional Paradigm*. Cambridge, MA, MIT Press, pp. 85-119.
- Amuedo-Dorantes, C.; Malo, M.; Muñoz-Bullón, F. (2008), "The Role of Temporary Help Agency Employment on Temp-to-Perm Transitions," *Journal of Labor Research* 29(2), 138–161.
- Andersson, F., Holzer, H. Lane, J., (2005). *Moving Up or Moving On: Workers, Firms and Advancement in the Low-Wage Labor Market*, New York: Russell Sage Foundation.
- Andersson, F., Holzer H., Lane J. (2009), "Temporary Help Agencies and the Advancement Prospects of Low Earners." In David Autor, ed., *Studies in Labor Market Intermediation*, Chicago: The University of Chicago Press, 373-398.
- Andersen, S. (2007), "Vikarer mellem fleksibilitet og sikkerhed," *Tidsskrift for ARBEJDSliv*, 9 (4), 63-78.

Antoni, M.; Jahn, E. (2009), "Do Changes in Regulation Affect Employment Duration in Temporary Work Agencies?" *Industrial and Labor Relations Review* 62(2), 226 - 251.

Arrowsmith, J. (2008), "Temporary agency work and collective bargaining in the EU", European Foundation for the Improvement of Living and Working Conditions, Luxembourg.

Autor, D. (2009), "The Economics of Labor Market Intermediation: An Analytic Framework," In David Autor, ed., *Studies in Labor Market Intermediation*, Chicago: The University of Chicago Press, 1-23.

Autor, D.; Houseman, S. (2002), "The Role of Temporary Employment Agencies in Welfare to Work: Part of the Problem or Part of the Solution?" *Focus* 22(1), 63-70.

_____ (2005), "Do Temporary Help Jobs Improve Labor Market Outcomes for Low-Skilled Workers? Evidence from Random Assignments," NBER Working Paper No. 11743.

_____ (2006), "Temporary Agency Employment as a Way out of Poverty?" In Rebecca Blank, Sheldon Danziger and Robert Schoeni, eds., *Working but Poor: How Economic and Policy Changes are Affecting Low-Wage Workers*, New York: Russell Sage.

Booth, A.; J. Francesconi, M.; J. Frank (2002), "Temporary Jobs: Stepping Stones or Dead Ends?" *Economic Journal*, 112, F189-F213.

Brinch, C. (2007), "Nonparametric Identification of the Mixed Hazards Model with Time-Varying Covariates", *Econometric Theory*, 23, 349-354.

CIETT (2002), "Rationale of Agency Work – European Labour Suppliers and Demanders' Motives to Engage in Agency Work," Rotterdam.

CIETT (2009), "Agency work indicators." Online available: <http://www.ciett.org>.

Card, D.; J. Kluve; A. Weber (2009), "Active Labor Market Policy Evaluations: A Meta-Analysis," IZA Discussion Paper No. 4002, Bonn

Cockx, B.; Picchio, M. (2009), "Are Short-Lived Jobs Stepping Stones to Long-Lasting Jobs?" IZA Discussion Paper No. 4007, Bonn.

De Graaf-Zijl, M.; Van den Berg, G.; Hemya, A. (2010), "Stepping Stones for the Unemployed: The Effect of Temporary Jobs on the Duration until Regular Work," *Journal of Population Economics*, forthcoming.

Gagliarducci, S. (2005), "The dynamics of repeated temporary jobs," *Labour Economics*, 12, 429-448.

Gaure, S.; Roed, K.; Thang, T. (2007), "Time and causality: A Monte Carlo assessment of the timing of Events Approach," *Journal of Econometrics* 141(2), 1159-1195.

García-Pérez, J.; Muñoz-Bullón, F. (2005), "Are Temporary Help Agencies Changing Mobility Patterns in the Spanish Labour Market?" *Spanish Economic Review* 7 (1), 43-65.

Göbel, Ch.; Verhofstadt, E. (2008), "Is Temporary Employment a Stepping Stone for Unemployed School Leavers?" ZEW Discussion Paper No. 08-093, Mannheim.

Hamersma, S.; Heinrich, C. (2008), "Temporary Help Service Firms' Use of Employer Tax Credits: Implications for Disadvantaged Workers' Labor Market Outcomes," Institute for Research on Poverty, Discussion paper 1335-08, Wisconsin.

- Heckman, J.; LaLonde, R.; Smith, J. (1999), "The Economics and Econometrics of Active Labor Market Programs," in *Handbook of Labor Economics*, Vol: III, ed. by Ashenfelter, O.; Card, D., 1865-2097, Amsterdam.
- Heckmann, J.; Singer, B. (1984), "A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data," *Econometrica*, 52(2), 271-320.
- Heinrich, C.; Mueser, P.; Troske, K. (2005): "Welfare to Temporary Work: Implications for Labor Market Outcomes," *Review of Economics and Statistics* 87(1), 154-173.
- _____ (2009), "The Role of Temporary Help Employment in Low-wage Worker Advancement." In David Autor, ed., *Studies in Labor Market Intermediation*, Chicago: The University of Chicago Press, 399-436.
- Houseman, S; Kalleberg, A.; Erickcek, G. (2003), "The Role of Temporary Agency Employment in Tight Labor Markets," *Industrial and Labor Relations Review* 57(1), 105-127.
- Ichino, A.; Mealli, F; Nannicini, T. (2008), "From Temporary Help Jobs to Permanent Employment: What can we learn from matching estimators and their sensitivity?" *Journal of Applied Econometrics*, 23, 305-327.
- Kudsk-Iversen, S; Andersen, S. (2006), I krydsfeltet mellem fleksibilitet og sikkerhed, Faos Discussion paper 071, Copenhagen, <http://faos.sociology.ku.dk/-dokum/fnotat71.pdf>.
- Jahn, E. (2010a), "Reassessing the wage penalty for temporary agency workers in Germany," *Journal of Economics and Statistics*, forthcoming.
- Jahn, E. (2010b), "The structure of the temp wages in tight labor markets," mimeo.
- Jahn, E.; Ochel, W. (2007), "Contracting-Out Temporary Help Services in Germany," *Journal of European Social Policy* 17(2), 125-138.
- Jensen, M.; Svarer, M.; Rosholm, M. (2003), "The Response of Youth Unemployment to Benefits, Incentives, and Sanctions," *European Journal of Political Economy* 19, 301-316.
- Jespersen, S., Munch, J.; Skipper, L. (2008), "Costs and benefits of Danish active labour market programmes," *Labour Economics* 15, 859-884.
- Katz, L.; Krueger, A. (1999), "The High-Pressure U.S. Labor Market of the 1990s," *Brookings Papers on Economic Activity* 1, 1-65.
- Kvasnicka, M. (2009), "Does Temporary Agency Work Provide a Stepping Stone to Regular Employment?" In David Autor, ed., *Studies of Labor Market Intermediation*, Chicago: The University of Chicago Press, 335-372.
- Kyyrä T.; Parrotta, P.; Rosholm, M. (2009), "The effect of receiving supplementary UI benefits on unemployment duration," IZA Discussion Papers 3920, Bonn.
- Lane, J.; Mikelson, K.; Sharkey, P.; Wissoker, D. (2003), "Pathways to Work for Low-Income Workers: The Effect of Work in the Temporary Help Industry," *Journal of Policy Analysis and Management* 22(4), 581-598.
- Malo, M.; Muñoz-Bullón, F. (2008), "Temporary help agencies and participation histories in the labour market: a sequence-oriented approach," *Estadística Española* 50(167), 25- 65.

Mølgaard, J. and Hansen, L. (2008), "Vikarbeskæftigelsen fortsætter opad", Arbejderbevægelses Erhvervsråd, København, www.ae.dk/analyse/vikarbeskaeftigelsen-fortsætter-opad.

OECD (2009), *Employment Outlook*, Paris.

Oxford Research (2003), "Nemme at hyre, nemme at fyre - undersøgelse af arbejdsforhold for vikarer i HK," Oxford Research, Copenhagen, 2003.

Pedersen, H.; Stener, H.; Claus, B.; Mahler, S. (2003), "Temporary Agency work in the European Union" (report), European Foundation for the Improvement of Living and Working Conditions, Dublin, <http://www.fr.eurofound.eu.int/pubdocs/2004/104/en/1/ef04104en.pdf>.

Rosholm, M.; Svarer, M. (2008), "Estimating the Threat Effect of Active Labour Market Programmes," *Scandinavian Journal of Economics* 110, 385-401.

Statistics Denmark (2009), "Produktstatistik for vikarbureauer og anden personaleformidling," 2007, København, <http://www.dst.dk/pukora/epub/Nyt/2009/NR092.pdf>.

Segal, L.; Sullivan, D. (1997), "The Growth of Temporary Services Work," *Journal of Economic Perspectives*, 11, 117-136.

Windelin, M.; Hansen L. (2007), "Kraftigt stigende tendens til at bruge vikarer," Arbejderbevægelses Erhvervsråd, <http://www.ae.dk/analyse/kraftigt-stigende-tendens-til-bruge-vikarer>, København.

Appendix

Table A1: Selected Sample Statistics

	Men				Women			
	Temp		Non temp		Temp		Non temp	
	mean	sd	mean	sd	mean	sd	mean	sd
Socio-economic characteristics								
Single	0.760	0.427	0.729	0.445	0.618	0.486	0.561	0.496
Working partner	0.301	0.459	0.300	0.458	0.525	0.499	0.542	0.498
Child in household	0.205	0.403	0.232	0.422	0.379	0.485	0.438	0.496
Child < 7 in hh	0.131	0.337	0.147	0.354	0.223	0.416	0.277	0.447
Age								
Average	33.4	10.6	34.4	11	36.3	10.6	37.3	11.2
Less than 20	0.032	0.175	0.031	0.172	0.013	0.113	0.018	0.132
20-24	0.222	0.416	0.183	0.387	0.129	0.336	0.109	0.312
25-34	0.346	0.476	0.359	0.480	0.353	0.478	0.341	0.474
35-44	0.213	0.409	0.221	0.415	0.251	0.434	0.247	0.431
Above 44	0.188	0.390	0.206	0.405	0.253	0.435	0.284	0.451
Nationality								
Danish	0.902	0.298	0.887	0.316	0.948	0.223	0.928	0.259
1st gen. west	0.028	0.165	0.025	0.157	0.024	0.152	0.021	0.143
2nd gen. west	0.004	0.065	0.004	0.064	0.003	0.058	0.004	0.060
1st gen. non west	0.058	0.233	0.075	0.263	0.020	0.141	0.041	0.199
2nd gen non west	0.008	0.089	0.009	0.094	0.005	0.070	0.006	0.079
Education								
Low	0.497	0.500	0.527	0.499	0.374	0.484	0.455	0.498
Vocational training	0.404	0.491	0.382	0.486	0.434	0.496	0.377	0.485
Short academic	0.055	0.227	0.040	0.195	0.089	0.284	0.059	0.236
Bachelor	0.031	0.173	0.034	0.181	0.075	0.264	0.084	0.277
Master	0.013	0.114	0.018	0.133	0.029	0.167	0.025	0.157
Copenhagen	0.291	0.454	0.264	0.441	0.363	0.481	0.279	0.448
Prev. LF status								
Employed	0.363	0.481	0.494	0.500	0.374	0.484	0.530	0.499
Temp employed	0.266	0.442	0.027	0.161	0.249	0.432	0.020	0.139
Self-employed	0.004	0.063	0.010	0.099	0.001	0.034	0.006	0.077
Sick	0.072	0.259	0.066	0.248	0.082	0.275	0.071	0.257
Out of labor force	0.295	0.456	0.404	0.491	0.294	0.455	0.373	0.484
Employment history								
Empl. dur (weeks)	75	52	74	52	79	52	70	50
Avg. no. temp jobs	0.755	1.290	0.405	0.948	0.818	1.610	0.485	1.420
Avg. no. almp	0.585	1.200	0.596	1.190	0.538	1.100	0.632	1.190
Avg. no. reg. jobs	2.870	2.380	3.300	3.220	2.610	2.430	3.930	4.710
Med. dur. unemp. spell	33		10		32		9	
Med. dur. temp spell	6				5			
Exit to regular job	0.767		0.612		0.788		0.660	
Employment stability	36		25		52		14	
Job stability	22		11		32		7	
Pre-wage	129	132	122	123	122	135	121	147
Post-wage	132	157	126	99	125	172	120	116
No. of persons	3,824		31,810		5,557		34,441	
No. of u-spells	11,224		112,205		14,249		122,994	

Notes: Pre-wages refer to the average hourly wage in DKK of the job before entering unemployment; post-wages refer the first job after leaving successful unemployment. Employment stability measures the median total number of weeks employed and job stability measures the median number of weeks employed in the first job after leaving successful unemployment.

Table A2: Sample selection

	Men				Women			
	Non Temp		Temp		Non Temp		Temp	
	in %		in %		in %		in %	
Full Sample	128,547	100.0	14,079	100.0	163,569	100.0	19,529	100.0
- CEO / top manager	11,350	8.8	1,034	7.3	18,641	11.4	1,533	7.8
- health sector	1,342	1.0	162	1.2	17,989	11.0	1,936	9.9
- parallel students	3,650	2.8	942	6.7	3,945	2.4	883	4.5
- spell over 52 weeks	0	0.0	658	4.7	0	0.0	855	4.4
public sector temp	0	0.0	59	0.4	0	0.0	73	0.4
Final data set	112,205	87.3	11,224	79.7	122,994	75.2	14,249	73.0

Table A3: Full estimation results – homogenous treatment effects

		Men				Women			
		sel. equation		hazard to empl.		sel. equation		hazard to empl.	
		coeff.	se	coeff.	se	coeff.	se	coeff.	se
Baseline hazard (weeks)	0-4	-5.449	(0.173)	-1.791	(0.082)	-5.032	(0.163)	-1.708	(0.054)
	4-8	-5.212	(0.175)	-1.706	(0.082)	-4.908	(0.164)	-1.922	(0.054)
	8-12	-5.157	(0.176)	-1.816	(0.083)	-4.847	(0.164)	-2.126	(0.055)
	12-16	-5.082	(0.177)	-1.802	(0.083)	-4.852	(0.165)	-2.081	(0.055)
	16-20	-5.199	(0.178)	-1.921	(0.084)	-4.971	(0.167)	-2.265	(0.056)
	20-25	-5.317	(0.179)	-2.015	(0.084)	-4.971	(0.166)	-2.341	(0.056)
	25-35	-5.257	(0.179)	-2.031	(0.084)	-4.985	(0.167)	-2.198	(0.055)
	35-52	-5.428	(0.179)	-2.172	(0.084)	-5.102	(0.167)	-2.373	(0.055)
	52-78	-5.676	(0.181)	-2.271	(0.084)	-5.310	(0.168)	-2.437	(0.056)
	78-104	-5.771	(0.186)	-2.390	(0.086)	-5.554	(0.174)	-2.537	(0.058)
	104-156	-6.139	(0.192)	-2.549	(0.087)	-5.766	(0.177)	-2.663	(0.059)
	-156	-6.254	(0.198)	-2.662	(0.089)	-5.993	(0.185)	-2.788	(0.061)
Age (ref: 25-34)	less than 20	0.477	(0.063)	0.207	(0.030)	0.165	(0.083)	0.169	(0.038)
	20-24	0.425	(0.030)	0.252	(0.012)	0.265	(0.033)	0.200	(0.014)
	35-44	-0.004	(0.029)	-0.084	(0.011)	-0.021	(0.026)	-0.064	(0.011)
	above 44	-0.108	(0.033)	-0.255	(0.013)	-0.141	(0.028)	-0.165	(0.012)
Family status	Single	0.022	(0.030)	-0.062	(0.011)	0.038	(0.023)	-0.033	(0.010)
	Working partner*	0.201	(0.026)	0.145	(0.010)	0.082	(0.021)	0.094	(0.008)
	Child in hh	-0.038	(0.043)	0.135	(0.015)	-0.107	(0.029)	0.045	(0.011)
	Child < 7 in hh	-0.050	(0.048)	-0.119	(0.016)	-0.253	(0.032)	-0.105	(0.012)
Nationality (ref: natives)	1st gen. west	0.026	(0.065)	-0.089	(0.029)	-0.070	(0.063)	-0.117	(0.032)
	2nd gen. west	0.060	(0.172)	-0.076	(0.071)	-0.109	(0.164)	0.077	(0.081)
	1st gen. non west	-0.381	(0.048)	-0.248	(0.021)	-0.661	(0.065)	-0.287	(0.026)
	2nd gen non west	-0.317	(0.119)	-0.082	(0.056)	-0.574	(0.138)	-0.258	(0.070)
Education (ref: low)	Voc. training	0.191	(0.026)	0.152	(0.011)	0.191	(0.023)	0.093	(0.010)
	Short academic	0.399	(0.053)	0.159	(0.023)	0.309	(0.039)	0.127	(0.020)
	Bachelor	0.140	(0.065)	0.250	(0.027)	0.016	(0.042)	0.246	(0.018)
	Master	-0.175	(0.108)	0.119	(0.041)	-0.130	(0.072)	0.226	(0.035)
Empl. dur. (weeks)		0.218	(0.043)	0.142	(0.016)	0.367	(0.039)	-0.188	(0.014)
Capital		0.062	(0.028)	-0.059	(0.012)	0.132	(0.023)	0.008	(0.011)
Treatment effect	In-treatment			-0.015	(0.015)			-0.007	(0.014)
	Post-treatment			0.178	(0.022)			0.065	(0.019)
Mean log-likelihood				-2.706				-2.622	
N				146,987				176,316	

Notes: Bold coefficients are statistically significant at least at the 5 percent level. In addition, the model includes indicators for the year and quarter of entry into unemployment, for the number of temporary agency jobs (1, 2, 3-4, more than five), the number of regular jobs (1, 2, 3-4, more than five) during the past three years, indicators on how often the worker participated in programs of active labor market programs during the past three years (1, 2-3, more than 4), the yearly regional unemployment rate (based on 14 regions), a dummy variable indicating whether the workers was previously out of the labor force, or sick, and parameters for the distribution of the unobserved characteristics. *The reference category is cohabiting, partner not working.

Table A4: Homogenous treatment effects – baseline estimations

	Model 1		Model 2		Model 3		Model 4	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Men								
In-treatment	0.859	0.013	0.059	0.014	0.070	0.014	-0.009	0.014
Post-treatment	0.275	0.019	0.260	0.022	0.261	0.022	0.175	0.022
Unobserved heterogeneity	no		no		yes		yes	
Control variables	no		yes		yes		yes	
Mass points	-		-		2		5	
Log-Likelihood	-2.416		-2.259		-2.712		-2.707	
N	146,987		146,987		146,987		146,987	
Women								
In-treatment	0.857	0.012	0.078	0.013	0.094	0.015	-0.006	0.014
Post-treatment	0.227	0.016	0.164	0.020	0.135	0.019	0.068	0.019
Unobserved heterogeneity	no		no		yes		yes	
Control variables	no		yes		yes		yes	
Mass-points	-		-		2		5	
Mean log-likelihood	-2.334		-2.173		-2.628		-2.622	
N	176,316		176,316		176,316		176,316	

Notes: Bold coefficients are statistically significant at least at the 5 percent level.

Table A5: Heterogeneous treatment effects – robustness check

	Men				Women			
	In-treatment coeff.	se	Post-treatment coeff.	se	In-treatment coeff.	se	Post-treatment coeff.	se
Family Status								
Treatment (ref: married *no child)	0.007	0.031	0.163	0.043	-0.122	0.025	0.006	0.030
Treatment*married*child	-0.034	0.054	-0.073	0.082	0.157	0.042	0.127	0.051
Treatment*single*no child	-0.029	0.034	0.038	0.047	0.152	0.029	0.086	0.034
Treatment*single*child	0.071	0.055	0.071	0.083	0.171	0.048	0.059	0.062
Age								
Treatment (ref: 25 <= age < 35)	0.016	(0.022)	0.215	(0.033)	0.070	(0.021)	0.209	(0.030)
Treatment* age < 20	0.030	(0.114)	0.018	(0.167)	0.162	(0.128)	-0.382	(0.247)
Treatment* 20 <= age < 24	-0.060	(0.035)	0.101	(0.054)	-0.039	(0.051)	0.058	(0.057)
Treatment* 35 <= age <44	0.005	(0.033)	-0.092	(0.050)	-0.051	(0.031)	-0.102	(0.040)
Treatment* age>=45	-0.055	(0.037)	-0.171	(0.050)	-0.227	(0.032)	-0.307	(0.038)
Working Partner								
Treatment (ref: no)	0.003	(0.017)	0.187	(0.026)	0.020	(0.019)	0.076	(0.025)
Treatment* yes	-0.052	(0.027)	-0.044	(0.040)	-0.054	(0.024)	-0.019	(0.029)
Employment Experience (weeks)								
Treatment (ref: no employment)	-0.048	(0.024)	0.201	(0.035)	-0.036	(0.023)	0.075	(0.030)
Treatment* 0 < empex <= 52 r	0.299	(0.046)	0.014	(0.059)	0.247	(0.042)	0.071	(0.048)
Treatment* 52 < empex <= 104	0.062	(0.033)	-0.036	(0.045)	-0.022	(0.032)	-0.105	(0.038)
Treatment* 104 < empex	-0.024	(0.033)	-0.066	(0.055)	0.061	(0.031)	0.144	(0.045)

Notes: Bold coefficients are statistically significant at least at the 5 percent level. In addition, the model includes indicators for the year and quarter of entry into unemployment, for the number of temporary agency jobs (1, 2, 3-4, more than five), the number of regular jobs (1, 2, 3-4, more than five) during the past three years, indicators on how often the worker participated in programs of active labor market programs during the past three years (1, 2-3, more than 4), the yearly regional unemployment rate (based on 14 regions), a dummy variable indicating whether the workers was previously out of the labor force, or sick, and parameters for the distribution of the unobserved characteristics.

Recently published

No.	Author(s)	Title	Date
18/2009	Fuchs, M.	The determinants of local employment dynamics in Western Germany	8/09
19/2009	Kunz, M.	Sources for regional unemployment disparities in Germany: Lagged adjustment processes, exogenous shocks or both?	8/09
20/2009	Hohmeyer, K.	Effectiveness of One-Euro-Jobs: Do programme characteristics matter?	8/09
21/2009	Drasch, K. Matthes, B.	Improving Retrospective life course data by combining modularized self-reports and event history calendars: Experiences from a large scale survey	9/09
22/2009	Litzel, N. Möller, J.	Industrial clusters and economic integration: Theoretic concepts and an application to the European Metropolitan Region Nuremberg	9/09
23/2009	Bauer, Th. Bender, S. Paloyo, A.R. Schmidt, Ch.M.	Evaluating the labor-market effects of compulsory military service	11/09
24/2009	Hohendanner, C.	Arbeitsgelegenheiten mit Mehraufwandsentschädigung: Eine Analyse potenzieller Substitutionseffekte mit Daten des IAB-Betriebspanels	12/09
25/2009	Dlugosz St. Stephan, G. Wilke, R.A.	Fixing the leak: Unemployment incidence before and after the 2006 reform of unemployment benefits in Germany	12/09
1/2010	Schmieder J.F. von Wachter, T. Bender, S.	The long-term impact of job displacement in Germany during the 1982 recession on earnings, income, and employment	1/10
2/2010	Heckmann, M. Noll, S. Rebien, M.	Stellenbesetzungen mit Hindernissen: Auf der Suche nach Bestimmungsfaktoren für den Suchverlauf	1/10
3/2010	Schmillen, A. Möller, J.	Determinants of lifetime unemployment: A micro data analysis with censored quantile regressions	1/10
4/2010	Schmieder, J.F. von Wachter, T. Bender, S.	The effects of unemployment insurance on labour supply and search outcomes: Regression discontinuity estimates from Germany	2/10
5/2010	Rebien, M.	The use of social networks in recruiting processes from a firms perspective	2/10
6/2010	Drechsler, J.	Multiple imputation of missing values in the wave 2007 of the IAB establishment panel	2/10
7/2010	Dauth, W.	Agglomeration and regional employment growth	2/10
8/2010	Lietzmann, T.	Zur Dauer der Bedürftigkeit von Müttern : Dauer des Leistungsbezugs im SGB II und Ausstiegchancen	3/10

As per: June 01, 2010

For a full list, consult the IAB website

<http://www.iab.de/de/publikationen/discussionpaper.aspx>

Imprint

IAB-Discussion Paper 9/2010

Editorial address

Institute for Employment Research
of the Federal Employment Agency
Regensburger Str. 104
D-90478 Nuremberg

Editorial staff

Regina Stoll, Jutta Palm-Nowak

Technical completion

Jutta Sebald

All rights reserved

Reproduction and distribution in any form, also in parts,
requires the permission of IAB Nuremberg

Website

<http://www.iab.de>

Download of this Discussion Paper

<http://doku.iab.de/discussionpapers/2010/dp0910.pdf>

For further inquiries contact the author:

Elke J. Jahn
Phone +49.911.179 5183
E-mail elke.jahn@iab.de