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ABSTRACT

Stepping Stones for the Unemployed: The Effect of Temporary Jobs on the Duration until Regular Work*

Transitions from unemployment into temporary work are often succeeded by a transition from temporary into regular work. This paper investigates whether temporary work increases the transition rate to regular work. We use longitudinal survey data of individuals to estimate a multi-state duration model, applying the 'timing of events' approach. The data contain multiple spells in labour market states at the individual level. We analyse results using novel graphical representations, which unambiguously show that temporary jobs shorten the unemployment duration, although they do not increase the fraction of unemployed workers having regular work within a few years after entry into unemployment.

JEL Classification: J64, C41

Keywords: unemployment, fixed term contracts, temporary work, job search, duration model, treatment effect

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1. Introduction

The labour market in many countries has displayed an increase in flexible jobs - particularly temporary jobs. An extensive debate has explored the extent to which such jobs improve welfare and help individual workers. It is often argued that the existence of temporary work is especially beneficial to currently unemployed workers, because it provides them opportunities to gain work experience and acquire human capital, to deepen the attachment to the labour market, and to search more effectively for more desirable jobs. Temporary job experience may reveal information regarding the ability and motivation of the individual (screening or signalling). Some studies show that employers indeed use atypical contracts as a way of screening for permanent jobs (e.g. Storrie, 2002; Houseman et al., 2003). This paper examines the extent to which temporary work facilitates individual unemployed workers to move from unemployment to regular work— that is, the extent to which temporary work acts as a stepping-stone towards regular work.

Our empirical analysis follows the 'timing of events' approach formalised by Abbring and Van den Berg (2003). We use longitudinal survey data of individuals to estimate a multi-state duration model. The model specifies the transition rates from unemployment to temporary jobs, from temporary jobs to regular work, and from unemployment directly to regular work. Each transition rate is allowed to depend on observed and unobserved explanatory variables as well as on the elapsed time spent in the current state. To deal with selection effects, we allow the unobserved determinants to be dependent across transition rates. For example, if more motivated individuals have

less trouble finding permanent jobs, but are also over-represented among those in temporary jobs, then a casual observer who does not take this into account may conclude that there is a positive causal effect even if, in reality, there is none.[1] We also exploit subjective responses on whether the individual desires to have a regular job. We exploit the multi-spell nature of the data to reduce the dependence of the results on functional form specifications. The 'timing of events' approach exploits variation in observed moments of transitions in order to distinguish empirically between causal effects and selection effects. Expressed somewhat informally, if a transition to a temporary job is often quickly succeeded by a transition into a regular job, for any constellation of explanatory variables, then this is strong evidence of a causal effect.[2]

This paper adopts the specific model framework developed by Van den Berg et al. (2002)[3], for two reasons. First, their framework allows in a natural way for 'lock-in' effects of temporary jobs (meaning that they may involve a temporary standstill of search activities for other jobs). Secondly, it allows for heterogeneous treatment effects (meaning that the effect of having a temporary job on the transition rate to regular work may vary across observed and unobserved individual characteristics). Because of lock-in

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1 Purcell et al. (1999), Feldman et al. (2001) and Von Hippel et al. (1997) found low levels of motivation among temporary workers.

2 The approach does not require exclusion restrictions, instrumental variables, or conditional independence assumptions. Recently, a number of studies have appeared in which the 'timing of events' approach is applied to analyse the effects of dynamically assigned treatments on duration outcomes (see Abbring and Van den Berg, 2004, for an overview).

3 Chalmers and Kalb (2001) employed the same method to analyse the effect of casual jobs (i.e. those without holiday and sick leave entitlements), using the Survey of Employment and Unemployment patterns 1994-1997 from the Australian Bureau of Statistics.

effects and effect heterogeneity, the parameter estimates are hard to interpret. We contribute to the methodological literature by analysing this in some detail and by developing a graphical procedure to express the main results.

The estimation results also shed light on whether individuals with a high incidence and/or duration of unemployment flow into temporary work more often, and whether they benefit more from the stepping-stone effect of temporary work. More generally, we address whether individuals who benefit from temporary work also have a high transition rate into temporary work. This is important from a policy point of view. If certain types of individuals hardly ever flow into temporary work (although their average duration until regular work would be substantially reduced by it), then it may be sensible to stimulate the use of temporary work among this group, for example by helping individuals to register at temporary work agencies.

We abstract from effects of the existence of temporary jobs on the transition rate from unemployment directly into regular work (i.e. without intervening temporary work spell). It can be argued that this effect is negative if a temporary job facilitates a move to a regular job and if unemployed individuals are aware of this. The data, however, do not allow for identification of this effect. We also abstract from equilibrium effects. Temporary employment might improve the economic performance of firms because there is less need to hoard workers as an insurance against a sudden upswing in demand (Pacelli, 2002; Kahn, 2000, Von Hippel et al., 1997). The use of temporary workers may also reduce cyclical swings in labour productivity, since firms might be better able to shed workers quickly during a downturn (Estevão and Lach, 1999). Moreover, temporary

contracts imply lower layoff costs and could thus stimulate employment creation. The literature is not unanimous, however, on the issue of how temporary employment affects the overall employment level. The overview study of Ljungqvist (2002) shows that early general equilibrium analyses by Burda (1992), Hopenhayn and Rogerson (1993) and Saint-Paul (1995) display a negative effect of firing costs on employment, whereas later general equilibrium models by Alvarez and Veracierto (1998) and Mortensen and Pissarides (1999) conclude that firing costs affect employment positively. Ljungqvist shows that the results of these theoretical models depend crucially on the model features and assumptions.[4] Also partial equilibrium models (such as Bentolila and Saint-Paul, 1992 and 1994; Bentolila and Bertola, 1990 and Aguirregabiria and Alfonso-Borrego, 1999) and empirical work (e.g. Hunt, 2000; Bentolila and Saint-Paul, 1992 and Aguirregabiria and Alonso-Borrego, 1999) are inconclusive.

To the extent that the data allow it, we examine how job characteristics of regular jobs depend on whether they were directly preceded by a spell of unemployment or whether there was an intermediate spell of temporary work (see also Booth et al., 2002; Houseman, 2001).[5]

The paper is organised as follows. Section 2 presents the dataset, defines temporary jobs, discusses some variables that we use in the analyses, and provides

[4] In search and matching models with the standard assumption of a constant relative split in the match surplus between firms and workers, layoff costs tend to increase employment by reducing labour reallocation, whereas employment effects tend to be negative in models with employment lotteries due to the diminished private return to work.

descriptive statistics. Section 3 presents the model. Section 4 discusses the estimation results, which are illustrated with some graphical overviews. We draw conclusions on the stepping-stone effect of temporary employment, covariate effects, the role of unobserved heterogeneity and the quality of the jobs found. Section 5 concludes.

2. Data

This paper uses the OSA labour supply panel, which is a longitudinal dataset collected by the Dutch Institute for Labour Studies (OSA). The Netherlands is an interesting case study for studying the effects of temporary employment. It is generally acknowledged that temporary work arrangements are designed with the aim of avoiding stringent employment protection and high firing costs. Firing costs are incurred if an employer dismisses a worker who is employed on an indefinite contract. These costs consist not only of severance payments paid to the employee, but also, more importantly, of the implicit costs of lengthy layoff procedures. As OECD (1999) shows, the Netherlands, with its rather complicated system of dismissal legislation, scores high on these procedural inconveniences. If the employer can prove to the Centre for Work and Income (CWI) that a dismissal is legitimate, he gets a so-called *layoff permit*, which means he does not have to pay any severance payment. A dismissal is legitimate in case of financial necessity, unsuitability or blameworthy behaviour of the employee. Nowadays, less than half of all dismissals go through the Centre for Work and Income. Instead,

[5] We are unable to check whether temporary work is associated with lack of training opportunities, as suggested by Farber (1997, 1999), Arulampalam and Booth (1998), and Amuedo-Dorantes (2002).

employers go to court. These procedures are shorter than the lengthy CWI procedures, and chances of success are higher. However, judges do impose severance payments; these are related to the monthly wage. Generally, a worker who is laid off receives one monthly wage per year of service. This payment may be higher or lower, depending on who is blamed most (the employer or the employee), and is somewhat higher for workers aged over forty.

The OSA labour supply panel follows a random sample of Dutch households over time since 1985, by way of biannual face-to-face interviews. The survey concentrates on individuals between the ages of 16 and 64 years, and who are not full-time students. Only households with at least one person in this category are thus included. Interviews are conducted with all individuals in the household who fall under this category— head of household, partner, children and other household members. This results in some 4000 individuals per wave. All households that cooperate in a wave are asked to participate again two years later (except if all household members became over 65 years of age). An attempt is made to locate family (members) who have moved. If household members choose not to participate, then the other members are surveyed anyway. If the whole household declines, a replacement household is approached. A replacement household matches the declining one by sex, age, family size and region. We use data from 1988 to 2000. The 1988 wave consists of 4464 individuals. In 2000, about a quarter of these individuals is still in the panel. Refreshment samples were drawn in 1990, 1992, 1994, 1996, 1998 and 2000, so that in 2000 the sample size was 4185. Van den Berg and Lindeboom (1998) and Van den Berg et al. (1994) study the effect of attrition in the OSA

data on the estimates of the transition rates between unemployment and employment and between jobs. They find that although attrition is sometimes sizeable, it does not have discernible effects on the estimates of these rates. These two studies also provide ample background information on the data, as well as references to other studies using these data.

In the OSA panel, an effort is made to collect extensive information on the labour market histories of the individual respondents. Individuals are asked about their labour market status two years ago (the previous interview date), about all transitions made since then, and about their current labour market status. For every transition we observe when it happened, why it happened, by which channel the new position was found, and what the respective labour market positions were. Regarding the labour market position after a change, individuals can choose from the following: other function with same employer, employee at other employer, self-employed, co-working partner of self-employed, no paid job but looking for one, no paid job and not looking for one, military service, and full-time education. From these labour market histories we obtain both the sequence of labour market states occupied and the sojourn times in these states. People are defined as *unemployed* when they do not have a job but are looking for one. One does not need to receive unemployment benefits to be unemployed.

We define *regular work* as being in a job that is a permanent job or being in a job with a limited-duration contract that is supposed to become permanent. In the Netherlands, starting on a one-year contract in a job is rather common, and practically everybody gets a subsequent offer of a permanent contract for the same job. These one-

year contract jobs are not the temporary jobs of interest to us in this study, since these are by definition a starting point for regular employment. Rather, we define temporary jobs as the more contingent types of jobs: fixed-term jobs, temporary agency work, on-call contracts and subsidised temporary jobs. It should be noted that in the Netherlands, contrary to certain other countries, unemployed individuals who are registered at commercial temporary work agencies, but are currently not assigned to an employer, do not receive wage income and are considered to be unemployed. This also applies to our data. Some studies treat part-time employment as a form of non-standard employment. Since most part-time employment in the Netherlands is on a voluntary basis, we treat part-time employment in the same way as regular employment. This implies that it can be either regular or temporary, depending on the duration of the contract.

With regard to the employment positions at the survey moments, we observe the wage, number of hours worked, industry, occupation, type of work, type of contract, etcetera. Less information is available for periods between survey moments, which leads to two problems. First, we do not observe many characteristics of jobs that start and end between two consecutive interviews: Notably, we often do not observe the wage of such jobs. This implies that the set of explanatory variables that we can use is restricted mostly to background characteristics of the individual (listed below). Second, it is not always clear whether a job that begins and ends between two consecutive interviews is temporary or not. In case of doubt we infer the type of contract from other variables. We use the stated channel by which the job was found (this can be a temporary help agency) and the stated reason why transitions into and out of the job are made (to get more job

security, or because of the end of contract, respectively). In some cases these variables are missing, and we *right-censor* the unemployment spell at the moment of the transition into such a job. The latter occurred in 12% of all spells.

We can then measure the duration between the start of unemployment and the moment at which the individual moves into either regular or temporary work. This is what we call the *unemployment spell*. Subsequently, we can measure the duration from the start of a temporary job until the moment at which the individual moves to a regular job. This is what we call the *temporary job spell*. The latter duration period may include intermittent temporary jobs and periods of unemployment in-between. All of these durations may be right-censored due to a transition to another labour market state, or due to reaching the end of the observation window. Our model does not consider spells of regular employment.

We do not include unemployment spells that started before the first interview, so that there are no initial conditions problems that arise with interrupted spells. The indicated selection results in a sample of 976 individuals. All individuals have become unemployed at least once during the time period 1988-2000. We use up to three spells of unemployment per individual. This results in 1175 spells.

Table 1 provides some descriptive statistics of the labour market positions of individuals at interview dates (for example, 16 percent of the unemployed are in temporary employment two years later). These numbers are roughly consistent with earlier findings both in the Netherlands and other Western countries (e.g. Dekker and Kaiser, 2000; Segal and Sullivan, 1997). Transitions from temporary jobs to regular work

are frequent; indeed, they are more frequent than transitions from unemployment to regular work. This suggests that temporary employment might serve as a stepping-stone towards regular work. Figure 1 shows the total number of observed labour market transitions in our sub sample. Note that some types of transitions do not play a role in the empirical analysis below (in particular, the transitions to and from 'not in the labour force', the transitions to unemployment, and the transitions from regular (or permanent) employment to temporary employment.

Table 1. Labour market transitions in our sub sample, 1988-2000 (percentages).

	Labour force status survey year t+2				
Labour force status survey year t	Out of the labour force	Unemployment[#]	Temporary employment	Regular employment	Share in labour force 1998*
Out of the labour force	58%	26%	7%	9%	23%
Unemployment	22%	32%	16%	30%	3%
Temporary employment	6%	21%	35%	38%	9%
Regular employment	3%	18%	8%	71%	64%

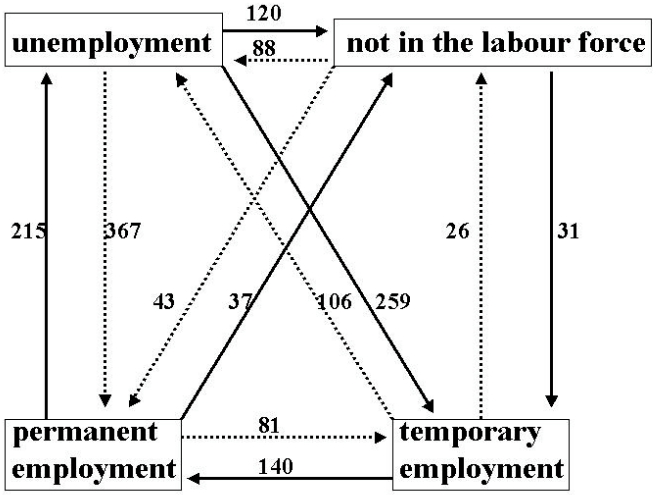
\# Transitions to unemployment are relatively frequent in our sample since we select only those who are observed to become unemployed at least once.

* Calculations based on OSA wave 1998. Regular employment includes 4% fixed-term contracts with extension to permanent at the end (if screening is successful).

A number of individual characteristics are recorded at the first interview, and an attempt is made to keep track of changes in time-varying characteristics such as family composition, marital status and level of education. These characteristics are used as explanatory variables. All explanatory variables in the analysis concern the situation at the start of the unemployment spell (i.e. they are not time-varying). Appendix 1 provides some sample averages. Information on the labour market tightness, particularly the

unemployment/vacancy ratios per education level, comes from Netherlands Statistics (CBS).

Figure 1. Labour market transitions in the dataset



3. Model specification

3.1. Transition rates

The introduction of the paper mentioned the distinguishing features of the 'timing of events' methodology that we apply. We adopt the model framework of Van den Berg et al. (2002), which was constructed to study the existence of stepping-stone jobs in the Dutch medical profession. In our context, the model specifies the transition rates from unemployment to temporary employment, from unemployment to regular employment, and from temporary employment to regular employment. In general, the transition rate or hazard rate θ_{ij} is defined as the rate at which an individual flows from one state i to

another state j, given that (s)he survived in state i until the current moment. We define the indices i and j to have the following values: 1 = unemployment, 2 = temporary employment and 3 = regular employment. We specify a mixed proportional hazard model for each transition rate. Let observed characteristics be denoted by x_{ij} and the baseline hazard by $\lambda_{ij}(.)$, for the transition rate from state i to state j. In addition, β_{ij} is a vector of parameters to be estimated. The multiplicative random effects v_{ij} are state- and exit-destination specific. Then,

$$\theta_{ij}(t \mid x, v_{ij}) = \lambda_{ij}(t) e^{\beta_{ij}' x_{ij} + v_{ij}}$$

and the corresponding survival function equals

$$S_i(t \mid x, v_{ij}) = e^{-\sum_{j=1, j \neq i}^{j=3} \int_0^t \theta_{ij}(s \mid x, v_{ij}) ds}.$$

Note that this imposes that the hazard rates depend only on the elapsed duration in the current state and not on earlier outcomes.[6]

Recall that we define an unemployment spell as the time span between entry into unemployment and entry into either regular or temporary work. A temporary job spell is defined as the time span between the start of the first temporary job and entry into regular employment. Thus, a temporary job spell may consist of multiple periods of (short) unemployment and temporary job spells. The total spell between the start of unemployment and regular employment is the sum of the unemployment spell and, if

applicable, the temporary job spell. In our data we observe more than one of these 'total' spells per individual. For a given individual, the values of v_{ij} are assumed to be identical across different spells. To deal with selective inflow into temporary work and permanent work, we test how the v_{ij} for a given individual are related. For example, the observed transition rate from temporary work to regular work may be higher than the observed rate from unemployment to regular work just because individuals for whom it is easy to find regular work tend to self-select into temporary work. Then, v_{12} is positively related to v_{13} and v_{23}. It is also possible that persons who most easily find regular work find a temporary job less easily, which means that v_{12} and v_{13} are negatively related.

The individual likelihood contributions are unconditional on the unobserved heterogeneity terms (see e.g. Lancaster, 1990). With unobserved heterogeneity, the likelihood function is not separable in the parameters of different transition rates. Abbring and Van den Berg (2003) analyse the identification of these types of models. The availability of multiple spell data is useful in the sense that fewer assumptions are needed for identification, and the empirical results are therefore less sensitive to aspects of the model specification. See also Abbring and Van den Berg (2004) for comparisons to inference with latent variable methods and panel data methods. In particular, in multi-spell duration analysis, as in fixed-effects panel data analysis, the results do not critically

[6] With random effects, including individual past labour market outcomes as explanatory variables is difficult as it gives rise to initial conditions problems, unless the data contain a natural starting point of each individual labour market history. By implication, the individual treatment effects defined below do not directly depend on e.g. past annual earnings, but at most on the observed and unobserved determinants of past outcomes.

depend on the assumption that observed and unobserved explanatory variables are independent.

An important condition for identification concerns the absence of anticipation of the moment of treatment. This means, essentially, that the individual should not know more about the moment of treatment than is captured by the modelled distribution of the duration until treatment. In our context, anticipation occurs if the individual stops looking for regular work (or actually has an increased transition rate into regular work) upon the moment it is decided that he will enter a temporary job in a certain time period from now. If this were the case, and the researcher does not observe the moment of this decision, then the estimates of current transition rates are determined by future events. Such a scenario seems unlikely in the present set-up, however. From a dynamic (search) point of view, it is unlikely that people know in advance the exact moment at which they will find a temporary job. In any search model, the moment at which a match between a worker and a temporary job is realised is not fully in the hands of the unemployed worker, especially since temporary workers are often called at short notice. The worker can, at most, determine the rate at which the match is realised, and this leaves some randomness in the realised moment. This implies that the way in which search frictions are usually modelled— as random arrivals of trading opportunities— has fruitful applications in the literature on treatment evaluation, and we use it as such in this paper. Against this, one may argue that some individuals are registered at temporary work agencies as looking for such jobs; this is unobserved, however, and these individuals may have a higher rate of moving from unemployment to temporary work. This is captured in our model as

unobserved and observed[7] heterogeneity. The model framework we use is designed to disentangle *selection effects* from *causal effects*. This selection effect can certainly be a self-selection effect (as is the case if some individuals search for temporary jobs and others do not).

3.2. Parameterisation

We follow the literature by taking the duration dependence functions (or baseline hazards) $\lambda_{ij}(t)$ to have piecewise constant specifications. Let t denote the elapsed duration, ζ refer to the successive intervals and $I_\zeta(t)$ denote time-varying dummy variables that are equal to 1 iff t is in the interval ζ. The piecewise constant duration dependence function can then be written as

$$\log \lambda_{ij}(t) = \sum_{\zeta=1,2,\ldots} \lambda_{ij\zeta} I_\zeta(t) .$$

We subdivide a duration axis into eight quarterly intervals for the first two years, followed by two half-year intervals for the third year, and an open interval for durations of more than three years. These intervals capture the empirical shapes rather well.

We take the distribution of the unobserved heterogeneity term v to be multivariate discrete with mass points, and we take the locations of the mass points as well as the associated probabilities to be unknown parameters. Let v_{ijn} denote a realisation of the random variable v_{ij}. Each individual has a set of v_{12}, v_{13} and v_{23}. We allow for N different types of individuals, where a type is characterized by a unique set of values of v_{12},v_{13},v_{23}.

[7] The data contain an explanatory variable indicating whether the individual, when unemployed, prefers temporary work to regular work.

Let p_n with n=1,2,…,N denote probabilities that add to 1. Following the specifications of the distribution G of v in Card and Sullivan (1988) and Van den Berg, et al. (2002), we impose that

$$\Pr(v_{ij} = v_{ijn}) = p_n \quad \text{for all } ij \in \{12,13,23\}$$

$$\text{and } v_{ij} = v_{ijn} \Leftrightarrow v_{i^*j^*} = v_{i^*j^*n} \quad \text{for all } ij, i^*j^* \in \{12,13,23\}$$

The resulting family of distributions of v is a special case of the general multivariate discrete distribution. The latter has N possible realisations of each v_{ij}, and every combination of realisations of v_{ij} and v_{i*j*} is allowed, so that the vector v has N^3 possible realisations. This amounts to N^3+3N-1 unknown parameters, which, in the light of the large number of parameters elsewhere in the model, is less feasible even for N=2. Our specification of the distribution of v restricts the general multivariate distribution by imposing some structure on the relation between the elements of v_{12},v_{13},v_{23}, and indeed it has only 4N-1 unknown parameters. Note that since we also allow for constant terms in the vectors of regression coefficients, not all of these parameters are identified. Hence, we normalise the mean of (v_{12},v_{13},v_{23}) to be 1. This reduces the number of estimated parameters for the distribution of v by three.[8] The application used in this study, allows for two possible realisations for each v_{ij} . In addition, we impose the condition that if v_{13} = v_{13n} then v_{23} = v_{23n}. This assumes that individuals who more easily find regular work from unemployment also find regular work more easily from a temporary position. This specification results in four different types of individuals (four different combinations of

[8] Clearly, if we would divide the states of unemployment and/or temporary employment into a number of sub-states then the number of parameters would become too large to be able to estimate the model.

mass points), where a type is characterised by a unique set of values of v_{12}, v_{13} and v_{23}, and six different mass points. Note that the combination of mass points (v_{12},v_{13},v_{23}) replaces the constants in the vector of regression coefficients, and can thus all be identified. There is no restriction imposed that the relation between the elements of (v_{12},v_{13},v_{23}) must be monotone. As noted above, the extent to which v_{12} is related to v_{13} and v_{23} determines the extent to which selectivity affects the relation in the raw data between having temporary work or not, on the one hand, and the rate of entering regular work, on the other.

3.3. Quantities of interest

We now examine which model quantities are informative on the treatment[9] or stepping-stone effect. Section 3.3.1 treats the stepping-stone effect. Usually, the treatment effect in this type of model is calculated by comparing the hazard rate from unemployment to regular work with and without the treatment. In the current set-up, as a result of the different duration dependence patterns, this comparison is not represented by a single parameter. Therefore, we also assess the overall effect of temporary work using outcome measures that aggregate over effects on the hazard rates. Section 3.3.2 discusses the share of individuals finding regular employment via temporary work. This number does not in itself capture a treatment effect, but is informative on the population fraction of

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[9] The present use of the term "treatment" is somewhat out of line with the common use, because the move into a temporary job is to a large extent driven by the behaviour of the individual under consideration.

unemployed individuals who find regular work through either the temporary work channel or the direct channel. Section 3.3.3 discusses the treatment effect on the duration until regular work by comparing the (cumulative) share of individuals finding regular work in a situation with and without temporary employment. Section 3.3.4 presents the treatment effect on the unemployment duration.

3.3.1. Stepping-stone effect

The *stepping-stone effect* is defined as the increase in the hazard rate of finding regular employment as a result of the acceptance of a temporary job. This stepping-stone effect is not represented by a single model parameter. To see this, note that in our parameterisation the transition rate from unemployment into regular work depends on the time elapsed since entry into unemployment (t), whereas the rate from temporary work to regular work depends on the time elapsed since entry into temporary work(τ). Both of these exhibit distinctive duration dependence patterns. Ruling out the difference in duration dependence patterns would be absurd in light of the fact that temporary jobs may involve a lock-in effect, causing the transition rate into regular work to be lower right after having entered a temporary job and higher some time later. As a result, the treatment effect of having moved into temporary work at a given time t_{UE} on the individual transition rate into regular work at time $t>t_{UE}$, compared to not having entered temporary work until and including t, equals $\frac{\theta_{23}(t,\tau \mid x,v_{23})}{\theta_{13}(t \mid x,v_{13})}-1$, where $t=t_{UE}+\tau$. This means that the usual treatment effect that results from comparing the hazard rate from

unemployment to (regular) work with and without the treatment cannot be calculated as one parameter. Of course it is still interesting to examine the duration dependence patterns and average levels of transitions into regular work. For example, if for an individual with given values of *x* and *v* it always holds that $\theta_{23}(\tau|x,v_{23})>\theta_{13}(t|x,v_{13})$, then the individual treatment effect is positive at all points of time. Results of this comparison are presented in section 4.1.

3.3.2. Share of individuals finding regular employment via temporary work

Given the complexity of the model, a quantitative assessment of the over-all effect of temporary work is more easily studied with an outcome measure that aggregates over effects on instantaneous transition rates, than by studying the instantaneous transition rates themselves. For this purpose we use the cumulative probability of moving into a regular job, measured at various points of time after entry into unemployment. Therefore, we compare the (cumulative) probability of moving into regular work directly from unemployment with the (cumulative) probability of moving into regular work from unemployment via temporary work. We quantify these probabilities by using the estimated model. The cumulative probability of moving into regular work within *t* periods after having entered unemployment equals

$$\int_0^t \theta_{13}(\sigma) S_{13}(\sigma) S_{12}(\sigma) + \theta_{12}(\sigma) S_{12}(\sigma) S_{13}(\sigma)(1 - S_{23}(t-\sigma))\, d\sigma \qquad (1)$$

where the indices of *S* refer to the corresponding duration variable (i.e. S_{12} is the survivor function of the duration from unemployment into temporary work). The first part of the

expression equals the probability of moving into regular work by way of a direct transition from unemployment, whereas the second part equals the probability of moving into regular work by way of temporary work. Logically, the probability of moving into regular work directly from unemployment does not converge to 1 as *t* goes to infinity, if $\theta_{12}>0$. The relevant population estimate of (1) follows by integration of the total expression over the distribution of observed and unobserved characteristics.

The decomposition of (1) into its two terms does *not* capture a treatment effect. To see this, note that both terms are positive even if there is no individual treatment effect (i.e. if the states of unemployment and temporary work are equivalent in the sense that the transition rate from temporary work to regular work at any calendar time point equals the transition rate from unemployment to regular work that would have prevailed at that point). Instead, the decomposition of (1) represents the population fraction of unemployed individuals who find regular work through either the temporary work channel or the direct channel. Results of this decomposition are presented in section 4.2.

3.3.3. Treatment effect on duration until regular work

One can define a sensible treatment effect by comparing the actual magnitude of expression (1) to the magnitude in a situation where temporary employment is not available. We can quantify the probability of moving into regular work within *t* periods in the absence of temporary work by simply imposing in (1) the requirement that the transition rate into temporary work θ_{12} equals zero, resulting in the expression

$\int_0^t \theta_{13}(\sigma) S_{13}(\sigma) d\sigma$. This holds both for the general model parameterisation in which θ_{23} is also allowed to depend on the time *t* since entry into unemployment, as well as for our actual parameterisation.[10] This is demonstrated formally in Appendix 2. The treatment effect that we calculate here might be called the stepping-stone effect. It indicates to what extent the duration until regular work is shortened by the existence of temporary jobs. Results of this treatment effect are presented in section 4.3.

Some comments are in order. First, in the absence of temporary work, some of the individuals who would otherwise have moved into regular work by way of a temporary job move into regular work directly from unemployment. Therefore, the cumulative fraction of individuals moving into regular work that we calculate exceeds the observed fraction of individuals who move directly from unemployment into regular work. The estimated cumulative probability of moving into regular work from unemployment, which in the presence of temporary work converges to one minus the cumulative probability of moving into temporary work from unemployment, is thus extrapolated to converge to 1 as *t* goes to infinity. This assumes the same pattern of duration dependence and relative effects of the explanatory factors. This means that we abstract from potential effects of the mere existence of temporary jobs on the transition rate from unemployment directly into regular work. Second, all these calculations at the micro level assume that on

[10] The fact that we allow β_{13} to be different from β_{23} and that we allow v_{13}/v_{23} to be different across individuals means that we allow the individual effects of temporary work to differ between individuals. The average effects can then be obtained by averaging the individual effect over *x* and *v*.

the macro level the absence of temporary jobs does not affect the magnitude of the direct transition rate from unemployment to regular work (recall the discussion in Section 1). Among the many reasons why this assumption may be incorrect is the possibility of equilibrium effects on the demand and supply of regular jobs. Third, it is not possible to test nonparametrically whether the curve described by (1) is different from the curve obtained by imposing $\theta_{12}=0$, simply because the curve obtained by imposing $\theta_{12}=0$ is counterfactual and therefore cannot be estimated nonparametrically.

3.3.4. Treatment effect on the unemployment duration

In addition, another treatment effect can be defined as the effect of temporary employment on the probability of reemployment. The cumulative probability of moving into (regular or temporary) work within t periods after having entered unemployment equals

$$\int_0^t \theta_{13}(\sigma) S_{13}(\sigma) S_{12}(\sigma) + \theta_{12}(\sigma) S_{12}(\sigma) S_{13}(\sigma)\, d\sigma \qquad (2)$$

Equivalent to the quantification of the treatment effect on the duration until regular work, the treatment effect on the reemployment probability can be quantified by imposing in expression (2) the condition that the transition rate into temporary work θ_{12} equals zero, resulting in the expression $\int_0^t \theta_{13}(\sigma) S_{13}(\sigma)\, d\sigma$.

The difference between these two expressions is the treatment effect that measures the extent to which unemployment is shortened by the existence of temporary

employment. Even if we cannot find an effect of the existence of temporary work on the duration until regular work (as described in section 3.3.2), we might find an effect on the unemployment duration if the temporary job spell is simply an alternative for an equally long time searching from unemployment. The results presented in section 4.4 show that this is exactly what we find.

4. Estimation results

4.1. Stepping-stone effect

We start by presenting the estimates of the shapes of the individual transition rates as functions of the elapsed durations in the states under consideration. Given the initial level of a transition rate (i.e., upon entry into the state under consideration), the shape of this rate is described by the parameters of the duration dependence function (see the estimates in Table 2a). Figure 2 plots the individual transition rates as functions of the elapsed duration in the present state for an individual with average observed (x) and unobserved characteristics (v), using the estimated model.[11] Tables 2b and 2c present the parameter estimates of the covariate effects and the unobserved heterogeneity distribution; these are discussed in detail later in this section. The curves in figure 2 depict the effect for the average individual.

[11] The average unobserved characteristics are calculated by multiplying the estimated v_{ij}'s with the estimated corresponding probabilities (p's).

Table 2a. Estimation results for the log duration dependence functions

Time interval (reference 0-3 months)	Unemployment to Temporary work		Unemployment to regular work		Temporary to regular work	
4 - 6 months	0.2	(0.114)	0.5	(0.120)	-0	(0.193)
7 - 9 months	0.2	(0.133)	0.4	(0.125)	0	(0.121)
10 - 12 months	0.5	(0.176)	0.7	(0.117)	0	(0.137)
13 - 15 months	-0.1	(0.198)	0.6	(0.120)	0	(0.155)
16 - 18 months	0.3	(0.191)	0.6	(0.145)	0	(0.137)
19 - 21 months	0.6	(0.242)	-0.1	(0.249)	0	(0.132)
22 - 24 months	1.2	(0.243)	1.3	(0.159)	1	(0.184)
25 - 30 months	1.3	(0.272)	1.4	(0.159)	1	(0.193)
31 - 36 months	0.5	(0.377)	1.9	(0.201)	1	(0.226)
> 36 months	1.2	(0.249)	1.7	(0.214)	1	(0.235)

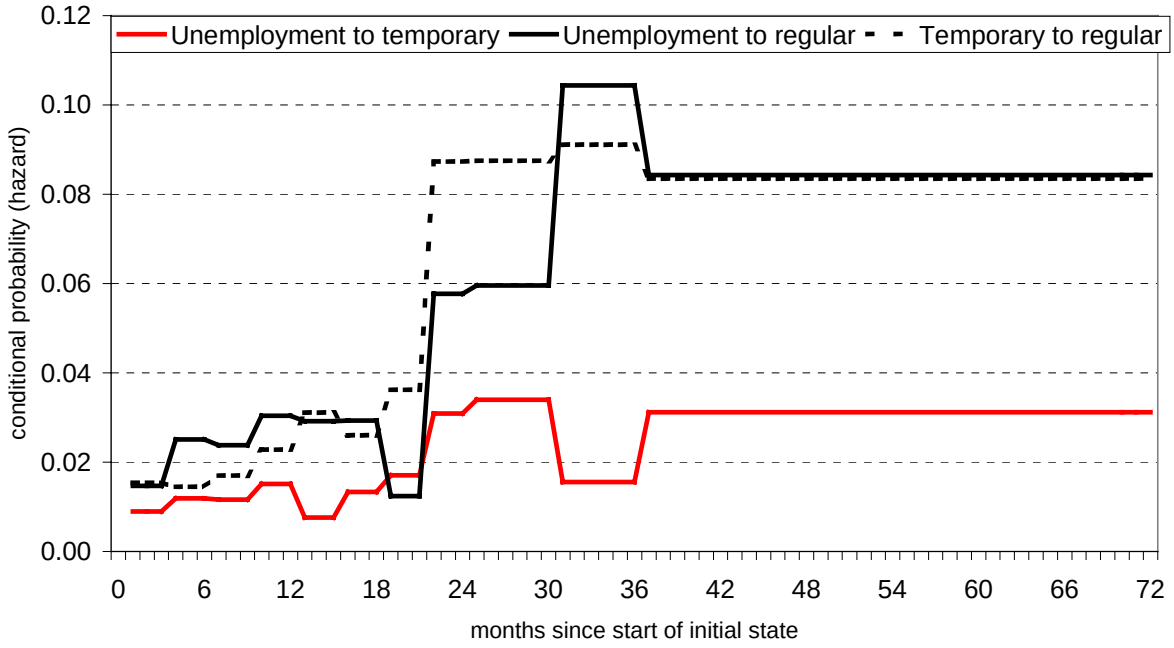
Standard errors in parentheses

Evidently, the rate into temporary work from unemployment is smaller than the rate into regular work. However, once an individual is in temporary employment, the rate of flowing into regular work is at some time after the start of the search larger than otherwise. One might expect workers who accept a temporary job to be initially strongly attached to that job— for example, for contractual reasons. This is true in some sense: the transition rate from temporary into regular employment increases substantially after a period of one-and-a-half years. As a result, newly employed temporary workers have a slightly lower rate into regular work than unemployed workers. The exit rate from temporary work, however, becomes higher than the exit rate from unemployment after one-and-a-half years in temporary employment. After 30 months we are left with only 225 observations in the data, which makes the estimated hazards, and the observed jumps in the transition rates, rather imprecise. These jumps in the hazard rates could be due to the loss of wage-related unemployment benefits for many of the unemployed.

The transition rate from temporary work to regular work increases during the temporary job. This indicates that the accumulation of human capital may be a major reason for employers to prefer individuals who have occupied a temporary job. An increasingly larger social network among employed workers may also explain this. Apparently, for prospective employers, being in a temporary job constitutes more than just a (positive) signal that one has been found acceptable for such a job.

Note that these estimation results are not due to selection effects, since we corrected for observed and unobserved heterogeneity. As indicated earlier, the selection effect for which we correct might well be a self-selection effect, as is the case if some individuals search for temporary jobs and others do not. This selection is captured as unobserved and observed heterogeneity, with respectively the mass points for unobserved heterogeneity and an explanatory variable indicating whether the unemployed individual prefers temporary work to regular work. Because the unobserved heterogeneity terms correct for the fact that individuals that are still in unemployment at long durations have low job-finding probabilities, the estimated hazard rates in a model without unobserved heterogeneity terms are higher at low durations and lower at long durations than in figure 2. This holds especially for transitions from unemployment. In the model without unobserved heterogeneity, the transition rate from temporary work to regular work is higher than the transition rate from unemployment to regular work at all point of duration.

Figure 2. Estimated transition rates for the average individual



4.2 Share of individuals finding regular employment via temporary work

We now turn to the quantification of the overall effect of temporary work on the cumulative probability of moving into regular work, as presented in section 3.3. The solid curve in Figure 3 displays the cumulative probability of moving into regular work, whether directly or via the temporary work channel, as a function of the time elapsed since entry into unemployment. This is obtained by using the estimated model to calculate expression (1) for each individual in the sample and for all possible combinations of v_{ij}'s weighted by the estimated p's. Similarly, the dashed curve visualises the probability of moving into regular work without an intermediate spell of temporary work, applying the decomposition of expression (1). As described in section

3.3, this decomposition shows the share of individuals finding regular employment via temporary work. After six months, 12 percent of the flow into regular work consisted of transitions through temporary work, while after 72 months this percentage increased to 43.

Figure 3. Estimated probability of moving to regular work, directly or through temporary work

4.3 Treatment effect on duration until regular work

Figure 4 provides an impression of the treatment effect of temporary work on the duration until regular work, as presented in section 3.3.1. The dashed curve in Figure 4 plots the estimated counterfactual cumulative probability of moving into regular work if there is no temporary employment. This is obtained by imposing in expression (1) the

condition that the transition rate into temporary work equals zero, taking again averages across individuals in the sample and across the v_{ij}'s. For comparison, the solid curve of Figure 3 is repeated in Figure 4. The two curves are virtually the same, indicating that the probability of finding regular work is the same in a situation with temporary employment as it is in a situation in which no temporary employment exists. If anything, the probability of finding regular employment is at some points during the job search duration somewhat lower in a situation with temporary employment. The lock-in effect of temporary work is, on average, slightly larger than the positive effect of temporary work on reaching regular work. This effect is not driven by our stringent definition of temporary employment (see section 2). Robustness checks using broader definitions of temporary jobs show approximately the same results. Estimates of a model without unobserved heterogeneity show a similar stepping-stone effect. Correcting for unobserved heterogeneity seems to make little difference in reducing the stepping-stone effect. Subsequent subsections examine whether this is an average result or whether it is uniformly valid for all types of individuals.[12]

12 Some recent studies consider the effect of temporary work on long-run employment outcomes using models without potentially selective unobserved heterogeneity (Amuedo-Dorantes, 2000, and Hagen, 2003). Hagen found a stepping-stone effect of temporary work in Germany; Amuedo-Dorantes found none for Spain. Gagliarducci (2005) considers the effect of the number of temporary jobs, taking selection effects into account.

Figure 4. Estimated cumulative probability of finding regular work, with and without temporary employment

4.4 Treatment effect on the unemployment duration

Figure 5 shows the effect of the existence of temporary employment on the duration until (re)employment (as described in section 3.3.2). The dashed curve in Figure 5 plots the estimated cumulative counterfactual probability of moving into (regular or temporary) work if there is no temporary employment. This is obtained by imposing in expression (2) the condition that the transition rate into temporary work equals zero, taking averages across individuals in the sample and across the v_{ij}'s. The solid curve of Figure 5 presents the (re)employment probability in the current situation, in which regular and temporary jobs coexist. Clearly, the (re)employment probability at any search duration is lower in the absence of temporary employment than in the current situation. This holds especially

in the first months after the start of unemployment. As the elapsed time since the start of unemployment increases, the job-finding probability in the absence of temporary employment slowly converges to the job-finding probability in the situation where temporary employment exists. Thus, although temporary employment does not increase the probabilities of finding a regular job, it does lead to a decrease in the unemployment duration. Instead of being unemployed, people are employed in temporary jobs. We should note that the temporary employment spell as we defined it may include periods of unemployment (see section 2). As a result there is more unemployment involved in the indirect route than is visible in Figure 5.

Figure 5. Estimated cumulative reemployment probability, with and without temporary employment

4.5 Covariate effects

Table 2b presents the covariate effects on the individual transition rates. Note that a positive sign indicates a higher transition probability and a shorter duration. Comparison of the coefficients for “unemployment to regular” with the coefficients for “temporary to regular” reveals the variation of the stepping-stone effect across different types of individuals. Given the presence of a stepping-stone effect, comparison of the coefficients for “unemployment to regular” with those for “unemployment to temporary” reveals how relevant this effect is for obtaining regular work. Before making these comparisons, we first discuss the coefficients themselves.

Transition rates into regular work are higher in labour markets with many vacancies per unemployed individual. This is generally found in the literature. This relation, however, does not hold for the rate into temporary work, since this rate seems to be less sensitive to business cycle fluctuations. This effect was also found for Spain in the study by Bover and Gomez (1999), which also showed that (in general) it is easier to become employed if one wants to work more hours— although males seem to find temporary work more easily if they prefer to work part-time. Older unemployed individuals need more time to move into regular and temporary positions, as do individuals from the ethnic minorities group. Unemployed individuals who prefer temporary work to regular work do not, as might be expected, often make the direct transition from unemployment to a regular job.

Having a partner has a strong positive effect on the direct transition from unemployment to regular work. This effect is well known (for an overview of studies on

this issue, see Ginter and Zavodny, 2001). There is no generally accepted reason for this phenomenon. Partners may make individuals more productive and therefore more attractive to employers. Alternatively, individuals who are successful on the labour market may have characteristics that also make them attractive on the marriage market. The effect we find is larger for working partners than for non-working partners, which supports the selection hypothesis.

Men with children at home have a higher transition rate from temporary to regular work. These men may be under greater pressure to provide a satisfactory level of family income and thus may be eager to transform their insecure temporary job into a more secure regular position. We also find a negative effect for men with a partner, perhaps indicating that having a partner reduces the urgency for provision of a satisfactory level of family income by the man alone.

Table 2b. Estimation results of covariate effects [13]

	Unemployment to temporary job	Unemployment to regular job	Temporary to regular job
Age / 10	-0.331(0.068)**	-0.514(0.057)**	-0.284(0.083)*
Female	-1.719(0.478)**	0.997(0.365)**	0.065(0.998)
Ethnicity (ref: native Dutch)			
Male ethnic minority	-1.513(0.185)**	-0.423(0.253)*	0.713(0.165)*
Female ethnic minority	-1.435(0.180)**	-0.791(0.067)**	-1.275(0.543)*
Education (ref: intermediate)			
Low education level	-0.264(0.131)**	-0.528(0.117)**	0.121(0.120)
High education level	-0.306(0.097)**	0.207(0.101)**	0.446(0.130)*
Region (ref: Randstad)			
West	1.686(0.207)**	0.500(0.136)**	-0.126(0.172)
North	0.582(0.153)**	-0.694(0.140)**	-1.147(0.204)*
East	0.876(0.176)**	0.471(0.136)**	-0.323(0.162)*
South	1.251(0.189)**	0.149(0.134)	-0.921(0.132)*
Children (ref: no children)			
Man with children in household	-0.065(0.221)	0.216(0.140)	1.669(0.161)*
Woman with children in household	-0.317(0.156)**	-0.700(0.136)**	-0.587(0.230)*
Partner (ref: no partner)			
Man with working partner	0.226(0.213)	0.662(0.144)**	-0.460(0.154)*
Woman with working partner	0.252(0.147)*	1.141(0.136)**	0.692(0.122)*
Man with non-working partner	-0.258(0.291)	0.467(0.144)**	-0.600(0.217)*
Woman with non-working partner	-0.186(0.168)	0.509(0.112)**	
Desired working hours per week			
Men: desired working hours/10	-0.051(0.086)	0.557(0.095)**	0.009(0.206)
Women: desired working hours/10	0.432(0.098)**	0.115(0.064)*	0.059(0.133)
Temporary job preferred to regular job at start of unemployment	-0.249(0.174)	-0.766(0.180)**	0.077(0.117)
Vacancy/unemployment ratio	0.274(0.172)	1.296(0.266)**	1.498(0.222)*

Standard errors in parentheses

* indicates two-sided significance at a 10% level, ** at a 5% level

[13] There are no observed transitions from temporary work to regular work by women with a non-working partner.

4.5.1 Potential stepping-stone effect

Comparison of the coefficients for "unemployment to regular" with those for "temporary to regular" reveals the variation of the stepping-stone effect across different types of individuals. From a policy perspective, it is particularly interesting to focus on disadvantaged groups, notably ethnic minorities (defined as the four largest groups originating from Surinam, the Dutch Antilles, Morocco and Turkey), the low educated and women. For example, Netherlands Statistics notes that non-western ethnic minorities have unemployment rates that are more than four times as high as native Dutch individuals— in 2003, 17.6 versus 4.3 percent (unemployment benefits and social assistance). The stepping-stone effect may be larger for ethnic minorities if employers who are reluctant to hire them can use temporary contracts to screen them. In that case, it makes sense to stimulate unemployed immigrants to register at temporary work agencies. Table 2b shows that there is a difference between male and female ethnic minorities. For males, the stepping-stone effect is much higher for ethnic minorities than for native Dutch males, since the coefficient for temporary to regular work is positive and the coefficient from unemployment to regular work is negative. Clearly, this supports policy measures that stimulate the use of temporary work by ethnic minorities— for example, by helping them to register at temporary work agencies. For females, both coefficients for ethnic minorities are smaller than for native Dutch females— even more so for temporary to regular work than from unemployment to regular work. This implies a smaller stepping-stone effect for women from ethnic minorities than for native Dutch women.

The potential stepping-stone effect varies with other characteristics as well. It is higher for the low educated than for the high educated, for men compared to women, for singles compared to persons with a partner, for men preferring part-time work compared to men preferring full-time work, for people preferring regular work compared to those preferring temporary work and for people in the Randstad compared to those in other regions.

4.5.2 Use of the stepping-stone effect

Given the presence of a stepping-stone effect, comparison of the coefficients for "unemployment to regular" with those for "unemployment to temporary" sheds light on the relevance of this effect for obtaining regular work. In the better phase of the business cycle, with many vacancies and low unemployment, the use of temporary jobs as the stepping-stones is smaller than in recessions. With respect to ethnic minorities, an eye-catching result is that ethnic minorities, both males and females, make little use of temporary jobs. For male ethnic minorities we established the substantial potential benefit of temporary employment as a stepping-stone towards regular work. This adds to the support for policy measures that stimulate the use of temporary work by ethnic minorities. The same holds for individuals with intermediate education levels. Compared to more highly educated individuals, they have a higher potential benefit from temporary jobs, but they use it less often.

With regard to other characteristics, the use of temporary employment is higher for men compared to women, for men without children compared to men with children,

for women with children compared to those without children, for singles compared to individuals with a partner and for men preferring full-time jobs compared to men preferring part-time work.

It is the combination of the potential stepping-stone effect and the take-up that determines the actual treatment effects. To illustrate this, figures 6a and 6b show the equivalents of figures 4 and 5 for males from ethnic minorities versus native Dutch men. As these figures show, the men from the ethnic minority group experience a greater stepping-stone effect than native Dutch men. Their probability of having found regular work after six years is 4.3 percentage points (or 6 percent) higher in a situation with temporary employment than in the situation without. For native men we see no such effect. On the overall probability of finding employment, the effect of temporary employment is higher for native men than for those from ethnic groups. Native Dutch men have an 11 percentage-point (or 13.5 percent) higher probability of having found employment in a situation with temporary employment than in a situation without this type of work. For ethnic men the difference is 9 percentage points (or 12.5 percent).

Figure 6a. Estimated cumulative probability of finding regular work, with and without temporary employment, for males from ethnic minorities versus native Dutch men

Figure 6b. Estimated cumulative reemployment probability, with and without temporary employment, for males from ethnic minorities versus native Dutch men

4.6. Unobserved heterogeneity

Table 2c presents the estimates of the parameters of the unobserved heterogeneity distribution. These concern the general specification discussed in Section 3, allowing for realisations of all possible combinations of the value of the unobserved heterogeneity term in the transition rate from unemployment to temporary work, on the one hand, and the values of the unobserved heterogeneity terms in the other transition rates, on the other. This results in four types of individual values of the vector of unobserved heterogeneity terms (see Table 2c). The largest group is the one with low probabilities of moving to both regular and temporary jobs based on their unobserved characteristics; the smallest group has high probabilities for both. Together, these two groups (with a positive relation between the probability of finding temporary and regular work) are the majority. This implies a positive correlation between the ability to find regular work and the ability to find temporary work. The stepping-stone effect shown in figure 4 would have been higher, had this relation been the other way around.

Table 2c. Estimation results for unobserved heterogeneity

	$V(13_1)$ = -5.335 (0.382)** (low) $V(23_1)$ =-4.488 (0.969)** (low)	$V(13_2)$ = -2.767 (0.299)** (high) $V(23_2)$ = -2.601 (0.834)** (high)
$V(12_1)$ = -6.233 (0.540)** (low)	0.370 (0.005)** (type 1)	0.245 (0.004)** (type 3)
$V(12_2)$ = -3.654 (0.410)** (high)	0.218 (0.003)** (type 2)	0.167 (0.001)** (type 4)

Standard errors in parentheses. ** indicates two-sided significance at a 5% level.

As always in models with unobserved heterogeneity, the heterogeneity distribution estimates are difficult to interpret. First, they are determined by the set of included covariates. Secondly, the discrete heterogeneity distribution should be interpreted as an approximation of the true distribution. Keeping this in mind, note that for all groups it holds that v_{23} v_{13}, which indicates a positive stepping-stone effect. Type-1 individuals have a relatively low probability of finding both regular and temporary employment, but benefit from the stepping-stone effect of temporary jobs. Type-2 individuals have a lower probability of finding regular work directly from unemployment, but a higher probability of finding temporary work, whereas for Type 3 it is the other way around. Type-2 individuals have a high stepping-stone effect. For Type-3 individuals $v_{23} \approx v_{13}$, so their stepping-stone effect is smaller, and for certain elapsed durations and covariates it is small in absolute value. Type-4 individuals have a high probability of finding both regular and temporary employment, and like type-3 individuals experience a lower stepping-stone effect than type-1 and type-2 workers. The variances and correlations of the unobserved heterogeneity terms are all significantly different from zero. This implies that a model that does not take the selection into temporary work into account is misspecified, and leads to incorrect inference on the stepping-stone effect.

In general, the main results are robust with respect to a range of model specification features like the set of included covariates, the duration dependence intervals, and the numbers of mass points of the heterogeneity distribution. We tested our model against models without unobserved heterogeneity terms, with more heterogeneity

terms and with different splines of duration dependence. None of the models was found to be preferable to the current model, according to the likelihood ratio test.

4.4. Quality of jobs found

A limitation of analyses of treatment effects on unemployment durations is that they typically ignore effects on the type and quality of the accepted job. Unfortunately, our data do not allow us to address this issue in detail either, since neither the wages that are earned, nor the hours worked, nor the fringe benefits are observed. The dataset supplies only job characteristics at survey dates of jobs held at survey dates; it does not supply job characteristics at the moment of job acceptance, nor does it supply characteristics of jobs held in between survey dates. The data do allow us, however, to address the stability of the jobs. Ideally, this would have to be included in the duration model above. But our number of observations is limited, and inclusion of two other transitions, from temporary jobs to unemployment and from regular jobs to unemployment, is unfeasible. We thus estimate duration models simply for the duration of the regular job, where the way in which the job is found— directly or by way of temporary employment— is used as an explanatory variable (see Appendix 3).

The results indicate that the duration of the regular job does not depend on whether it is directly preceded by a temporary job or by unemployment. Simple t-tests also show that the reason why people separate from their regular job does not differ significantly between directly and indirectly found regular jobs. Regarding the exit state, there is a slight difference: jobs found by way of temporary employment end less often in

unemployment and more often in a transition to another temporary job. However, this difference is not statistically significant. Together, this does not suggest that the jobs found by way of temporary work differ greatly from those found directly from unemployment.

5. Conclusion

This paper analysed the effect of temporary employment for the employment opportunities of unemployed individuals. The *stepping-stone effect*, defined as the increase in the hazard rate of finding regular employment as a result of the acceptance of a temporary job, is not represented by a single model parameter in the current set-up. Examining duration dependence patterns indicates that newly employed temporary workers have a slightly lower rate into regular work than unemployed workers. Workers who accept a temporary job are initially strongly attached to that job. The exit rate from temporary work, however, becomes higher than the exit rate from unemployment after one-and-a-half years in temporary employment. The fact that the transition rate from temporary work to regular work increases during the temporary job indicates that the accumulation of human capital may be a reason for employers to prefer individuals who have occupied a temporary job. An increasingly larger social network among employed workers may also explain this.

As we have shown in this paper, a quantitative assessment of the over-all effect of temporary work is more easily studied with an outcome measure that aggregates over effects on instantaneous transition rates, than by studying the instantaneous transition

rates themselves. For this purpose we have used the cumulative probability of moving into a regular job, measured at various points of time after entry into unemployment. Using these cumulative probabilities we have shown that after six months, 12 percent of the flow into regular work consisted of transitions through temporary work, while after six years this percentage increased to 43. Also, the cumulative probabilities have been used to determine the *treatment effect of temporary work on the duration until regular work*. This duration is not affected by the existence of temporary jobs. The probability of finding regular employment hardly differs between the counterfactual situation, without temporary work, and the current situation, in which regular and temporary employment coexist. The *treatment effect of temporary work on the unemployment duration* is unambiguously negative, which implies that temporary work shortens the unemployment duration. In the counterfactual situation without temporary employment, job-finding probabilities are lower at any job search duration, compared with the situation with temporary jobs. Thus, even though individuals need to search as long for a regular job, they are employed – in temporary positions – instead of unemployed in the meanwhile. All of these results were obtained while correcting for selection effects associated with moving into temporary work. We should re-emphasise that we abstract from the potentially negative effects of the existence of temporary jobs on the transition rate from unemployment directly into regular work (i.e. without intervening temporary job spell) and from equilibrium effects of a general increase in temporary work.

The above effects are the same for virtually all workers, including those with a relatively weak labour market position. We have shown that the stepping-stone effect is

somewhat higher for low educated than for higher educated workers, for (male) ethnic minorities compared to native Dutch, for men compared to women and for singles compared to persons with a partner. However, groups do not only differ with respect to the potential advantage temporary work offers them as a stepping-stone, but also regarding the take-up of temporary work (and thus of the stepping-stone). The use of temporary employment is higher for men compared to women and for singles compared to individuals with a partner. Ethnic minorities are a special case in this respect. Although male ethnic minorities experience a high stepping-stone effect on the transition rate to regular work, they rarely flow into temporary jobs, so they do not benefit from the effect. This suggests that policy measures should be taken to stimulate the use of temporary work by ethnic minorities, for example by helping them to register at temporary work agencies.

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Appendix 1. Sample statistics of explanatory variables

Table A1. Sample averages of explanatory variables

variable	average
Age (at start unemployment)	33
Female	0.56
Ethnic minority	0.04
Education:	
Low	0.32
Medium	0.55
High	0.13
Region:	
Randstad	0.19
West	0.24
North	0.13
East	0.20
South	0.24
Children:	
No children at home	0.57
Man with children at home	0.15
Woman with children at home	0.27
Partner:	
Single	0.46
Man with working partner	0.12
Woman with working partner	0.29
Man with non-working partner	0.11
Woman with non-working partner	0.05
Desired number of working hours	32
Temp job preferred (at start unemployment)	0.07
Vacancies/Unemployment ratio	0.19

Appendix 2. The treatment effect on the probability of moving into regular work

Consider the model extension where θ_{23} depends on the time τ since entry into temporary work as well as on the current time $t=\tau+t_{UE}$ since entry into unemployment, where t_{UE} denotes the moment of the transition into temporary work, so $\theta_{23}:=\theta_{23}(\tau,t)$. We define $S_{23}(\tau,t_{UE})$ as the survival function of the duration in temporary work if the transition into in temporary work occurs at t_{UE}, so

$$S_{23}(\tau, t_{UE}) = \exp(-\int_0^{\tau} \theta_{23}(z, t_{UE} + z)dz)$$

We have to modify expression (1) accordingly, to

$$\int_0^t \theta_{13}(y)S_{13}(y)S_{12}(y) + \theta_{12}(y)S_{12}(y)S_{13}(y)(1 - S_{23}(t-y, y))\, dy \qquad (3)$$

Absence of treatment effects means that for all t and τ there holds that $\theta_{23}(\tau,t)=\theta_{13}(t)$. This implies that $S_{23}(t-y,y)= S_{13}(t)/S_{13}(y)$. If we substitute this into expression (3) and elaborate on this then we simply obtain $S_{13}(t)$. The latter is also obtained if we substitute into (3) that $\theta_{12}=0$. (Notice that the first parts of expressions (1) and (3) do not change when imposing that for all t and τ there holds that $\theta_{23}(\tau,t)=\theta_{13}(t)$.)

Appendix 3. Analysis of the quality of the regular job

Table A2. Duration analysis of regular jobs

	Weibull		Exponential	
	estimate	standard error	estimate	standard error
Intercept	3.842	0.307	3.788	0.279
Female	-0.216	0.256	0.223	0.234
Ethnic minority	0.277	0.515	0.255	0.470
Job found indirectly	0.1946	0.181	0.173	0.165
Education				
Low	0.372 *	0.171	0.363 *	0.156
High	0.310	0.219	0.314	0.200
Region				
West	-0.599 *	0.295	-0.546 *	0.270
North	-0.621	0.337	-0.568	0.306
East	-0.495	0.296	-0.445	0.269
South	-0.292	0.289	0.239	0.262
Re-entrant	0.200	0.310	0.193	0.282
Children at home				
Man with children at home	0.109	0.291	0.111	0.266
Woman with children at home	0.589 *	0.236	0.562 *	0.216
Working partner				
Man with working partner	0.309	0.328	0.289	0.299
Woman with working partner	-0.096	0.420	-0.103	0.382
Man with non-working partner	0.307	0.290	0.278	0.264
Woman with non-working partner	-0.117	0.251	-0.094	0.228
Log Likelihood	-563.54		-565.26	

* significant at 5%-level

Table A3 Destination state after leaving a regular jobs, comparing regular jobs found directly from unemployment and regular jobs found via temporary work

Destination	Regular job found by way of temporary job	Regular job found directly from unemployment
Other regular job	67%	67%
Temporary job	23%	15%
Unemployed	4% *	12% *
Out of the labour force	4%	3%
Unknown	2%	4%

* difference significant at 5%-level