The Cyclicality of the Stepping Stone Effect of Temporary Agency Employment

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Abstract: This paper investigates whether the stepping stone effect of temporary agency employment varies over the business cycle. Using German administrative data for the period 1985-2012 and an estimation framework based on the timing-of-events model, we construct a time series of in-treatment and post-treatment effects and estimate their relationship to the aggregate unemployment rate. We find evidence for a strong lock-in effect of temporary agency employment that is even more pronounced in tight labor markets. This suggests that firms do not use agency employment as a screening device when unemployment is low. Moreover, we find a noticeable countercyclical positive post-treatment effect indicating that workers might be able to activate networks established while being in treatment. We further document that the treatment effects are non-linear over the business cycle.

Key words: temporary agency employment, stepping stone, cyclicality, Germany

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1. Introduction

A quarter of a century ago most economies relaxed regulations for temporary agency employment to increase labor market flexibility and thus overall employment. Introducing two-tier labor markets seemed to be particularly beneficial for economies where it was politically difficult to reduce employment protection for workers with permanent contracts (Boeri, 2011; Jahn et al., 2012). That said it comes not as a surprise that temporary agency employment increased almost all over the world (CIETT 2014).[1]

The central idea of temporary agency employment is to lower hiring and firing costs for flexible jobs and thus allows firms to adjust the size of their workforce to the volatility of the business cycle. And indeed, it is well documented that the demand for agency work has a strong procyclical component (de Graaf-Zijl and Berkhout, 2007; Jahn and Bentzen 2012). At the same time, temporary agency employment should act as a bridge into regular employment especially for individuals having difficulties finding a (new) job. The high volatility of temporary agency employment over the business cycle together with poor working conditions in this sector are the main reasons why the stepping stone effect of temporary agency employment has become the heart of the debate on two-tier labor markets (Boeri, 2011; Jahn et al., 2012; OECD, 2013). As a result a growing literature empirically investigates whether agency work leads to stable jobs or traps workers in poor-quality jobs. Up to day, the empirical evidence is ambiguous. While some studies find evidence for agency employment being a springboard into regular employment other studies provide evidence that agency employment does not lead to stable jobs (see Table 1 for a survey of the empirical literature).

What has been largely neglected so far is that the procyclical demand for temporary agency workers should also affect the transition from agency employment to regular employment. If the stepping stone effect of temporary agency employment moves indeed cyclical this could explain why the

[1] To ease readability, the terms “agency job” are used as synonyms for “temporary agency work,” and “agency workers” are often used instead of “temporary agency workers.”

empirical evidence on the stepping stone effect is ambiguous, as the observation period of most studies only span a few years. It is the aim of this study to close this gap.

We investigate the cyclical behavior of the stepping stone effect of agency employment using administrative employer-employee data for West Germany which has a long tradition with respect to agency employment and is one of the biggest markets for the temporary help service sector in the world. This allows us to investigate the stepping stone effect for the period 1985-2012. In order to access the cyclicality of the stepping stone effect of agency employment we build on Abbring and van den Berg (2003a) and apply the timing of events model on an inflow sample into unemployment thereby not only accounting for left-truncation and right-censoring of unemployment durations but also to control for time-invariant unobserved characteristics affecting selection into agency employment and the transition out of unemployment which might differ over the business cycle. By controlling of unobserved traits we are also able to take into account different motives for unemployed people to work as agency workers, namely escaping unemployment, obtaining or prolonging eligibility for unemployment benefits, or avoiding commitment to long lasting employment relationship.

Our paper contributes to the previous literature along two dimensions. (i) The long time span of our data set covering more than three business cycles allows us to access the cyclicality of the stepping stone effect of agency employment. In order to investigate the mechanism through which agency employment provides a bridge into regular employment we separately investigate the cyclicality of in-treatment and post-treatment effect of taking up an agency job during a phase of unemployment. While the in-treatment effect refers to the effect of agency employment while being in treatment, the post-treatment effect investigates if an agency job might have a positive effect on the transition rate out of unemployment even though the workers falls back to open unemployment at first. Differentiating between in-treatment and post-treatment effect might be important, as agency workers falling back to open unemployment might have gained valuable human capital or build up productive job search networks while being on assignment.

(ii) It seems plausible that the type of the agency jobs and their duration might depend on the business cycle itself. Due to the richness of our data set we are also able to control for the type of agency job and the endogeneity of the treatment duration over the business cycle.

The literature on the stepping stone effect of agency employment stresses three mechanisms through which agency employment might provide a pathway to a regular job. First, human capital theory argues that the acquisition of human capital while being on assignment at a client firm is the main channel through which agency employment leads to a regular jobs (e.g. Abraham, 1990, Autor, 2001). However, critics of agency employment argue that agency workers are not able to accumulate human capital during assignment due to the primarily low-skilled nature of these jobs which are often below the qualification of the workers (e.g. Segal and Sullivan, 1997). Second, search theory predicts that agency workers might gain useful labor market contacts compared to unemployed searching for a direct hire job. Consequently, agency workers might receive more and faster information on open vacancies which may facilitate rapid entry into regular jobs. This effect is more pronounced if client firms use temporary staffing arrangements to screen workers to fill open posts (e.g. Houseman et *al.,* 2003). However, if client firms use agency work primarily as a buffer over the business cycle agency jobs can be dead ends if firms do not plan to fill these jobs permanently (e.g. Booth *et al.,* 2002; Boeri and Garibaldi, 2009; Heinrich *et al.,* 2005). In this case agency employment crowds out direct job search and should have a strong lock-in effect (Autor and Houseman, 2010). Finally, signaling theory predicts that jobseekers can overcome negative stigma effects or signal high productivity by accepting an agency job (Autor, 2001; Katz and Krueger, 1999). However, it might be also plausible that the acceptance of an agency job might stigmatize jobseekers as it signals low productivity (e.g. Heinrich et al., 2009). It seems to be plausible that the importance and dominance of these mechanism depend on the state of the economy.

How do we expect the in-treatment effect and post-treatment effect are affected by the business cycle? The sign of the in-treatment effect of agency employment is not obvious a priori. On the one hand, while being assigned, the worker has less time to search for a job outside the sector. There might be a lock-in effect and thus the in-treatment effect should be negative. However, if client firms use

agency employment to screen workers for permanent positions we would expect that the in-treatment effect becomes positive. The lock-in effect of agency employment should be much more pronounced in an upturn as available vacancies are not contacted. We thus expect that the in-treatment effect should be (more) negative. The lock-in effect might be less of a problem in a slump as during a downturn nobody finds a job. If agency employment acts as a screening device we would expect that the in-treatment effect becomes positive particularly in an upturn as firms might face a shortage of qualified workers.

The post-treatment effect should be positive if workers are able to accumulate human capital while being assigned to a client firm or can improve the job search networks. We would expect a negative sign, if agency employment attaches a negative stigma to the worker. In a recession networks might play an important role, as the few open vacancies might be filled by referrals of former co-workers (Glitz 2016). The same holds with regard to the human capital effect. During a downturn, the expected unemployment duration is longer and agency employment might be a means to keep or even increase human capital compared to searching for a permanent job out of open unemployment. If a job seeker takes up an agency job during an recession he might in addition send a positive signal about his productivity as he was at least able to find a job, albeit temporarily. In contrast, taking up an agency job during a boom and falling back to open unemployment might attach a negative stigma to the worker as the worker might have been only able to find a temporary job. Overall, one would expect that both the in-treatment effect and post-treatment effect should be counter cyclical.

We find that agency work does not serve as a bridge into regular employment while being in treatment. However, we did find a strong positive post-treatment effect. Moreover, we provide evidence that the in-treatment and post-treatment effect are counter cyclical. The post-treatment effect is less volatile over the business cycle compared to the in-treatment effect. Taking together both, in-treatment and post-treatment effect, we show that having had at least some agency experience during an unemployment episode might benefit workers. This effect is positive and pronounced in periods with slack employment demand. In upturns, however, long treatment durations might harm workers.

The paper is organized as follows. Section 2 presents the temporary help sector and the unemployment insurance system in Germany. Section 3 explains the estimation strategy. Section 4 presents the data and main descriptive statistics. In Section 5 we discuss the results; Section 6 concludes.

2. Institutional setting

In Germany all temporary agency workers are eligible for social benefits, have access to health insurance, holiday leave, and statutory pension plans. Agency workers who have been employed for more than six month with the agency are covered by the rather strict employment protection legislation. As all other wage and salary workers agency workers are eligible to receive unemployment benefits if the jobseeker was employed for at least 12 months during the past two years. The maximum entitlement duration is 12 months for workers aged below 55, which is the group we are interested in this paper[2]. If a jobseeker does not fulfill the eligibility criteria, she can claim unemployment assistance which is mean tested.

Temporary agency employment is regulated by national legal statutes since 1972. Since the 1980s the law on temporary agency employment have been amended several times while EPL for regular workers remained by and large the same. Most reforms in the 1980s and 1990s aimed to increase the flexibility of the user firms by prolonging the maximum period of assignment. The major purpose of the reforms after 2000 was to decrease the sizable wage gap between temporary agency workers and workers employed outside the sector (for an overview of the regulations see Burda and Kvasnicka 2006). However, the effect of these reforms were small. Although Antoni and Jahn (2009) find that the prolongation of the maximum period of assignment increased slightly the employment duration of agency workers, Jahn (2010) could not find any impact on the size of the pay gap. Moreover, it seems

[2] Further details about the unemployment insurance system in Germany and their changes during the Hartz reforms can be found e.g. in Lechner and Wunsch (2009) for the period before 2004 and e.g. in Dlugosz et al. (2014) for the period afterwards.

that the reforms had no significant effect on the growth of the temporary help service sector (Jahn and Bentzen, 2012).

Germany is one of the biggest markets for agency work European wide. In 2012 about 900.000 workers or 2.2 percent of the workforce were employed at a temporary work agency. At the same time, the share of agency workers of the total European working population was approximately 1.6 percent (CIETT 2015). Despite the relatively small size of the sector agency employment is an important pathway out of unemployment. In 2012 roughly 54 percent of the agency workers were previously unemployed and 10 percent not employed (Federal Employment Agency 2015).

Nevertheless, agency jobs are spot-market jobs which tend to be rather short: The median duration of an agency job is about 12 weeks. The high share of agency workers coming from unemployment, the concentration of low skilled workers in the sector, and the fact that working conditions in this sector are poor are the reasons, why the stepping stone effect of agency employment has become central to the policy debate about temporary agency work in Germany.

Agency employment clearly acts as a buffer over the business cycle: During the recent economic crisis there has been a substantial drop in the number of agency workers. In 2008 about 800.000 workers were employed in the sector while in 2009 only about 600.0000 were still employed at an agency. The Federal Employment Agency estimates that around 70 percent of the total job loss during the financial crisis in 2008 was due to lay-offs in the sector (Federal Employment Agency, 2012). After the crisis the temporary help service sector recovered fast. By 2010 the temporary help service sector has again fully recovered.

[Figure 1 about here]

The dynamic nature of agency work is also reflected by its volatility over the business cycle. The first differences of the log of the stock of agency workers and unemployed persons are shown in Figure 1 which confirms a clear pro-cyclical pattern.[3]

[3] As high-frequency data contain some short-run noise, a centered, 12-period moving-average filter has been applied to the time series before differencing the data.

Likely reasons for the importance of temporary agency employment in Germany are, the high matching efficiency of the temporary help service sector compared to the public employment service (Neugart and Storrie, 2006) and considerable productivity gains for firms complementing their permanent workforce with temporary agency employment (Hirsch and Müller 2012). These explanations are also in line with the perception that the extensive regulation of fixed-term contracts in Germany along with the strict employment protection legislation makes is attractive for user firms to adjust their workforce through temporary agency workers (Mitlacher 2007; Venn 2009). In contrast to southern European countries (Bentolila et al. 2012) fixed-term contracts only play a minor role for the flexibility of the firms. The share of workers with fixed-term contracts has only slightly increased since 1985 (Destatis 2013) and about 56 percent of them were converted to permanent contracts in 2011 (IAB 2012). This is important to bear in mind when investigating the stepping stone effect of temp employment in Germany.

3. Modelling the cyclicality of the treatment effects

3.1. Baseline Model

As unemployed workers do not take up agency jobs at random, we have to distinguish the causal effects of agency employment from selection effects. If unobserved variables influence the selection process as well as the potential outcomes, an approach based on the CIA will result in biased estimates. We therefore employ the timing-of-events approach, formalized by Abbring & van den Berg (2003a), and analyze the time from inflow into unemployment until regular employment is obtained. This enables us to exploit random variation in the observed moment of transition from (full-time) unemployment to agency employment and thus to separate selection effects from causal effects.

We sample workers at the point in time when they enter unemployment and analyze how long it takes them to find regular work, and whether having worked for a temp agency while unemployed accelerates this process. The duration modeled is therefore the time from becoming unemployed to

finding a regular job. The take-up of agency work during this period is considered the treatment, the effect of which we want to estimate.

Let T_u be a continuous random variable measuring the time from becoming unemployed to being hired into regular 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 regular job is assumed to be a Mixed Proportional Hazard (MPH):

$$\theta_u(t \mid x, d_1(t), d_2(t), \upsilon_u) = \lambda_u(t)\exp[x\beta_u + (1\ z)d_1(t)\gamma_1 + (1\ z)d_2(t)\gamma_2 + \upsilon_u] \qquad (1)$$

The hazard function is the product of a baseline hazard, $\lambda_u(t)$, depending on the elapsed unemployment duration, and a scaling function depending on observed variables, *x*, an unobserved variable υ_u, and two time-varying indicators, one for being employed by a temp agency at time t, $d_1(t) = 1$, and one for having been a temp during the current unemployment spell before t but not a temp at t, $d_2(t) = 1$. $(1\ z)$ is a $(K+1)$ vector of unemployment rate dummies, and γ_1 is a $(K+1)$ parameter vector, and similarly for γ_2.The coefficients γ_1 and γ_2 thus capture the in-treatment and post-treatment effects of temp jobs on the hazard rate into regular employment, respectively. In case of repeated treatments the in-treatment indicator is again $d_1(t) = 1$ while the post-treatment effect is $d_2(t) = 1$. Hence, we estimate a weighted average treatment effect of the respective treatment spell.

When evaluating 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 *a priori*. 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 agency employment as a screening device. In this case, agency workers may receive an offer for a regular 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 regular employment. A negative post-treatment effect would normally

be interpreted as some type of stigma. If temporary agency employment is to act as a bridge into regular employment, then either γ_1 or γ_2 (or both) should be positive.

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

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

where $l = 0, \ldots, 11$ is a subscript for the 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 6 months into monthly intervals. From the 7th month on, we split the time axis into quarterly intervals up to 2 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 agency work, i.e. the decision to take up a temp job while being unemployed. Let T_p denote the time from becoming unemployed until the person finds an agency job. Note that we in a sense consider temp periods to be part of the unemployment spell, hence, if T_p is observed, it is shorter than T_u. Specifying once again a MPH function, the transition rate into temporary agency jobs is specified as:

$$\theta_p(t \mid x, \upsilon_p) = \lambda_p(t)\exp[x\beta_p + \upsilon_p] \tag{2}$$

The unobserved random variables, υ_u, υ_p, are allowed to be correlated, which implies a correction for the potential endogeneity of the treatment status. As we have multiple unemployment spells for some jobseekers, the values of each unobserved heterogeneity term is assumed to be specific to the individual.

We first estimate the model without unobserved heterogeneity, and then we proceed by adding an additional point of support to the distribution of unobservables (that is, we estimate values of υ_u, υ_p and an associated probability restricted to lie between 0 and 1 through logistic transformation). If the Akaike Information Criterion is satisfied, we proceed by adding another support point, and we continue

to do so until the likelihood does not improve enough to satisfy the Akaike Information Criterion. This procedure allows for unrestricted correlation between the different unobserved variables and 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.

3.2. Key identifying assumption

In this sub-section, we will deal with three issues; first, we will motivate treating a temp job as part of the unemployment spell rather than as a separate state. Second, we will discuss the MPH assumption and the assumption of random variation in the timing of treatment. Finally, we will briefly discuss general equilibrium effects.

We perceive the temp job as part of the unemployment spell, that is, our outcome of interest is the time from initiation of an unemployment spell until regular employment. The counterfactual situation is one of continued unemployment until employment, so in this context and given its relatively short median duration, we believe that the most appropriate way of modeling the temp job is to perceive it as an activity undertaken during a spell of unemployment.

The Mixed Proportional Hazards assumption is fairly standard, but nevertheless crucial. We are not aware of any tests of its validity in the German context. Still, the presence of multiple spells - 3-4 on average per individual - implies that the distribution of unobserved variables is much better identified, and its identification relies less on the MPH assumption (e.g. Abbring & van den Berg 2003a, b; Brinch 2007; Gaure *et al.* 2007).

Under the assumption that unobserved characteristics are time-invariant and that there is no anticipation of treatment, random variation in the timing of the first temp job during the unemployment spell identifies its causal effect. Moreover, no additional exclusion restriction is necessary to identify the parameters of this model. In that sense, the random variation in the timing acts as an instrument or as an exclusion restriction in the class of models popularly known as Heckman selection models (e.g. Heckman *et al.* 1999).

The non-anticipation assumption implies that the individual is supposed not to know more about the moment when the agency job starts than is captured by the distribution of this duration. Anticipation in our model would occur if the jobseeker would know for too long in advance precisely when she will start a temp job. The non-anticipation assumption is crucial to rule out changes in behavior before the actual treatment takes place.

Next, we discuss the sources of this random variation. First of all, the unemployed worker should realize the possibility of signing up with a temp agency. Note that in Germany the information on the presence of temp agencies is not abundant. Hence, there will be a source of randomness in the arrival of information on the possibility of getting enlisted in a temp agency. Next, there may be some random variation in the time from approaching the agency until the jobseeker is actually listed in their pool of available workers. Subsequently, there may be some random variation, from the perspective of the individual in the arrival of temp job offers, that is, from the demand side. There is considerable variation between agencies in the amount of effort they put into this process and how time-consuming it is. In general, when a worker decides to enlist with a temp agency, she simply contacts the relevant agency, which then evaluates her qualifications. This typically involves a face-to-face meeting with an employee at the agency. The agency may also reject an applicant on the grounds that it would be difficult to find temp employment for that person.

Once a worker is listed in the database of an agency, the time from enlisting until the first temp job depends on the qualifications of the applicant and on demand side factors, such as the event of employee sickness requiring a substitute in a firm, or a temporary increase in the demand for its goods or services. Most often, the time from an order is placed until the person has to begin the temp job is short, ranging from the next morning up to a couple of weeks. In cases where middle management positions have to be filled, the time span can be longer.[4]

This discussion implies that there is considerable variation in the timing of the first temp job, which can also be seen from the descriptives in Section 4. Moreover, quite a bit of this variation can be

[4] This is one reason why we have excluded temp workers in management positions in the empirical part of the paper as in this case the non-anticipation condition might be violated, see Section 4.

considered exogenous to the individual unemployed worker due to information frictions, search frictions, variation in hiring processes of agencies, and demand side random variation due to events (sickness etc.) in firms requiring temp workers. Finally, the violation of the non-anticipation assumption appears to be also minor, due to the typically very short time from notification until the actual temp job starts.

Our estimations are performed at the micro-level, and we implicitly assume that agency jobs do not affect the exit rate from non-treated unemployment to regular jobs. However, we cannot rule out the possibility of equilibrium effects on the demand and supply side of regular jobs. Still, the share of agency workers in Germany is rather small. Even in the biggest markets for temporary help services in Europe like the UK and Netherlands the share of agency workers is only about 3 to 4% (CIETT 2014). Consequently, we believe that general equilibrium effects are a minor concern in our case.

3.3. Endogeneity of the duration of agency employment duration

However, there is an additional potential source of endogeneity, which might be important when analyzing the stepping stone effect of agency employment; the endogeneity of the duration of the temp job itself. To check whether the selection out of temp employment and back into open unemployment affects our results, we refine the timing-of-events approach by modeling explicitly the treatment duration.

Let T_d denote the duration of the temp job. The temp job may end by a transition directly into regular employment, which is already modeled in equation (1) above. If this occurs, the treatment duration T_d is treated as censored. Hence, T_d measures the (potentially latent) time from the beginning of a temp job until a transition back into open unemployment occurs. The treatment duration is modeled in the following way:

$$\theta_d(t \mid x, t_p, z, \upsilon_d) = \lambda_d(t)\exp[x\beta_d + f(t_p) + z\delta + \upsilon_d] \tag{3}$$

Note that we condition on the time taken until the treatment has begun. This is included as a step function, using the same intervals as those used for the baseline hazard function (except we collapse

the last 5 intervals, since there are very few temp jobs lasting longer than 52 weeks). As further controls, z, we included the wage received during the temp job, the number of previous treatments, as well as the accumulated number of weeks in temp jobs before the current temp spell.

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

$$L(\upsilon_u, \upsilon_p, \upsilon_d) = \prod_{i=1}^{N} L_i(\upsilon_u, \upsilon_p, \upsilon_d)$$

where

$$\begin{aligned} & L_i(\upsilon_u, \upsilon_p, \upsilon_d) \\ & = \theta_p[t_{pi} \mid x_i, \upsilon_p]^{I[t_{pi}<t_{ui}]} \theta_d[t_{di} \mid x_i, t_p, z, \upsilon_d]^{I[t_{pi}+t_{di}<t_{ui}]} \theta_u[t_{ui} \mid x_i, d_1(t_{ui}), d_2(t_{ui}), \upsilon_u]^{C_i} \\ & \times \exp\left\{ - \int_0^{t_{pi}} \theta_p[s \mid x_i, \upsilon_p] ds - \int_0^{t_{di}} \theta_d[t \mid x_i, t_p, z, \upsilon_d] dt - \int_0^{t_{ui}} \theta_u[r \mid x_i, d_1(t), d_2(t), \upsilon_u] dr \right\} \end{aligned} \quad (4)$$

As we sample a 2% random sample of all temp job participants but only 0.5% of the nonparticipants, the econometric models are estimated using the weighted exogenous sampling maximum likelihood estimation method (Manski & Lerman 1977) precisely as in van den Berg & Vikström (2013). This sampling scheme is frequently used in economics; in case of maximum likelihood it provides a consistent but not fully efficient estimator.[5]

The distribution of unobserved variables is approximated non-parametrically by a bivariate discrete distribution with M mass points (Heckman & Singer 1984; Gaure *et al.* 2007).

3.4. Calculating the expected remaining unemployment duration

The overall effect of having a temp job on the expected remaining unemployment duration gives an impression of the combined effects of in- and post-treatment effects. It obviously depends on the

[5] Ideally, we should have used the sandwich estimator for the covariance matrix. However, due to problems in calculating the numerical Hessian matrix, we used the inverse of the cross-products of the score vector.

timing and duration of the treatment as well as on individual characteristics. We follow e.g. Kyyrä *et al.* (2013) and consider the following treatment effect:

$$\Delta(t_p, t_d) = E[T_u - t_p \mid T_p = t_p, t_d, T_u > t_p] - E[T_u - t_p \mid T_p = \infty, T_u > t_p] \quad (8)$$

where t_p denotes the elapsed unemployment duration at the time of entry into a temp job and t_d is the (intended) duration of the temp job. Hence, $\Delta(\cdot)$ measures the effect on the expected remaining unemployment duration of entering a temp job at t_p and holding it for (at most) t_d weeks.

4. Data and descriptive statistics

In order to investigate the stepping stone effect of agency employment, we need detailed high-frequency data on unemployment durations and subsequent jobs over a long period of time, encompassing several business cycles. For our purpose, we combine two administrative data sets for the period 1980-2012: the Integrated Employment Biographies (IEB) and the Establishment History Panel (BHP) provided by the Institute for Employment Research (IAB).

The IEB comprises all wage and salary employees as well as all registered unemployed with the German social security system (for details on the IEB, see Jacobebbinghaus 2007). This data set contains information on unemployment and job durations at a daily frequency, transitions, wages, and worker characteristics. Since the information of the IEB is used to calculate social security contributions and unemployment benefits the data set is highly reliable and especially useful for analyses taking wages and unemployment durations into account. To this data set we merge the BHP which again stems from the German social insurances and provides information on the firms.

This dataset also contains observations for East German workers from 1992 onwards, restricting our analysis to the post-unification period would markedly reduce our period of observation and thus the scope of the paper. Moreover, including East Germany in our analysis would mix up business cycle effects and those effects stemming from the transition of a socialist planned economy to a market economy. We will thus focus our analysis throughout on individuals entering unemployment in West

Germany (excluding Berlin) during the period 1985-2012 and further restrict it to males aged 20-55 years to circumvent selectivity issues regarding female employment and early retirement.

We identify employment spells in temporary help agencies by an industry classification code. For the analysis, we use a two percent random sample of all individuals who were employed by a temporary work agency at least once during their employment career and a 0.5% random sample of all other individuals for the period 1980-2012. The information for the period 1980 to 1984 is used to construct the previous employment history of the job-seekers.

An unemployment spell is defined as a sequence of days during which a person receives either UI benefits or unemployment assistance or is employed at a temp agency. Unemployment spells continuing until the end of the sample period are treated as independently right-censored observations (3% of all spells). The dependent variable is the unemployment duration measured in days. We define the destination "regular employment and apprenticeship" as non-temp employment.[6]

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, in order to insure that workers have at least some attachment to the labor market and to exclude students temping during education we require that the jobseeker must have been at least for 90 days wage and salary employed during the past five years. Second, temp workers cannot be distinguished from the administrative staff of temporary employment agencies. However, we do not expect this to affect our estimations, since the absolute number of the 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. Moreover, we exclude individuals who hold management positions, as it is likely that they belong to the staff of the agency.[7] For the same reason, we exclude temp workers with a temp spell lasting more than two years. After this sample selection, the sample consists of 78,973

[6] Our dataset does not provide information on direct-hire temporary contracts. However, fixed-term contracts only play a minor role in Germany, see Section 2.

[7] Antoni and Jahn (2009) provide evidence for share of staff belonging to the agency among all workers working in the temporary help service sector Germany and show that agency staff members account for about 7% 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 experiences fewer transitions into and out of jobs than the temp workers themselves.

individuals experiencing a total of 264,420 unemployment spells. Thus we observe on average about 3.3 unemployment spells per person.

In addition, the following socio-demographic variables are used: age (3 dummies), married or not, having no German citizenship, child in the household, and education (2 dummies). In addition, we have information on whether the worker receives unemployment benefits or unemployment assistance. As a proxy for the human capital and employability of the worker, we use the employment history of the past five years: previously employed (in the temporary help sector, as apprentice, or regular employed, which is the reference category), or out of the labor force. Moreover, we control for the fraction of time spent in agency and regular employment during the past five years, the number of regular jobs held (three dummies, 1, 2-4 and more than 4) and whether the worker made already an agency experience during the past five years. In the endogenous treatment duration we in addition include five dummies for the occupation of the agency job and the log of the deflated wage to control for the type of agency job which might vary over the business cycle.

Finally, we include dummies for the year and quarter as well as the aggregate centered unemployment rate (for West Germany)[8]. All controls, except the two treatment indicators, the occupation dummies, the log wage during treatment, the year and quarter dummies, and the unemployment rate, are measured at the beginning of the unemployment spell. However the time-invariant regressors can vary over different spells for the same person.

Table 2 presents key descriptive statistics for the treatment and the control group divided by upturn and downturn at the beginning of an unemployment spell. Unemployed from the treatment group are about 2 years younger less often married. Foreigners are clearly overrepresented in the treatment group. While about 30 percent of the treatment group received unemployment assistance at the beginning of the unemployment spell this is only true for 22 percent of the control group. During upturns the share of workers receiving unemployment assistance is slightly larger. With regards to the

[8] Note using the regional unemployment rate would mix up cyclical movements of unemployment over time and structural differences in unemployment across regions which is the reason we use the aggregate unemployment rate. We also experimented with including regional dummies to the estimations. It turned out that they do not affect the results. To lower the computational burden we have dropped these dummies from the estimations.

previous labor force status there are only minor differences. About half of the unemployed in the treatment group were employed before registering for unemployment benefits or assistance and 64 percent of the control group were previously unemployed. However, unemployed from the treatment group held more often a temp job before becoming unemployed, that is, they went from regular employment or out of the labor force to temp employment and then into open unemployment. Interestingly the share of unemployed being temp worker previously to entering unemployment is higher during upturn than during the downturn. As the timing-of events model does not allow for selection at time zero, inflow into unemployment always begins with an open unemployment spell.[9]

Of the 264,420 unemployment spells, 28,434 involve at least one agency work spell. There are strong differences in the median duration of unemployment. Median search for a regular job lasts around 3.5 months for the untreated group and 12.1 months for individuals who experienced a temp spell during unemployment. During downturns the median unemployment duration is about one months longer for the control group and two months longer for the treatment group. Table 2 also shows that 40 percent (60 percent) of the treated (control) group ultimately ended up in regular employment. About 9 percent of the unemployment spell of the treatment group are right-censored and 3 percent for the control group.

The median time until first accepting an agency job is about 4.7 months when the unemployment episode started in a downturn and 3 months when unemployment started in an upturn. The median duration of a temp spell is about 2.7 months during a downturn and 3 months during an upturn and the average number of separate temp spells (separated by unemployment) during an unemployment spell (given that there is at least one temp spell) is 1.2. About 15 percent of the unemployment spells of the treated group experienced more than one temp job during the unemployment spell.

Figure 2 displays the hazard rate to temporary agency employment which measures the probability of entering agency employment at a given day for those who are unemployed at the beginning of the day. The hazard rate to agency employment starts at about 0.08 percent per day and decreases over

[9] As a robustness check we also estimated our baseline model excluding those unemployment spells. The results are robust to these changes.

the first year of unemployment to a level of around 0.03 percent and decreases only slightly afterwards. The visible variation in the probability of entering agency employment documents that there is some exogenous variation in the time until being treated, which is one key identifying assumption of the timing-of-events model.

[Figure 2 about here]

The Kaplan-Meier hazard rate, which is measured from the time of unemployment entry in days, for the transition to employment for the non-treated starts at a level of 0.45 percent and gradually decrease thereafter. Note that the hazard rate jumps up after one year. One likely reason is that after one year unemployment benefits run out for most workers and unemployment assistance is means tested. The hazard rates for the transition to employment for the treated starts by construction much lower as they have been treated before leaving unemployment. It peaks after about 12 months and then stays constant. After 18 months, the exit rate for the treated lies slightly above the hazard rate for the non-treated. This pattern suggests that the dynamics of the job search process as well as the selection process are important, i.e. conditioning on unemployment duration is crucial when investigating the stepping stone effect of agency employment.

5. Results

5.1. Selection into temporary employment and back to open unemployment

Results of the selection equation the treatment equation and the hazard equation are shown in appendix Table A1 for the model with the endogenous treatment equation and six support points. First of all, duration dependence in the selection equation is decreasing with the time being unemployed. Young workers below the age of 25 (the reference group) have a much higher transition rates to temp jobs than older workers. Workers aged 45 have the lowest transition rate into temp jobs. Being married is associated with a higher probability of receiving treatment. Having a children in the household lowers the probability of being treated. The transition rate of workers without Germany citizenship is considerably higher than for Germans. Moreover, we find that the high skilled workers are less likely

to take up temp jobs compared to low skilled workers which is likely due to the low-skilled nature of agency jobs. Median skilled unemployed are more likely than those with no educational degree. Finally, the transition rate into temporary agency work decreases with the fraction of time the person was regular employed and increases with the fraction of time the person worked as an agency worker during the past five years. Workers receiving unemployment assistance have a lower probability to enter into an agency job. The transition probability also decrease in a downturn.

The treatment equation measures the time from the start of an agency job until the worker enters again into open unemployment. The duration dependence of the treatment equation is positive and decreases with time being in agency employment. The transition rate back into open unemployment is highest for workers aged 45-55. The probability to transit back to open unemployment is also higher for agency workers with foreign background, with children is the household, and for high-skilled workers. Employment experience be it in agency or regular jobs reduces the probability to re-enter unemployment. A higher wage during the treatment lowers the transition rate to unemployment. The probability to transit back into unemployment is highest for agency workers who accept manufacturing jobs. This is expected as particularly the manufacturing sector (automobile and aircraft) used agency workers to adjust their workforce to the high volatile product demand over the business cycle.

5.2. Cyclicality of in-treatment and post-treatment effects

Table 3 displays the results for the treatment effects. In a first step, we estimate a basic duration model with flexible baseline. In Model 1 we only include the two main explanatory variables, i.e. the in-treatment and post-treatment indicator but do not control for observable and unobservable heterogeneity and do not take into account selection out of the treatment to open unemployment. Model 1 in Table 2 indicates that there is a significant negative in-treatment effect, i.e. that currently working for a temporary work agency does significantly lower the transition rate out of unemployment compared to jobseekers who search for a regular job from open unemployment. The post-treatment effect is positive and significant, indicating that having worked at least once during the unemployment spell at a temporary work agency increases the hazard rate. The interaction term between both

treatment effects and the centered unemployment rate is not significant. The stepping stone effect of agency employment seems not to be cyclical.

[Table 3 about here]

Second, we estimate the same model but adding the covariates described in Section 4. After controlling for observed heterogeneity the in-treatment effect slightly decreases in absolute terms and the post-treatment increases by roughly 10 percentage points. Moreover, the interaction terms between the treatment effects and the unemployment rate becomes positive and significant. An increase of the unemployment rate by one percentage point above the mean increases the hazard rate by 6 % while being currently treated und by roughly 3% after having received treatment. The positive sign of both interaction terms thus confirm our theoretical expectations that the stepping stone effect is counter cyclical.

Third, we estimate the timing-of-events model, starting from a two point distribution of unobservables. We proceed, by estimating the same model, allowing sequentially for extra mass points as described in Section 3.1, freeing up the correlation structure of the unobservables. We add mass points as long as the Akaide Information Criterion improves (see e.g., Gaure *et al.* 2007). The results after adding six mass points are shown in Model 3, Table 3. Compared to Model 2 the negative in-treatment effect considerably increases in absolute terms by 10 percentage points. The results also show, that the in-treatment effect increases by about 6 percentage points (becomes less negative), if the unemployment rate increases one percent above the mean. After controlling for selection into agency employment and out of unemployment based on time-invariant unobserved heterogeneity the positive post-treatment effect decreases and the interaction term with the unemployment rate increases slightly.

Finally, Model 4 presents the results adding the equation for the treatment duration. As argued in Section 3, by adding the treatment duration equation to the timing-of-events model, we control in addition for selection back from agency work to open unemployment. This might be crucial, as selection might vary over the business cycle. To the treatment equation we in addition control for the occupations and the log of the daily wage in order to also take into account the type of agency jobs

which might vary depending on the state of the economy. Again, we add sequentially mass points until the Akaide Information Criterion is satisfied. The coefficients of the treatment effects barely change after adding four mass points. The results after adding six mass points are presented in Model 4, Table 3. The negative in-treatment and its interaction term with the unemployment rate does not react strongly to the inclusion of the treatment duration equation.

The negative in-treatment effect indicates that there might be a locking in effect at work. Taking up an agency job during unemployment lowers the transition rate out of unemployment by 24 percent. The negative in-treatment effect shows that taking up an agency job out of unemployment might reduce the search intensity for a regular job. Consequently, unemployment duration increases compared to workers not taking up such a short-term job opportunity. The negative in-treatment effect might be also an indication, that client firms use agency employment to buffer their workforce and the screening effect might not be important for user firms in Germany. The high negative lock.in effect might be also explained by the fact that agency jobs in Germany are with a median duration of about three months quite long. For example agency jobs in Denmark only last for about 6 weeks (Rosholm and Jahn, 2014). The interaction term of the in-treatment effect with the unemployment rate shows, that if economic conditions worsen the in-treatment effect becomes less negative. An increase of the unemployment rate above the mean lowers the in-treatment (in absolute terms) by 6 percentage points. This suggests that in a downturn, when nobody finds a job, agency employment might less harm the unemployed.

Having worked for a temporary work agency at least once earlier in the same unemployment spell causes a high positive post-treatment effect. The hazard rate to regular employment increases by about 35 percent. As with the in-treatment we find a positive counter-cyclical pattern. If the economy slows down (e.g. an increase of the unemployment rate about one percent above the mean unemployment rate) the exit rate to regular employment increases by three percent. Thus, the volatility of the post-treatment effect is less pronounced compared to the in-treatment effect. The positive post-treatment effects suggest that agency workers might be able to build up human capital during the temp spell or that they are able to build up productive job-search networks while being in

agency employment. That the post-treatment increases in a slump, when nobody finds a job, might indicate that particularly the search network might be a candidate for explaining the positive post-treatment effect.

In a next step we construct a quarterly time series of the long-run in-treatment and post-treatment effect from the data by combining quarterly information on the centered unemployment rate, the treatment effects and the interaction terms between the in-treatment effects and the centered unemployment rate.

[Table 4 about here]

Table 4 summarizes our estimates for the period 1985-2012 and shows that the aggregate unemployment rate varies considerably from 5.8 to 11.8 percent during over observation period. The long run treatment effects also vary markedly over our observation period with estimates for the in-treatment effect ranging from -43 % to -5 %. The post-treatment effect ranges depending on the state of the business cycle less pronounced between 26 % and 46 %. A plot of the time series of the treatment effects and the centered unemployment rate in Figure 3 suggests a substantial counter-cyclicality. Yet, the plot also reveals a strong seasonality in the elasticity series.

[Figure 3 about here]

5.3. Cyclicality and the level of unemployment

Up to now, we have found evidence that both the in-treatment and post-treatment move counter-cyclical. So far, we have restricted the impact of the aggregate unemployment rate on the treatment effects to be independent of the current state of the labour market, i.e. independent of the prevailing level of unemployment. However, deteriorating labor market prospects might be felt more by workers when the labor market is tight than in a situation with already poor outside opportunities. In other words, the impact of the aggregate unemployment rate on the long-run treatment effects might less pronounced for low levels of unemployment.

To check this surmise, we redo our analysis adding dummy variables for the unemployment rate and their interaction with the treatment effects as covariates to the model. We thus allow the impact of the aggregate unemployment rate on the respective treatment effect to depend on the prevailing state of the labor market.

[Table 5 about here]

As is clear from Table 5, which presents the main results obtained from fitting in the modified timing-of-event-model the coefficients of the interaction of the unemployment rate and the in-treatment effect are always statistically significant. The unemployment rate indeed has the worst adverse impact on the in-treatment effect if unemployment is low. The strong negative in-treatment effect at low unemployment rates points again to the irrelevance of the screening hypothesis on the transition to regular employment. While the changes of the treatment effect are moderate when the unemployment rate lies between 7% and 10 % once the unemployment rate reaches levels over 10 % the in-treatment effect is only moderately negative. It seems that if the unemployment rate is above 10 % nobody finds a job neither the treatment nor the control group and the lock-in effect does not play a major role.

Turning to the post-treatment effect we find that the post-treatment effect does not change for low unemployment rates ranging between 5.8 % and 9 %. The positive post-treatment effect becomes even more pronounced at unemployment rates above 9 %. This might indicate that either network effects or the acquisition of human capital play a role for the transition after having received treatment.

Taken together, these results point at the robustness of our main finding that both the in-treatment and post-treatment effect move counter-cyclical. Even more, they make clear that the counter-cyclicality is more pronounced in slack labor markets with high unemployment than in tight labor markets where lock-in effects deteriorate workers' search for regular jobs.

5.4. Expected remaining unemployment duration

To get an impression about the economic relevance of the treatment effect we compare in a next step the expected remaining unemployment durations for unemployed with and without treatment. To do so we follow the approach outlined in Section 3.4 and calculate the expected remaining unemployment duration of entering an agency job at a given unemployment and treatment duration compared to the counterfactual of having not received treatment, i.e the average treatment effect on the treated. For each combination of t_p and t_d, we calculate expected remaining durations and the effect of treatment for all individuals in the sample and then take the sample averages. We do this exercise for low unemployment rates (5-7%), median unemployment rates (8-9%) and high unemployment rates (>10%).

[Figure 4 about here]

In Figure 4, Panel A we vary the treatment duration in intervals of 15 days for the median time until entry into the first temp job which is 111 days. In order to interpret the results more easily we display the ATT in days in absolute terms. If the economy is in a recession with unemployment rates being above 10 %, the ATT is highest. Taking up a temp job during unemployment reduces remaining time in unemployment for the treatment group by 154 days if the agency jobs lasts two weeks (15 days). The gain from treatment is less pronounced if the duration of the agency job increases. But even if treatment last about one year the effects is positive, i.e. the expected remaining unemployment duration for the treated is about 58 days shorter. Once the business conditions improve the gains from receiving treatment become less pronounced. At the unemployment rate between 8% and 9% the gains are 109 days it the agency job lasts 15 days. This gain turns into longer unemployment duration of about -3 days in case of a treatment duration of one year. In tight labor markets the treatment harms workers with treatment durations lasting longer than 240 days. After one year the unemployment duration increases by 58 days.

Panel B in Figure 4 investigates whether the treatment effect varies with the time entered to the first temp job at constant treatment durations of 91 days (median). Panel B makes clear that workers

at the median treatment duration always benefit from having received treatment. The expected remaining unemployment duration decreases at most when unemployment is high. The gain is largest for those who entered into treatment after having been unemployed for more than two years (117 days). In line with the results of Table 5 there are no differences for unemployment rates between 5.8 % and 9 %.

6. Conclusion

The question whether temporary agency employment is a bridge into regular employment has been investigated thoroughly. Up to day, the empirical literature is ambiguous. While some studies find evidence for a positive stepping stone effect other studies provide evidence that agency employment is not a springboard into regular employment. However, the demand for agency employment is strongly cyclical and thus we would expect the stepping stone effect being cyclical as well. We argue that the cyclicality of the stepping stone effect of temporary agency employment could provide an explanation why the evidence on the stepping stone effect is ambiguous so far.

We find that the stepping stone effect is indeed strongly counter-cyclical. Agency work does not serve as a bridge into regular employment when the labor market is tight. The likely reason for the strong counter-cyclicality of the in-treatment effect is a strong lock-in effect. However, in slack labor markets the in-treatment effect increases.

We also find a strong positive post-treatment effect over the entire business cycle, which is counter cyclical as well. It seems that having had at least some employment experience during unemployment might benefit workers particular in periods with slack employment demand. One possible explanation might be that workers are able to build up job-search networks while working as a temp. These networks might be useful in a slump, when the unemployed have more difficulties finding a job.

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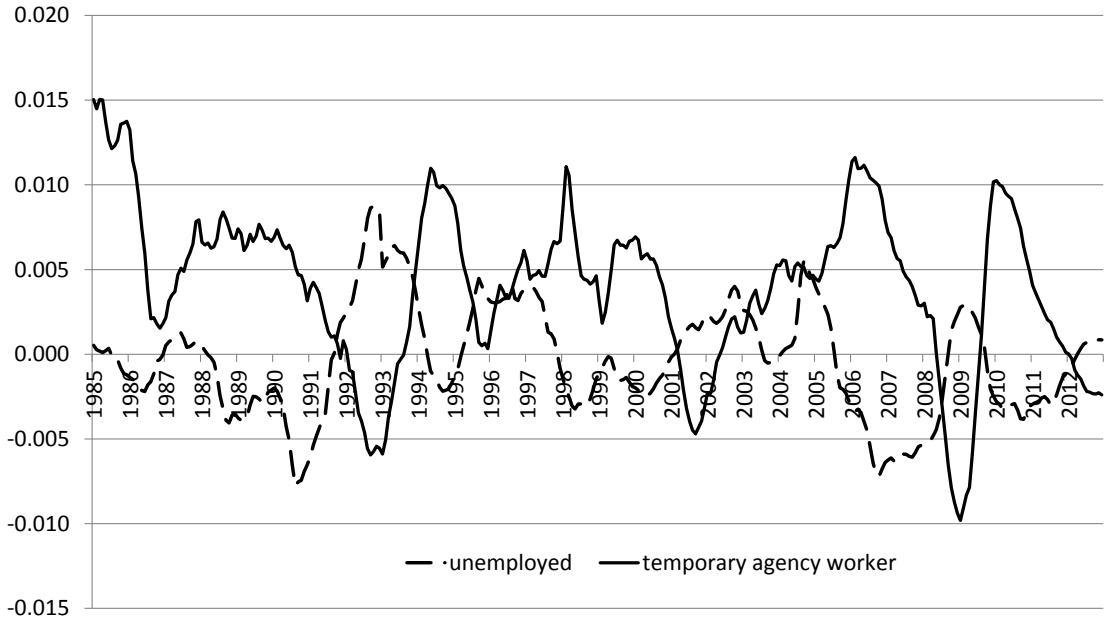
Tables and Figures

Table 1: The effect of temporary help employment of employment and earnings

Study	Sample	Outcome Variable	Method	Results
Amuedo-Dorantes et al. (2008)	Spain (1998-2004)	Employment	Matching	Agency workers are less likely hired on a permanent basis than workers on fixed-term contracts
Andersson et al. (2009)	US, five states (1993-2001)	Earnings	OLS	Higher post earnings for low income workers
Autor and Houseman (2010)	US, Michigan (1999-2003)	Employment and earnings	Quasi Experimental setting, IV	Lower post earnings, negative employment effect, higher welfare recidivism compared to direct hire fixed-term workers
De Graaf-Zijl et al. (2011)	Netherlands (1988-2000)	Employment	Timing of events	No positive effect on contingent workers except for foreign workers
Givord and Wilner (2015)	France (2002-2010)	Employment	Conditional likelihood, Logit model	Fixed-term jobs provide a path to permanent employment, while agency employment has no positive effect
Heinrich et al. (2009)	US, Missouri (1997 / 2001)	Employment and earnings	Multinomial logit	Positive effect on employment probability and post-earnings for TANF recipients
Heinrich et al. (2005)	US, Missouri and North Carolina (1993-1997)	Employment and earnings	Multinomial logit	Positive effect on employment probability and post-earnings for TANF recipients
Hveem (2013)	Sweden (2001-2008)	Employment and earnings	Matching and DID	Negative effect except for immigrants
Ichino et al. (2008)	Italy, Tuscany and Sicily, 2001	Employment	Matching	Tuscany positive effect; Sicily negative effect
Jahn and Rosholm (2013)	Denmark (1997-2006)	Employment	Timing of events	Positive employment effect for immigrants
Jahn and Rosholm (2014)	Denmark (1997-2006)	Employment and earnings	Timing of events	Positive employment effect and higher post wages
Kvasnicka (2009)	Germany (1994-2001)	Regular employment	Matching	In the short run negative effect, in the long run no effect, but reduces unemployment risk
Lane at el. (2003)	US (mid 1990s)	Regular employment	Multinomial logit, Matching	Positive employment effect
Malo and Muñoz-Bullón. (2008)	Spain (1990-1999)	Employment	Sequence analysis	No effect, except young women

Figure 1: Cyclicality of temporary agency employment



Notes: Labor Placement Statistics and Unemployment Statsistics, Federal Employment Service: The level values of the variables are smoothed by an 12-period centered moving average; first differences of log values are displayed at the vertcal axis.

Figure 2: Smoothed Kaplan Meier hazard rates out of unemployment to employment and temp jobs

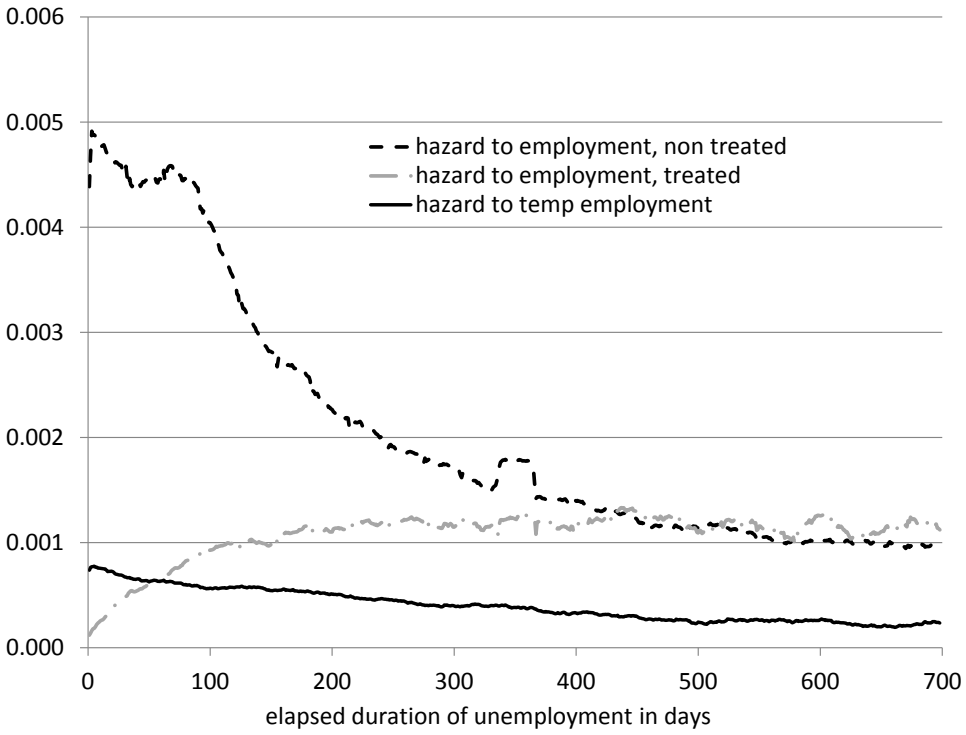


Figure 3: Cyclicality of the treatment effect

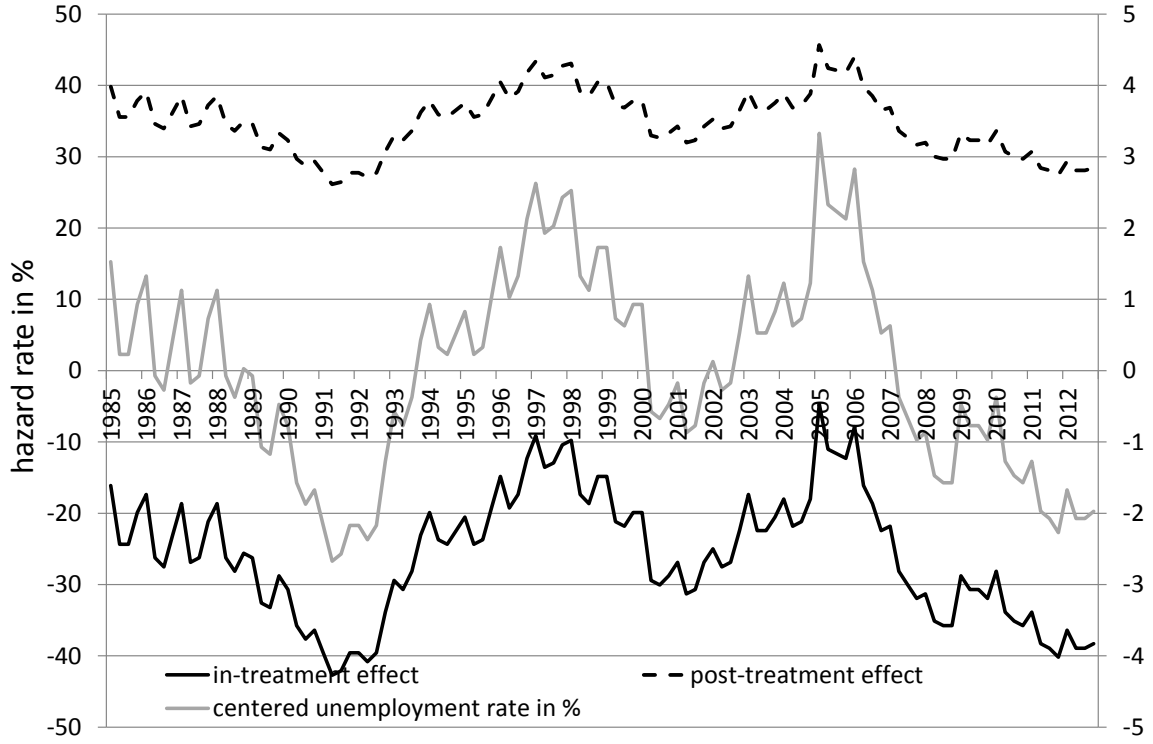


Figure 4: Average treatment effect on the treated in days

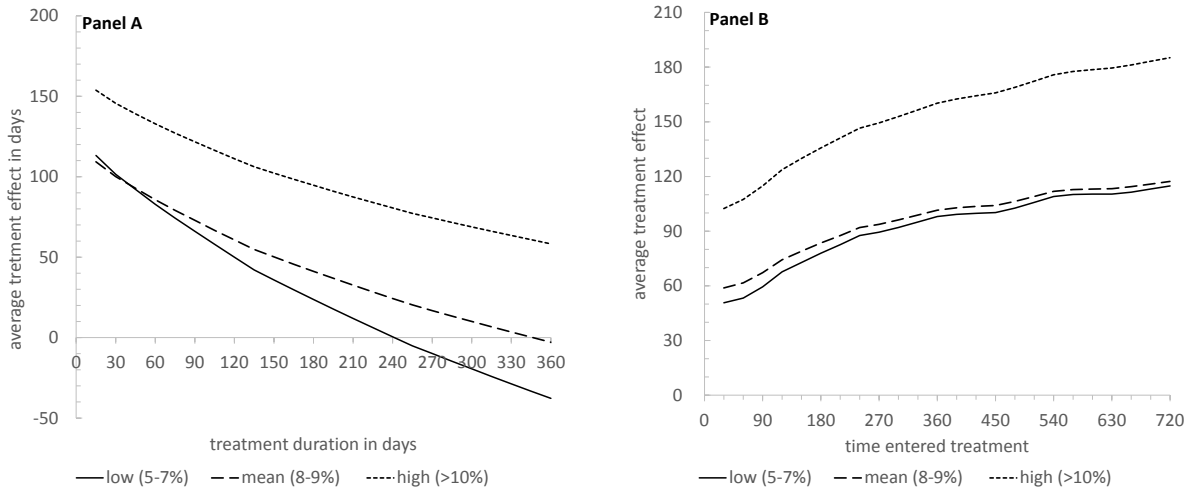


Table 2: Selected sample statistics

	Control				Treatment			
	Downturn		Upturn		Downturn		Upturn	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Average age	34.047	9.250	34.439	9.565	32.498	8.609	33.399	9.286
Married	0.421	0.494	0.386	0.487	0.358	0.479	0.309	0.462
Child in household	0.371	0.483	0.347	0.476	0.335	0.472	0.307	0.461
Foreign	0.236	0.425	0.224	0.417	0.308	0.462	0.285	0.452
Low qualified	0.189	0.391	0.190	0.392	0.216	0.411	0.218	0.413
Medium qualified	0.767	0.423	0.764	0.425	0.757	0.429	0.752	0.432
High qualified	0.044	0.205	0.046	0.210	0.028	0.164	0.030	0.171
Unemployment assistance	0.217	0.412	0.235	0.424	0.293	0.455	0.318	0.466
Previous regular employed	0.639	0.480	0.648	0.478	0.548	0.498	0.541	0.498
Previous temp	0.023	0.150	0.039	0.194	0.093	0.291	0.149	0.356
Previous apprentice	0.006	0.078	0.005	0.073	0.007	0.084	0.009	0.095
Previous out of labor force	0.332	0.471	0.308	0.462	0.352	0.478	0.301	0.459
Uspells ending in regular employment (%)	62.610		60.610		53.567		45.884	
Median unemployment duration (months)	4.008		3.055		13.405		11.236	
Median duration of agency spell (months)					2.727		2.990	
Median time until first accepting a temp job (months)					4.699		3.055	
Mean number of agency spells					1.226		1.228	
No. of unemployment spells	124,842		110,964		12,461		15,973	
No. of persons a)		58,222				20,751		
Number of unemployment spells per person a)		2.885				4.640		
Share right censored spells		2.801				9.099		

Notes: IEB V11.0, 1985-2012. a) Variable refers to persons who have been treated at least once during the observation period. All events refer to the business cycle indicator at the beginning of the unemployment spell. Further control variables are the fraction of time spent in regular and agency employment during the past five years, a dummy for having experience at least one agency job during the past 5 years, dummies for the number of regular jobs (1, 2-4, more than five) during the past three years, the time varying centered quarterly unemployment rate for Western Germany, and year and quarter dummies.

Table 3: In-treatment and post-treatment effects

	Model 1		Model 2		Model 3		Model 4	
In-treatment	-0.164 **	(0.012)	-0.154 **	(0.012)	-0.247 **	(0.013)	-0.258 **	(0.014)
In-treatment x centered unemployment rate	0.011	(0.008)	0.064 **	(0.012)	0.061 **	(0.009)	0.063 **	(0.009)
Post-treatment	0.291 **	(0.014)	0.387 **	(0.014)	0.316 **	(0.014)	0.348 **	(0.015)
Post-treatment x centered unemployment rate	-0.016	(0.009)	0.024 **	(0.009)	0.033 **	(0.009)	0.033 **	(0.009)
Control variables	N		Y		Y		Y	
Unobserved heterogeneity	N		N		Y		Y	
Treatment duration	N		N		N		Y	

Notes: IEB V11.0, 1985-2012. Standard errors in parentheses. **/* denotes statistical significance at the 1/5 % level. The distribution of the unobservables is approximated non-parametrically by a bivariate discrete distribution with six mass points. The time varying centered quarterly unemployment rate for West Germany is used as a business cycle indicator. In addition, Models 3 and 4 include three age dummies, two education dummies, a dummy for being married and having children, a dummy for having no German citizenship, the fraction of time spent in regular and agency employment during the past five years, a dummy for having experienced at least one agency job during the past five years, dummies for the number of regular jobs (1, 2-4, more than five) during the past five years, dummy variables indicating whether the workers was previously an agency worker, an apprentice, or out of the labor force, year and quarter dummies, and parameters for the distribution of the unobserved characteristics. In Model 4, the endogenous treatment equation in addition controls for the type of occupation during the agency job (5 dummies) and the log of the wage during the agency job.

Table 4: Unemployment rate and estimated treatment effects

	Mean	S.D.	Min	Max
Aggregate unemployment rate	8.472	1.377	5.800	11.800
In-treatment effect	-25.790	8.730	-42.733	-4.693
Post-treatment effect	34.840	4.489	26.128	45.688
Observations (quarters)		112		

Notes: IEB V11.0, 1985-2012. The in-treatment and post-treatment effects are estimated using the results from Table 3, Model 4.

Table 5: Treatment effects and prevailing level of unemployment

In-treatment (ref: 5.8-7%)	-0.409	**	(0.024)
In-treatment x unemployment rate 7-8%	0.133	**	(0.033)
In-treatment x unemployment rate 8-9%	0.164	**	(0.038)
In-treatment x unemployment rate 9-10%	0.170	**	(0.034)
In-treatment x unemployment rate >10 %	0.310	**	(0.041)
Post-treatment (ref: 5.8-7%)	0.295	**	(0.027)
Post-treatment x unemployment rate 7-8%	0.037		(0.036)
Post-treatment x unemployment rate 8-9%	-0.014		(0.046)
Post-treatment x unemployment rate 9-10%	0.117	**	(0.038)
Post-treatment x unemployment rate >10 %	0.090	*	(0.046)

Notes: IEB V11.0, 1985-2012. Standard errors in parentheses. **/* denotes statistical significance at the 1/5 % level. The distribution of the unobservables is approximated non-parametrically by a bivariate discrete distribution with six mass points. The time varying centered quarterly unemployment rate for West Germany is used as a business cycle indicator. In addition, Models 3 and 4 include three age dummies, two education dummies, a dummy for being married and having children, a dummy for having no German citizenship, the fraction of time spent in regular and agency employment during the past five years, a dummy for having experienced at least one agency job during the past five years, dummies for the number of regular jobs (1, 2-4, more than five) during the past five years, dummy variables indicating whether the workers was previously an agency worker, an apprentice, or out of the labor force, year and quarter dummies, and parameters for the distribution of the unobserved characteristics. In Model 4, the endogenous treatment equation in addition controls for the type of occupation during the agency job (5 dummies) and the log of the wage during the agency job.

Appendix

Table A1: Full estimation results

	Selection equation		Treatment equation		Hazard equation	
	Coef	SE	Coef	SE	Coef	SE
0-28	-9.473	(0.362)	0.195	(0.562)	-3.245	(0.026)
28-56	-9.495	(0.362)	-0.179	(0.562)	-3.109	(0.026)
56-84	-9.548	(0.362)	-0.500	(0.562)	-3.082	(0.026)
84-112	-9.631	(0.362)	-0.743	(0.563)	-3.035	(0.027)
112-140	-9.683	(0.362)	-0.878	(0.563)	-3.167	(0.028)
140-175	-9.667	(0.362)	-0.897	(0.563)	-3.373	(0.028)
175-245	-9.719	(0.362)	-1.104	(0.563)	-3.451	(0.028)
245-364	-9.847	(0.362)	-1.124	(0.562)	-3.675	(0.028)
364-546	-10.091	(0.363)			-3.802	(0.028)
546-728	-10.349	(0.363)			-3.977	(0.030)
728-1092	-10.575	(0.364)			-4.089	(0.030)
1092-	-11.186	(0.364)			-4.727	(0.032)
Age 25-34	-0.452	(0.018)	0.051	(0.023)	-0.246	(0.008)
Age 35-44	-0.624	(0.021)	0.180	(0.026)	-0.438	(0.010)
Age 45-55	-0.955	(0.024)	0.251	(0.030)	-0.748	(0.011)
Married	0.030	(0.017)	-0.041	(0.021)	0.136	(0.007)
Child	-0.130	(0.016)	0.094	(0.020)	-0.009	(0.007)
Foreign	0.127	(0.015)	0.035	(0.019)	-0.112	(0.008)
Medium skilled	0.136	(0.017)	-0.037	(0.020)	0.214	(0.008)
High skilled	-0.332	(0.039)	0.041	(0.055)	0.065	(0.017)
Prev. agency employed	0.424	(0.021)	-0.025	(0.026)	-0.199	(0.016)
Prev. apprentice	0.307	(0.069)	-0.033	(0.088)	0.157	(0.034)
Prev. out of the labor force	-0.164	(0.015)	-0.078	(0.019)	-0.410	(0.006)
Fraction regular employed	-0.133	(0.028)	-0.185	(0.036)	0.156	(0.012)
Fraction agency employed	0.847	(0.052)	-0.563	(0.064)	0.168	(0.035)
Agency experience (dummy)	0.066	(0.015)	0.048	(0.019)	0.185	(0.008)
1 regular job	0.052	(0.019)	0.134	(0.024)	0.361	(0.009)
2-4 regular jobs	0.075	(0.032)	0.262	(0.043)	0.567	(0.011)
5+ regular jobs	0.124	(0.004)	0.070	(0.004)	-0.065	(0.004)
UA	-0.202	(0.015)	0.133	(0.019)	-0.173	(0.007)
curate	-0.105	(0.019)	0.118	(0.023)	-0.135	(0.008)
Occ. personal services			-0.219	(0.056)		
Occ. commercial services			-0.252	(0.041)		
Occ. IT and natural sciences			-0.087	(0.093)		
Occ. other support services			-0.254	(0.024)		
Occ. Unknown			-0.142	(0.020)		
Daily wage (log)			-1.273	(0.023)		
in_treat					-0.258	(0.014)
post_tr					0.348	(0.015)
in*crate					0.063	(0.009)
po*crate					0.033	(0.009)
Points of support						
$ln\ \upsilon_1$	1.292	(0.384)	-0.739	(0.546)	-1.465	0.065
$ln\ \upsilon_2$	1.744	(0.350)	-0.598	(0.528)	-2.081	0.020
$ln\ \upsilon_3$	0.810	(0.351)	-0.207	(0.528)	-2.741	0.019
$ln\ \upsilon_4$	-0.819	(0.489)	1.871	(0.533)	-1.764	0.067
$ln\ \upsilon_5$	-0.972	(0.551)	-0.999	(0.701)	-1.111	0.024
Prbability masses (log transform)						
λ_1					-2.540	(0.173)
λ_2					0.049	(0.250)
λ_3					2.073	(0.143)
λ_4					2.006	(0.142)
λ_5					-0.972	(0.290)

Source: IEB V11.0, 1985-2012. Standard errors in parenthesis. The distribution of the unobservables is approximated non-parametrically by a bivariate discrete distribution with six mass points. In addition, the model includes year and quarter dummies.