Earnings Exemptions for Unemployed Workers: The Impact of Marginal Employment on Unemployment Duration and Job Quality

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Abstract

In some countries including Germany unemployed workers can increase their income by working a few hours per week. The intention is to keep unemployed job seekers attached to the labour market and to increase their job-finding probabilities. To evaluate the impact of this policy, we consider an inflow sample into unemployment and estimate multivariate duration models. While we do not find any significant impact during the first twelve months of unemployment, job finding probabilities increase for the long-term unemployed. Our results suggest that marginal employment leads to more stable post-unemployment jobs, but has no impact on wages.

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1 Introduction

Unemployment insurance (UI) systems provide benefit payments for unemployed job seekers. The amount of benefits usually depends on previous earnings and declines in accordance with the elapsed unemployment duration. Many studies have shown that more generous benefit schemes correspond with longer unemployment durations, while the empirical evidence of benefit generosity on job match quality is rather mixed and only some studies find positive impacts on post unemployment outcomes.[1] In general, UI systems have to strike a balance between the insurance component and the aim of providing the opportunity to search for suitable job matches on the one hand and disincentive effects and moral hazard on the other hand.

Besides a decreasing profile of benefit payments, different strategies exist to increase the outflow probability from unemployment to employment, and to avoid long spells of unemployment. Such strategies comprise active labour market policies (ALMP) including training programs, wage subsidies, public employment measures, job search assistance and monitoring schemes (see Card, Kluve, and Weber, 2010; Kluve, 2010, for recent overviews of the effectiveness of these program types). In some countries, the UI system is characterized by an additional feature: unemployed workers are allowed to work for a few hours per week during their job search and to keep a certain amount of the additional earnings without a reduction in unemployment benefits. Such a policy corresponds to an earnings exemption, which exists in many UI benefits and other social policy programs in Europe and North America, and generally aims to increase labour supply of specific labour market groups. Unemployed workers in Germany have an additional incentive to make use of this earnings exemption due to "marginal employment" (known as a "mini-job" in Germany). This is defined as employment below a certain income threshold where employees are exempted from social security contributions (SSC) and employers pay an overall reduced rate of SSC.

While the intention of such a policy for unemployed workers is to keep them attached to the labour market, its expected effects are ambiguous. On the one hand, marginal employment might increase the probability of taking up a regular job because it may lower human capital deterioration. Moreover, it

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[1] For example Belzil (2001), Tatsiramos (2009) and Caliendo, Tatsiramos, and Uhlendorff (2013) find evidence for positive impacts while van Ours and Vodopivec (2008) and Card, Chetty, and Weber (2007) find no impact of the generosity of unemployment benefits on job quality.

may be used as a positive screening device or probation period by potential employers before offering a regular job and may increase the probability of receiving job offers due to network effects, i.e., the mini-job might serve as a stepping stone to regular employment. On the other hand, the additional income should increase the reservation wage for taking up a regular job, which should prolong the unemployment duration. These effects may have an impact on both, the unemployment duration and the job match quality. Hence, the overall impact of entering marginal employment on subsequent employment outcomes is theoretically ambiguous. It is the aim of this paper to empirically assess the overall impact of entering marginal employment and making use of the earnings exemption on the unemployment duration and subsequent job quality of unemployed individuals.

Comparable to the German setting, unemployment insurance systems in Finland and Denmark allow unemployed workers to take up a part-time job if they still search for a full-time job. Kyyrä (2010) applies a "timing of events" approach and finds evidence for positive effects on the transition rate to regular jobs for Finland, while Kyyrä, Parrotta, and Rosholm (2013) find heterogeneous effects on the expected unemployment duration for Denmark. Both studies do not take post unemployment outcomes into account. However, to evaluate the effectiveness of this kind of policy it is important to know whether taking up a part-time job during unemployment has an impact on the subsequent job quality and whether this reduces the probability of re-entering unemployment.

In this paper we take into account the dynamic selection of unemployed job seekers into marginal employment by estimating discrete-time duration models for the duration of unemployment and the duration until entering a mini-job and allowing for correlation between these two durations based on unobserved characteristics. We additionally evaluate the treatment effect on the job match quality, i.e. we extend the model by estimating the duration of subsequent employment spells and a wage equation for the initial wage.[2] This framework allows analysing effect heterogeneity with respect to observed characteristics such as age, skill level and the previous working sector, and to investigate whether the treatment effect varies with the elapsed unemployment duration. Our analysis is based on detailed administrative data from an inflow sample of male workers into unemployment in West Germany in 2001.

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[2]For a similar approach in the context of training programs for unemployed workers see Osikominu (2013), and in the context of sanction effects Arni, Lalive, and van Ours (2013) and van den Berg and Vikström (2013). Jahn and Rosholm (2010) apply a similar method to analyse potential stepping-stone effects of temporary agency employment for unemployed workers.

Our results suggest that having a mini-job does not have any effect on the probability of finding a regular job within the first twelve months of unemployment. However, we find a significantly positive impact on the outflow probability for long-term unemployed workers. Simulations based on the average individual in our sample suggest that after a year of unemployment the expected remaining unemployment duration drops from 16.6 to 14.9 months for job-seekers with a mini-job. Moreover, the jobs taken up by job seekers who entered a mini-job during their unemployment spell are more stable compared with jobs found by the non-treated individuals. For the average individual the expected employment duration increases from 15.5 to 17.6 months if he entered a mini-job at the beginning of the unemployment spell. We find some evidence for effect heterogeneity with respect to observable characteristics: more skilled individuals and individuals who are not working in the construction sector appear to have slightly lower wages if they have taken up a mini-job during unemployment, while a higher local unemployment rate correlates with lower wages for these workers. We find a significantly higher transition probability to regular employment if the mini-job is in the same sector as the previous regular job.

The paper is organized as follows: Section 2 describes the institutional background and surveys relevant previous research. Section 3 presents the data and descriptive statistics. Section 4 describes the econometric approach. The results of the empirical analysis are presented in Section 5, and Section 6 concludes.

2 Institutional Background and Related Literature

2.1 Institutional Settings

During our observation period from 2001 to 2004 the unemployment insurance system was characterized by two pillars: unemployment benefits ("Arbeitslosengeld") and means-tested unemployment assistance ("Arbeitslosenhilfe"). Individuals were eligible for unemployment benefits if they were regularly employed subject to social security contributions for at least 12 months within the last three years. The benefit level relates to previous average earnings with a replacement rate of 60% (67% with children living in the household) of net earnings whereby earnings are capped by the social security contribution assessment ceiling. After the unemployment benefit entitlement expired – which ranges in that period from six to 32

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months depending on age and the time spent in employment in the previous seven years – individuals become eligible for means-tested unemployment assistance given they are still searching for a job, with a decreased replacement rate of 53% (57% with children). There has been no time limit for the receipt of unemployment assistance. In addition to these transfer payments, the unemployed in Germany are allowed to earn additional income through employment. The intention of this earnings exemption is to encourage the unemployed to take up marginal employment in order to stay attached to the labour market. Therefore, recipients of unemployment benefit and assistance are allowed to keep €165/month of additional earnings without suffering a reduction in transfer payments as long as their working time does not exceed 15 hours per week. Earnings above this threshold are fully withdrawn. While holding a marginal job increases the income during unemployment, unemployed job seekers have the same access to active labor market programs as unemployed job seekers without a marginal job.

While the German UI system is comparable to many other countries, unemployed individuals in Germany have an additional incentive to work for some hours during unemployment due to the concept of marginal employment. Marginal employment is defined as employment below a certain income level or as temporary employment for a fixed period, and is subject to reduced social security contributions. For 2010 the Federal Employment Agency reports about 7.3 million "marginal jobs", where around two-thirds of these jobs are held by individuals who do not have a regular job (including unemployed workers). The idea of marginal employment was primarily developed in the 1960's as an attempt to increase work incentives for groups with traditionally low labour force participation, including students and housewives/-men, etc. (cf. Rudolph, 1999).

Since 1999 marginal employment was restricted to a maximum of €325 per month, combined with a working time restriction of 15 hours per week, and temporary employment contracts were restricted to a maximum of two months or 50 working days per year. While employees have been exempted from social security contributions, employers paid only a fixed rate of 22%. In 2003, the income threshold increased from €325 to €400 per month, the working time restriction of 15 hours per week was abolished, and the SSC paid by the employer increased slightly to 23%. It is important to note that the mini-job reform in 2003 had no impact on the situation of unemployed workers. The conditions for additional earnings during the receipt of unemployment benefits, i.e., the exemption rate of €165 and working time restrictions of 15

hours per week, remained unchanged across the reform in 2003. Caliendo and Wrohlich (2010) show do not find any evidence for a significant impact of the reform on the unemployed, which is plausible since the incentive for the unemployed to take up marginal employment did not change within this reform.

2.2 Potential Impacts of Marginal Employment

We assume that unemployment is "involuntary", independent of having a mini-job during unemployment or not. This corresponds to the institutional setting, since the receipt of unemployment benefits implies specific job search requirements and – given a suitable job offer – the willingness to take up a regular full-time job. Similar to a job search model allowing for partial benefits presented by Ek and Holmlund (2011), this implies that individuals who receive unemployment benefits have a reservation wage for both types of jobs. The reservation wages depend on observed and unobserved characteristics. Unemployed workers without marginal employment search for a mini-job and for a full-time job simultaneously. The probability of entering a mini-job as well as the probability of entering a full-time job depends on the arrival rate and the reservation wage for the corresponding type of job. In this setting, having a mini-job might have an impact on the probability of receiving a regular job offer, on the search effort and on the reservation wage for a regular job.

On the one hand, marginal employment offers the unemployed job seeker the opportunity to gain some work experience during job search and thereby to maintain his professional skills. This effect should be especially relevant if the mini-job is related to the previous sectoral experience. Moreover, having a mini-job should increase the number of job-related contacts. This increase in the network should have a positive impact on the probability of receiving a job offer. A mini-job might also be used as a positive screening device or probation period by potential employers before offering a regular job. These effects may lead to an increased exit probability from unemployment to regular jobs. On the other hand, there exist potentially negative effects on the exit probability from unemployment. When having a mini-job, job seekers have less time to search for regular jobs, see Kyyrä (2010) for a similar argument in the context of partial benefit schemes. The increase in the income increases the utility from unemployment and therewith the reservation wage. These effects should lead to a lower exit probability to regular employment. Besides this effect, the increased income due to marginal employment may allow the unemployed to wait for

a better and more stable job, which could decrease the risk of re-entering unemployment. Given these arguments, the overall effect of having a mini-job on the exit rate to regular employment and the job match quality is ambiguous.

The existence of earnings exemptions and the possibility to hold a mini-job during unemployment should have an impact on the reservation wage and the search effort for full-time jobs, even for individuals who do not hold a mini-job. In order to investigate the job search behaviour in counterfactual policy designs, one would need to estimate a structural job search model. In this paper, we do not follow this approach. Instead, we estimate reduced-form models and focus on the causal effect of making use of the earnings exemption, i.e. of having a mini-job, on job search outcomes in the current institutional setting.

2.3 Related Literature

There exists a number of empirical studies investigating "stepping stone effects" of different employment types to enter regular jobs. For example, Cockx and Picchio (2012) analyse the impact of short-term jobs on subsequent employment outcomes in Belgium based on a multivariate duration model and find evidence for short-term jobs representing a spring-board to long-term jobs. Zijl, van den Berg, and Heyma (2011) find that temporary jobs shorten the unemployment duration in the Netherlands but do not lead to a higher proportion of unemployed workers having regular jobs. Jahn and Rosholm (2010) investigate the impact of temporary agency employment on job search outcomes of unemployed Danish workers and find positive effects especially in tight labour markets.

In Finland, unemployed workers are allowed to take up a part-time or a short full-time job with a duration up to one month whilst receiving unemployment benefits if they continue searching for a full-time job. Kyyrä (2010) applies a timing of events approach and his results suggest that this might have positive effects on the transition rate to regular jobs. He finds evidence for an increasing impact of taking up a short full-time job over the unemployment duration, i.e., for those who take up a short full-time job shortly after entering unemployment the treatment effect does not differ significantly from zero, but it becomes stronger with the elapsed unemployment duration. For part-time jobs he does not find evidence for effect heterogeneity with respect to the elapsed unemployment duration. Within a similar institutional setting in Denmark Kyyrä, Parrotta, and Rosholm (2013) find heterogeneous effects

of taking up a part-time job during job search on the expected unemployment duration, for example with respect to age, sex and marital status. Fremigacci and Terracol (2013) find for a similar French program a negative lock-in effect during treatment – subsidized temporary jobs during unemployment – and a positive post-treatment impact on the hazard rate to employment. None of the three studies take post-unemployment outcomes into consideration. There exist two studies investigating the effects of marginal employment on subsequent employment outcomes. Freier and Steiner (2008) find that marginal employment leads to a reduction in future unemployment and slightly increases cumulated earnings. In a study for Austria, Böheim and Weber (2011) find that marginally employed workers experience less frequent regular employment, more unemployment and lower wages compared to non-participants. Both studies apply a static propensity score matching approach not taking the dynamic selection over time into account.

3 Data and descriptive statistics

3.1 Dataset and sample definition

Our analysis is based on data from the administrative part of the *IZA Evaluation Dataset*. This dataset is based on the *Integrated Employment Biographies* (IEB) by the Institute for Employment Research (IAB) and consists of a random draw of unemployment entries between 2001 and 2008 (Caliendo et al., 2011). The IEB contains detailed information on employment subject to social security contributions, unemployment and participation in active labour market policy including wages and transfer payments. The data additionally include a broad range of socio-economic characteristic including education, family status and health restrictions. The data do not contain information about the working hours and periods in self-employment, working as a civil servant, or spent in inactivity. From this data we draw a random sample of inflows into unemployment in 2001. The unemployment spell must last at least two weeks and prior to this unemployment entry the individuals have to be employed subject to social security contributions for a minimum duration of three months to ensure that we have a "real" inflow sample into unemployment. Moreover, we exclude individuals who had a mini-job during the three months before entering unemployment because we want to model the inflow into the treatment. We restrict our

observation period from 2001 to 2004, since in a major reform of the German UI system was introduced in 2005.

Our sample is based on male individuals in West Germany. We focus on males because nearly all men work full-time if they have a regular job. In contrast, part-time work is much more common among females (see e.g. Haan, 2010). This implies that in some cases it is difficult to distinguish between preferred part-time jobs and mini-jobs for women during job searches in our dataset. Furthermore, the high share of part-timers among women renders an evaluation of wages in the first job after leaving unemployment difficult as we do not observe working hours. Since East and West Germany still differ substantially in terms of economic and labour market indicators during our observation period, we exclude East Germany from the analysis. As we are interested in the transition to regular employment and subsequent job stability, the adverse labour market conditions in East Germany might have distorting effects, making results difficult to interpret and transfer to other countries. Moreover, the share of unemployed individuals entering public employment programs is clearly higher in East than West Germany. Therefore, focusing on men in West Germany leads to a relatively homogeneous estimation sample. We further restrict our sample to men aged between 25 and 55. The lower age restriction is motivated by the educational system, and the upper by the retirement schemes in Germany. Our final sample thus consists of 24,131 individuals out of which we randomly draw an estimation sample of 10,000 individuals to reduce the computational burden. We follow each individual for 36 months from entry into unemployment onwards. In Germany most of employment spells start at the beginning of a month (and unemployment spells typically last until the end of a month). In our data set, around 60% of new employment spells start within the first five days of the corresponding month. Therefore we construct discrete time spell data in which one month corresponds to one time unit.

In our dataset we define two mutually exclusive labour market states: unemployment and regular employment. Individuals who are either registered as unemployed at the Federal Employment Office (with or without benefit receipt) or participants of programs of the Active Labour Market Policy are defined as being unemployed. During unemployment individuals might take up a mini-job. Individuals with a mini-job as a secondary job are defined as being regularly employed, i.e. the secondary job is

ignored. Regular employment is defined as employment subject to social security contributions.[3] We exclude any periods without information for more than one month and treat the corresponding spells as right-censored. This might be due to self-employment, employment as a civil servant, or not being available to the labour market. A further reason might be that individuals de-register as unemployment benefits elapse or are too low (compared to the administrative burden) yet still continue looking for a job. As our sample consists of prime-age men only, it is likely that individuals who are neither self-employed nor civil servants continue seeking a job independent of being registered as unemployed. Therefore, we examine the sensitivity of our results to this aspect in Section 5.3 and redefine uncovered periods as unemployment.

3.2 Descriptive statistics of transition processes

Table 1 provides the number of spells per individual spent in unemployment, in unemployment with a transition to a mini-job, and employment within our observation window. Due to the construction of our sample (inflows into unemployment) every individual has at least one unemployment spell. Almost half of all individuals have repeated unemployment spells and only a minority have five or more spells. Around 8,500 individuals never take up a mini-job during unemployment, and for around 2,900 individuals we do not observe a transition to regular employment.

[TABLE 1 AND FIGURE 1 ABOUT HERE]

Figure 1 depicts the hazard rates for the transition from unemployment to regular employment, and the take-up rate of mini-jobs during unemployment. The probability of leaving unemployment for a regular job is first increasing and – after around five months – decreases with the elapsed unemployment duration. Compared to the transition from unemployment to employment the probability of entering a mini-job is rather low, and does not vary strongly according to the elapsed unemployment duration.

3.3 Differences in observable characteristics

Table 2 provides descriptive statistics measured at the initial entry into unemployment in 2001. Results are depicted for the full and estimation sample, and in addition are separated by treatment status, i.e.,

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[3]To exclude low-income jobs, we determine a minimum income of 600€/month.

those who take up a mini-job during the 36 months and those who do not.

[TABLE 2 ABOUT HERE]

Of the 10,000 drawn individuals, 1,507 take up a mini-job during unemployment within our observation window. Comparing both subgroups in column three and four suggests that the group of individuals who take up marginal employment are on average lower educated in terms of both schooling and professional training. For example, around 13.5% among the treated individuals have no schooling degree, while this share is only around 9% for the non-treated. More than 40% of the unemployed workers who take up a mini-job do not have any occupational degree. The corresponding share among the comparison group is less than 30%. The sectoral distribution, the mean age and the family status is rather similar between treated and non-treated individuals, as is the situation on the local labour market measured by unemployment rate (quarterly information) and GDP per capita (yearly basis).[4]

3.4 Characteristics of mini-job spells

In our data we have information about the sector in which individuals have regular jobs and mini-jobs.[5] Table 3 displays the sectoral distribution of mini-jobs in our sample. They are primarily provided by the service and the construction sectors and this is similar among skilled and unskilled workers, although the share of unskilled workers taking up a mini-job in the service sector is larger (50.4%) than the corresponding share among skilled individuals (41.4%).

Table 4 and 5 depict a sectoral comparison of the mini-job with the previous and subsequent regular job, respectively. For instance, Table 4 shows that among all unemployed who take up a mini-job and previously worked in the construction sector, 75.2% have a mini-job in the same sector. We observe two patterns in Table 4. First, we see that many individuals take up a mini-job in the same sector in which they worked before entering unemployment. Second, if workers change the sector, they usually take up mini-jobs in the service sector. Table 5 suggests a strong correlation between sectors for the mini-job and the subsequent regular job. For example, 82.4% of the individuals with a mini-job in the construction sector and for whom we observe a transition into a regular job find employment in the construction

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[4]Both the unemployment rate and the GDP are measured on the level of 178 employment agency districts.

[5]Mini-jobs in our sample have a mean (median) duration of 4.7 (3) months.

sector. These numbers indicate that the mini-jobs are related to the sectoral experience and skills of the unemployed workers, which suggests that they might be relevant for the job-finding probability, for example by lowering human capital deterioration, as a screening device for potential employers or by increasing the probability of getting job offers due to network effects.

[TABLE 3, 4 AND 5 ABOUT HERE]

Further to the finding that unemployed with a mini-job are likely to find regular employment in the same sector, in Table 6 we present the shares of treated individuals who find a regular job in the same firm in which they have been marginally employed. In the upper panel we consider all transitions to regular employment with a mini-job at any time before. In the lower panel we only take into account spells in which the unemployed worker was still marginally employed in the month of the exit from unemployment to employment, i.e. the individual has not left the mini-job before finding a new regular job. A large share of marginal employed individuals find a regular job within the same firm (45%), which suggests that mini-jobs are in some cases utilized as a probation period. The share of transitions within the same firm is with 52% higher in the first 12 months of unemployment than the corresponding share after one year of unemployment (30.3%). Within the group of individuals who are holding a mini-job in the month that they find a new job, the corresponding shares are slightly higher (60.0% and 39.3%, respectively).

Unemployed workers are allowed to earn up to 165€/month without suffering a reduction in transfer payments. This implies that the average treated individual in our sample can increase his income during unemployment by around 23%. Figure 2 depicts the income distribution of mini-jobs during unemployment and it can be seen that indeed 50% earn 164€/month or less. However, there is still a large fraction of job seekers who earn more than threshold amount. These higher earnings might be explained by labour demand side restriction, i.e., the offered jobs do not always have the exact number of working hours which would result in 165€/month. This supports the idea that there exist search frictions in the segment of the mini-jobs. For individuals who earn more than 165€/month benefit payments are reduced accordingly.

[TABLE 6 AND FIGURE 2 ABOUT HERE]

4 Empirical Model

We are interested in the causal impact of taking up a mini-job on two outcomes, the unemployment duration and the job match quality. Individuals are defined to be treated if they enter a mini-job in month t of the unemployment spell from the corresponding month t onwards. This implies that individuals who have a mini-job for some time during unemployment and leave this marginal employment before they find a regular job are still defined to be "treated".

In this section we start with the presentation of a bivariate duration model for the duration until leaving unemployment for a job and the duration until the treatment, which is entering marginal employment, following the "timing of events" approach (Abbring and van den Berg, 2003). We estimate a discrete time duration model. Abbring and van den Berg (2003) provide a proof for continuous time models. For identification in dynamic discrete models see Heckman and Navarro (2007).[6] In a next step we extend this bivariate duration model by incorporating the job match quality similar to van den Berg and Vikström (2013).

Our dataset contains multiple observations for some individuals, which facilitates the identification and estimation of the joint distribution of the unobserved heterogeneity variables (see e.g. Honore, 1993). Moreover, our dataset includes time-varying variables such as the local unemployment rate. Eberwein, Ham, and LaLonde (1997) and Gaure, Roed, and Zhang (2007) emphasize that time-varying covariates provide exclusion restrictions because past values affect current transition probabilities only through the selection process. Brinch (2007) presents identification results that in the presence of covariates that not only vary across observations but also over time within individual observations, the mixed hazard model is non-parametrically identified with single spell duration data. These features of the dataset imply that identification does not solely rely on the functional form of the model.

4.1 Durations until employment and until treatment

We observe labour market states in discrete time and assume that all individual differences in the probability of leaving unemployment for a job in period t can be characterized by observed characteristics x,

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[6]Cockx, Robin, and Goebel (2013) discuss the estimation of grouped duration data in the context of competing risks models. In our context, this issue is less relevant, since the data are grouped in intervals of one month and most of the employment spells are starting at the beginning of a month.

unobserved characteristics V_u, and a treatment effect if a mini-job has been taken up before or at the discrete period t. Similarly, we assume that all individual differences in the probability of being treated in period t can be characterized by observable characteristics x and unobserved characteristics V_m. Given these assumptions the probability of leaving unemployment for a job $\theta_u(t)$ and the probability of taking up marginal employment $\theta_m(t)$ can be expressed by complementary log log specifications:

$$\theta_u(t|x, V_u, t_m) = 1 - \exp(-\exp(\lambda_{tu} + x_t'\beta_u + I(t \geq t_m)\delta_u + V_u)) \tag{1}$$

$$\theta_m(t|x, V_m) = 1 - \exp(-\exp(\lambda_{tm} + x_t'\beta_m + V_m)) \tag{2}$$

$I(\cdot)$ takes on the value one if $t \geq t_m$ and δ_u is the effect of being treated on the probability of finding a job. λ_{tu} and λ_{tm} capture the duration dependencies. We implement this in a flexible way by including a set of dummy variables for the elapsed unemployment duration. We assume that the unobserved heterogeneity components V_u and V_m are constant over time, i.e. across repeated spells of unemployed individuals, and that V_u and V_m are uncorrelated with observed characteristics x.

Moreover, we assume that the treatment does not affect the probability of leaving unemployment for a job before the moment of accepting the job. This assumption is referred to as the no-anticipation assumption and is very likely to hold in our application. The unemployed workers have to search for a mini-job and – similar to the transition to a regular job – the job-finding probability depends on the job offer arrival rate and the probability that the job characteristics are acceptable. It is plausible that vacancies of mini-jobs are usually filled at short notice, i.e., once a match between an individual looking for a mini-job and a potential employer is realized, the job starts without a (major) delay. It seems to be unlikely that an unemployed workers knows in advance the exact moment at which he will find a mini-job. Similar to the transition into temporary jobs, the worker can probably determine the rate at which a match is realized, but he cannot determine the exact timing; see Zijl, van den Berg, and Heyma (2011) for similar arguments in the context of temporary jobs and Kyyrä (2010) in the context of partial benefits for unemployed job seekers. It is important to note that the unemployed job seekers are allowed to know the probability distribution of future events conditional on observable and unobservable characteristics, which implies that the no-anticipation assumption does not rule out forward-looking behaviour.

4.2 Post-unemployment outcomes

We measure the job match quality by the monthly wage and the probability of re-entering unemployment. We allow both outcomes to depend on unobserved characteristics which might be correlated with the unobserved factors V_u and V_m. In order to identify the causal impact of mini-jobs on realized wages, we assume that the unobserved heterogeneity and the causal effect have an additive impact on the mean log wage. We specify the following equation for the wage at the beginning of the new employment spell:

$$\ln w = x_t'\beta_w + I(t_m \leq t_u)\delta_w + t_u\eta_w + V_w + \varepsilon_w \tag{3}$$

The treatment effect is given by δ_w, V_w is the unobserved heterogeneity which is assumed to be constant across repeated spells, and ε_w is assumed to be normally distributed with mean zero and unknown variance σ_w. In addition, we allow the log wage to vary with respect to the previous unemployment duration t_u.

Similarly to the duration of unemployment we specify a duration of employment, described by the probability of leaving employment and re-entering unemployment in period t. We assume that all individual differences in the probability of re-entering unemployment in t can be characterized by observed characteristics x, unobserved characteristics V_e and a treatment effect δ_e if a mini-job has been taken up in the previous unemployment spell. The probability of leaving employment in period t is given by:

$$\theta_e(t|x, V_e, t_u, t_m) = 1 - \exp(-\exp(\lambda_{te} + x_t'\beta_e + I(t_m \leq t_u)\delta_e + t_u\eta_e + V_e)) \tag{4}$$

Similarly to the wage equation we allow θ_e to vary with respect to the previous unemployment duration t_u. In the empirical specification we include a linear and a quadratic term reflecting the previous unemployment duration in a flexible way. V_e is constant over time and uncorrelated with observed characteristics x. However, V_e and V_w might be correlated with the treatment indicator and the previous unemployment duration, which captures the dynamic selection into job matches.

4.3 Distribution of unobserved heterogeneity

We specify the distribution of unobserved heterogeneity G to have a discrete support with P support points. In order to ensure that the corresponding probabilities are between zero and one and to sum to

one, we use a multinomial logit parameterization of the class probabilities:

$$\pi_p = \frac{exp(\omega_p)}{\sum_{p=1}^{P} exp(\omega_p)}, \quad p = 1, ..., P, \quad \omega_1 = 0 \tag{5}$$

Each of the six components of the unobserved heterogeneity V takes on a specific value at support point p, whereby for identification reasons the values are set to be zero for $p = 1$. This implies that for a model with $P = 2$ G would be described by 5 parameters, for $P = 3$ we estimate 10 parameters, etc. This approach allows for a flexible covariance matrix for the unobserved components. For a similar model for unobserved heterogeneity in the context of timing of events models see Crepon, Ferracci, Jolivet, and van den Berg (2010) and in the context of random coefficient models in the statistical literature see e.g. Aitkin (1999). Gaure, Roed, and Zhang (2007) provide Monte Carlo evidence that modelling selection based on unobservables by a flexible discrete distribution works well in the context of timing of events models. In the estimation we increase the number of support points until the model fit cannot be further improved by an additional support point, evaluated on the basis of the Akaike Criterion (AIC) and Bayesian Information Criterion (BIC).

4.4 Likelihood function

Given this setup, the likelihood contribution of an individual i with one sequence s, i.e., one unemployment spell of length t_u and one employment spell of length t_e, for given unobserved and observed characteristics V and x is given by:

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\begin{aligned}
L_{is}(x, V) = & \prod_{t=1}^{t_m} \left[1 - \theta_m(t|x_i, V_m) \right] \left(\frac{\theta_m(t_m|x_i, V_m)}{1 - \theta_m(t_m|x_i, V_m)} \right)^{\kappa_m} \\
& \prod_{t=1}^{t_u} \left[1 - \theta_u(t|x_i, V_u, t_m) \right] \left(\frac{\theta_u(t_u|x_i, V_u, t_m)}{1 - \theta_u(t_u|x_i, V_u, t_m)} \right)^{\kappa_u} \\
& \prod_{t=t_u+1}^{t_u+t_e} \left[1 - \theta_e(t|x_i, V_e, t_u, t_m) \right]^{\kappa_u} \left(\frac{\theta_e(t_e|x_i, V_e, t_u, t_m)}{1 - \theta_e(t_e|x_i, V_e, t_u, t_m)} \right)^{\kappa_u \kappa_e} \\
& \left(\frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(\ln w_i - \widehat{\ln w_i})^2}{2\sigma^2} \right) \right)^{\kappa_u}
\end{aligned}
\tag{6}
$$

The indicators κ_m, κ_u and κ_e take on the value one if a transition to a mini-job, to regular employment or to unemployment, respectively, is observed and zero otherwise. $\ln w_i$ is the logarithm of the observed wage in our data – in case we observe a transition from unemployment to a regular job – and $\widehat{\ln w_i}$ corresponds to the predicted value based on the coefficients β_w. We observe multiple spells for some

individuals in our dataset. Therefore, the likelihood contribution of an individual corresponds to the product of the likelihood contributions of S sequences of unemployment and employment spells.

$$L_i(x, V) \;\; = \;\; \prod_{s=1}^{S} L_{is}(x_i, V)$$

Since we do not know the unobserved characteristics for an individual i, the "unconditional" log-likelihood contribution corresponds to the weighted sum of the contributions corresponding to the P points of support. The log-Likelihood function for the sample with N individuals is given by:

$$\ln L = \sum_{i=1}^{N} \ln \sum_{p=1}^{P} \pi_p L_i(x_i, V(p)) \tag{7}$$

5 Results

We estimate the duration until finding a mini-job, the duration of unemployment, the duration of employment and the reemployment wage with jointly distributed unobserved heterogeneity. We estimate different empirical specifications of this model. Starting with a baseline model which allows for homogeneous treatment effects, in a second step we introduce effect heterogeneity with respect to selected observable characteristics. In a third step we estimate interaction effects of the treatment indicator with elapsed unemployment duration. We re-estimate our model on a sample in which we re-define uncovered periods in the data as unemployment to test whether our results are robust with respect to this alternative specification of employment states. Additionally, we investigate to what extent our results are robust with respect to controlling for participation in ALMP and controlling for transitions to regular jobs within the same firm as the mini-job. Finally, we perform simulations to get insights in the extent to which marginal employment has an impact on expected time spent in unemployment and employment.

5.1 Baseline results

In Table 7 we report the treatment effects on different outcomes. We control for observable characteristics as reported in Table 2 and allow for flexible duration dependencies for the duration in unemployment, the duration until treatment and the employment duration. Moreover, we control for the quarter in which the corresponding spell starts and include time-varying dummy indicators for the current quarter to capture

seasonal effects.[7] Our final specification includes 9 mass points (P=9), i.e. we estimate 40 additional parameters for the distribution of unobserved characteristics compared to a model without unobserved heterogeneity. A further increase of the mass points does not lead to a better model fit, evaluated on the basis of the AIC and the BIC. The coefficients of the preferred model with unobserved heterogeneity are reported in the columns (2) for the unemployment duration, in column (4) for the employment duration and in column (6) for the wages in Table 7. Columns (1), (3) and (5) refer to a model without controlling for selection based on unobserved characteristics.

Commencing with column (1), we report the coefficient of the time-varying treatment dummy for the probability of leaving unemployment for a regular job. The estimate is positive and significantly different from zero. Once we control for unobserved heterogeneity in column (2), the treatment effect clearly decreases and is no longer significantly different from zero. This suggests that mini-jobs are neither stepping-stones to regular jobs, nor do they lead to longer spells of unemployment.

[TABLE 7 ABOUT HERE]

Column (3) shows that we do not find any effect of the mini-job dummy on employment stability in a model without unobserved heterogeneity. However, once we control for selection, the estimated parameter suggests that treated individuals re-enter unemployment with a lower probability than individuals who have not been treated (column 4). Moreover, these individuals have nearly the same wages compared to the non-treated individuals when they take up a regular job (column 6). In the "naive" model without controlling for dynamic selection based on unobserved characteristics we estimate a significantly negative impact of mini-jobs on wages (column 5).

Overall, the baseline model suggests that mini-jobs are not increasing the outflow probability from unemployment and do not lead to higher paid jobs, but the treated individuals end up in more stable employment spells.

5.2 Heterogeneous treatment effects

To investigate effect heterogeneity we interact the treatment dummy with selected observable characteristics. These characteristics include individuals' age, dummy variables for being unskilled and for having

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[7]The complete set of coefficients including the distribution of the unobserved heterogeneity are available on request.

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worked in the construction sector in the last regular job, and the local unemployment rate. Additionally, we include a dummy variable indicating whether or not the mini-job is in the same sector as the previous regular job. We distinguish between five sectors: construction, production, wholesale/retail, private sector services, and others. We particularly investigate the treatment effect for the construction sector, because this sector is characterized by strong seasonal employment patterns which might imply a specific role of mini-jobs for periods of unemployment. To allow for non-linear effects, we include the logarithm of age. The estimation results are reported in Table 8. The reference person is an individual of mean age located in a region with the mean local unemployment rate, not working in the construction sector, not being unskilled and having a mini-job in a different sector than the previous job. The coefficient of the treatment dummy reflects the treatment for this reference person, and the coefficients of the interaction terms capture the heterogeneous effects for example with respect to the local unemployment rate or age.

[TABLE 8 ABOUT HERE]

We do not find evidence for effect heterogeneity for the transition probability from unemployment to regular employment with respect to age, skill level, whether or not the unemployed has worked in the construction sector before entering unemployment, and the local unemployment rate. Instead, we find a significantly positive coefficient for the variable indicating that the mini-job is in the same sector as the previous job. However, if we conduct a Wald-test for the significance of the overall impact – coefficient of the mini-job dummy plus coefficient of the dummy for the same sector – the test suggests that this effect is not statistically significant. This suggests that having a mini-job in the same sector as the previous regular job is better than having a mini-job in another sector, but it does not lead to a higher transition probability compared to non-treated individuals. Positive effects of taking up a mini-job during unemployment, for example by lowering human capital deterioration, as a screening device for potential employers or by increasing the job offer arrival rate due to network effects, seem to only occur if the marginal employment is related to sectoral experience and skills of the unemployed workers. This is in line with the descriptive evidence presented above, which shows that the sector of the mini-job positively correlates with both the sector of the previous job and the sector of the post-unemployment job. However, we have to interpret this coefficient with caution, since we do not control for selection into

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mini-jobs in the same sector as the previous job. Instead, the estimates are based on the assumption that taking up a mini-job in the same sector is not correlated with unobserved characteristics having an impact on unemployment duration. For the duration of employment we do not find any evidence for effect heterogeneity.

For the impact on the initial wage in a new job we find some evidence for effect heterogeneity. While the reference person – a skilled worker not working in the construction sector – takes up jobs with lower wages, this is neither the case for unskilled workers nor for workers in the construction sector. Moreover, the treated individuals enter higher paid jobs when the local unemployment rate is lower. These results indicate that good labour market conditions allow the treated unemployed workers to be more selective with respect to wages and job stability, while otherwise they end up in more stable jobs only. One reason for the difference with respect to the skill-level might be that mini-jobs are seen as a rather negative signal for skilled workers while this is not the case for unskilled individuals. A mini-job in the same sector as the previous job does not have an impact on the post-unemployment wage.

In Table 9 we report the coefficients of the interaction effects of the treatment indicator with elapsed unemployment duration, allowing for different treatment effects in months 1-6, 7-12, 13-24 and 25-36. The results suggest a significantly positive effect of entering a mini-job after one year of unemployment, while we do not observe any significant impact on the probability of finding a job for the first 12 months (column 1). The effect in months 25-36 is positive but not statistically significant. However, the number of observations is decreasing over time and these estimates are based on a small number of unemployed individuals. These results suggest that there exist stepping stone effects of mini-jobs to regular jobs, but that these effects are only relevant for long-term unemployed workers.

[Table 9 about here]

For employment stability we find a negative effect of having a mini-job on the probability of re-entering unemployment for regular jobs which are found during months 1-6 of the unemployment spell (column 2). These effects are stronger if the jobs are taken up after 12 months in the unemployment spell, but the coefficient is not statistically significant. For wages, we find a significantly positive interaction effect of having a mini-job with the elapsed unemployment duration between month 7 and 12. However, the

overall impact on wages during months 7 to 12 is statistically significant at a 10% level only (see column 3).

One important determinant of the probability of leaving unemployment for a job – the receipt of unemployment benefits – depends on the elapsed unemployment duration. The maximum duration of benefit receipt depends on the time spent in regular employment in the preceding years and the age at entry into unemployment, and after benefit exhaustion unemployed job-seekers are eligible for means-tested unemployment assistance (see Section 2 for details). Due to the reduced replacement rate for unemployment assistance the income during unemployment decreases over time. However, the rules for additional earnings from marginal employment do not change, and the decrease in income is rather small. This suggests that the exhaustion of benefits cannot explain the strong evidence for time-varying treatment effects of taking up marginal employment.

Given our descriptive evidence on a decreasing share of transitions within the same firm after twelve months of unemployment, the positive impact on employment stability is probably not driven by an increasing role of mini-jobs as a probation period. We will investigate in the next section to what extent a transition from a mini-job to a regular job within the same firm correlates with a more stable employment spell. The results suggest that the positive effects of entering marginal employment – which might occur due to signalling effects, network effects, or the reduced deterioration of human capital – seem to lead to both an increase of the job-finding probability and the employment stability. The impact on the job-finding probability seems to be less relevant at the beginning of an unemployment spell, which is plausible given that the contact frequency with former colleagues (network) and the deterioration of human capital are probably time-dependent.

5.3 Sensitivity Analysis

We have estimated the model based on an alternative definition of unemployment. In contrast to our preferred specification, here we additionally define periods of our sample members which are not covered within the data as unemployment. This leads to longer unemployment spells and a higher number of treated individuals. Overall, we find very similar results for this alternative definition of unemployment (see Tables A.1 - A.3 in the Appendix).

In the baseline model the effect of entering a mini-job on the job-finding probability is significantly positive at the 5%-level, which is probably driven by an increasing number of observations with longer unemployment durations. In line with this, we find stronger evidence for positive interaction effects of the treatment indicator with elapsed unemployment duration, see Table A.3. In this specification the treatment effect is significantly positive for unemployment durations between 25-36 months. Similar to the main specification, we only find evidence for effect heterogeneity for the unemployment duration with respect to the sector of the mini-job. We only observe an increased transition probability into regular employment if the mini-job is in the same sector as the previous regular job, whereby this effect is significant at the 10% level. Again, we do not find any evidence for effect heterogeneity with respect to employment stability. For the initial wages the effect for the construction sector is no longer significantly different from zero, while the significant effects for the skill level and the local unemployment rate are stable. Although we observe more transitions into regular employment especially for longer unemployment spells, again we only find weak evidence for different effects depending on the elapsed unemployment duration on initial wages.

In our data set, we observe that individuals who take up marginal employment during unemployment have a higher probability of entering other measures of ALMP than unemployed individuals who do not enter a mini-job. In order to test whether our results are driven by the participation in other programs, we have re-estimated our model including time-varying indicators for the participation in ALMP. Our results do not change, which indicates that the impact of an increased participation in other ALMP measure cannot explain our results.

The descriptive evidence reported in Table 6 suggests that some firms might use mini-jobs as a screening device; around 45% of the unemployed job seekers with a mini-job who find a regular job during our observation period take up a job at the same firm in which they had the mini-job before. In order to test in how far the job quality differs for these individuals, we interact the treatment indicator with a variable taking on the value 1 when the individual is employed at the same firm in the regular job as before during the spell of marginal employment. The results are reported in Table A.4 in the Appendix.

In the baseline specification, we do not find a significant difference for transitions within the same

firm with respect to the employment stability. In contrast to this, the interaction effects with elapsed unemployment duration indicate that jobs taken up after one year of unemployment are more stable if the mini-job has been in the same firm. However, compared to the non-treated, we still find that employment spells are significantly more stable for individuals who had a mini-job during their unemployment spell and who found a job in a different firm. In addition to that, the results indicate that a transition within the same firm goes along with a significantly lower wage. We find that this varies with respect to the elapsed unemployment duration; while we do not find a significant difference during the first 6 months, after 6 months of unemployment transitions within the same firm go along with significantly lower wages. When interpreting these results, we have to keep in mind that we do not control for selection into regular employment spells within the same firm, i.e., our estimates might be biased if job-seekers who take up a regular job in the same firm differ in terms of unobservables from treated individuals who find another employer. However, this (descriptive) evidence suggests that our findings can only partly be driven by transitions within the same firm; we find significantly more stable employment spells also for individuals who find a job outside the firm at which they have a mini-job.

5.4 Simulations

The coefficients reported in the previous sections give us insights about the direction and the relative size of the direct effects of having a mini-job on job search outcomes. In this section we perform simulations for the average unemployed worker. These simulations give us a measure of the overall impact of the treatment on time spent in unemployment and employment and on initial wages. Since our results indicate changing treatment effects over time, we perform simulations for a person who enters a mini-job at the beginning of the unemployment spell and for a person who is treated after one year. Our simulations are based on the model which allows for effect heterogeneity with respect to elapsed unemployment duration (Table 9). The corresponding standard errors of average state probabilities and initial wages are computed using parametric bootstrap based on 250 draws from the covariance matrix of the estimated parameters (Skrondal and Rabe-Hesketh, 2009).

We compare (i) a situation in which we assume that the unemployed worker takes up a mini-job in the first month of unemployment with (ii) a situation in which the unemployed worker never takes up a

mini-job. Since our coefficients indicate a strong positive effect on the exit probability to a regular job after 12 months of unemployment, we additionally simulate the transition processes for an individual who has been unemployed for 12 months for (iii) a situation in which he has a mini-job and for (iv) a situation in which he does not have a mini-job. We calculate the average unemployment duration, the average time spent in subsequent employment and the average initial daily gross wage for regular jobs found during this period. We simulate both durations for up to 36 months, which corresponds to the maximum length of unemployment and employment spells in our sample. After 36 months, spells are censored. The results are reported in Table 10.

[TABLE 10 ABOUT HERE]

The results indicate that the expected time spent in unemployment does not change depending on entering a mini-job already in month 1. The difference in unemployment durations between scenarios (i) and (ii) is virtually zero (0.03 months). The point estimates for the initial wages suggest slightly higher daily wages for scenario (i), but this difference is not statistically significant. Instead, we find a significant difference in the employment stability. While individuals without a mini-job are on average around 15.54 months in employment, individuals with a mini-job are on average 17.57 months employed after leaving the unemployment spell. In the next step, we assume that the unemployed job seekers have not found a regular job during the first 12 months of job search. In this case, the expected time spent in unemployment is significantly shorter for job-seekers holding a mini-job, which is in line with the coefficients reported in Table 9. While the unemployed worker without a mini-job spends around 16.64 additional months in unemployment, this expected time reduces to around 14.93 months for the treated individuals. In contrast to the comparison between scenarios (i) and (ii), the point estimates suggest that having a mini-job goes along with higher daily wages because having a mini job leads to shorter unemployment spells, but the difference is again not statistically significant. Moreover, our simulations suggest that also for longer-term unemployed workers mini-jobs go along with longer subsequent employment spells; the expected time spent in employment increases from 9.44 months to 13.25 months.

6 Conclusion

In many UI benefit systems unemployed workers are allowed to work for some hours and to increase their income due to earnings exemptions. In Germany, unemployed job seekers have an additional incentive due to marginal employment, which is not subject to SSC contributions by the employee. We analyse the causal impact of entering marginal employment on unemployment duration and job quality of unemployed individuals and investigate potential effect heterogeneity with respect to observed characteristics and elapsed unemployment duration.

Based on a random inflow sample into unemployment of male workers in West Germany, our results suggest that the treatment effects vary according to the time spent in unemployment. While we do not find any significant impact for the first 12 months of unemployment, job-finding probabilities clearly increase after one year, and the impact on job stability is stronger for individuals who are unemployed for longer. We find a significantly positive impact on the transition probability to regular employment if the mini-job is in the same sector as the previous job. The impact on wages seems to vary with the skill level and the sector. Skilled individuals have a lower wage in the initial job after leaving unemployment if they had a mini-job. Moreover, the results indicate that the wage effects are increasing if the economic situation within the local labour market is more favourable.

We perform simulations for the average unemployed job seeker in our sample. These simulations indicate that the expected unemployment duration does not change for an individual who is treated at the beginning of an unemployment spell. However, the employment spell is significantly longer for treated workers; the expected employment duration increases from 15.5 to 17.6 months. For long-term unemployed workers having a mini-job significantly shortens the remaining unemployment duration; after one year of unemployment the remaining unemployment duration drops from 16.6 to 14.9 months.

Our descriptive analysis suggests that the positive impact on unemployment exit and employment stability especially for longer unemployed workers is probably not driven by an increasing role of mini-jobs as a probation period. It appears more plausible that mechanisms which might be less relevant at the beginning of an unemployment spell, like the deterioration of human capital and changing networks due to changing contact frequency with colleagues, could drive these effects. Moreover, marginal employment

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during unemployment seems to increase the job-finding probability particularly if the mini-job is related to the sectoral experience and skills of the unemployed workers. However, our analysis is based on administrative data and we do not have information about the search behaviour of unemployed individuals with and without mini-jobs, nor on the changes in human capital over time. Future research should shed more light on the underlying mechanisms which might explain the positive effect of entering marginal employment on the employment outcomes.

Our results lead to the policy conclusion that – at least at the individual level – earnings exemptions and mini-jobs can be effective instruments to help long-term unemployed individuals to find (stable) jobs. Given the high share of long-term unemployed individuals in OECD countries (approx. 35% in 2010), it might be worth to thinking about adopting such a policy in other countries. Advantages of this instrument include that it does not involve any direct program costs, and that the administrative burden is low since the unemployed workers are searching for mini-jobs on their own. These findings are also highly relevant for the design and the timing of active labour market programs. As it is found that human capital deterioration and network effects become much more important with an increasing unemployment duration, the long-term unemployed should be primarily assigned to ALMP programs which have a strong link to the labour market, such as integration subsidies. Future research should shed some light on the interaction of marginal employment and measures such as job search assistance and training programs for unemployed workers. However, having a mini-job does not seem to have the same effect for all groups, and the results suggest the instrument does not help to increase the job finding probabilities at the beginning of an unemployment spells.

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Tables

Table 1: Spells per person

Number of Spells	Unemployment	Mini-Job (while being UE)	Employment
0	–	8,493	2,919
1	5,516	1,337	3,931
2	2,415	137	1,595
3	1,574	33[a)]	1,362
4	413	⋆	149
≥5	82	⋆	44

Note: Depicted are the number of spells per person. For instance, 5,516 individuals have only one single unemployment spell while 82 individuals have five or more. Each column sums up to the total number of individuals (N=10,000).
a) Contains the number of individuals with three or more mini-job spells.
⋆ To secure data anonymity cells with less than 20 observations are not shown.

Table 2: Descriptive statistics of observed characteristics

	Full sample	Estimation sample All	Having a Mini-Job No	Having a Mini-Job Yes
Number of individuals	24,131	10,000	8,493	1,507
Age (in years)	37.4	37.4	37.5	37.2
	(8.1)	(8.2)	(8.1)	(8.2)
Married	52.9	52.5	52.2	54.2
Children	33.6	33.2	32.9	35.0
Children ≤ 10 years	22.0	21.5	21.2	23.2
Non-German	15.7	15.7	14.6	21.6
Severely handicapped	2.0	2.1	2.2	1.5
Health restrictions	12.5	12.4	12.0	14.8
School leaving certificate				
No degree	9.4	9.5	8.8	13.5
Lower secondary school	59.5	59.6	58.9	63.7
Middle secondary school	15.5	15.7	15.7	15.3
(Specialized) Upper secondary school	15.6	15.2	16.6	7.5
Professional training				
Unskilled	30.3	30.1	28.1	41.5
Apprenticeship or technical college degree	63.2	63.6	65.0	55.6
University degree	6.5	6.3	6.9	2.9
Sector of last job				
Construction	25.4	25.8	26.3	23.1
Production	21.7	21.3	21.3	21.3
Wholesale/Retail	13.1	13.0	13.0	12.9
Private sector services	26.6	26.6	25.9	30.8
Others (public sector, agriculture)	13.2	13.3	13.5	11.9
Local macroeconomic conditions				
Unemployment rate (in %)	7.6	7.6	7.5	8.0
	(2.4)	(2.4)	(2.4)	(2.3)
Real GDP per capita[a)] (in thousand €)	28.6	28.6	28.7	28.2
	(11.5)	(11.5)	(11.7)	(10.6)

Note: All statistics are percentages (if not differently indicated) and measured at entry into unemployment; standard deviations in parenthesis.
[a)] Normalized to prices in 2005.

Table 3: Sectoral distribution of mini-jobs

	All	Professional training background Unskilled	Skilled
Number of spells	1,713	698	1,015
Construction	21.3	21.3	21.3
Production	8.3	7.3	9.1
Wholesale/Retail	14.0	11.6	15.7
Private sector services	45.1	50.4	41.4
Others (public sector, agriculture)	11.3	9.3	12.6

Note: All statistics are percentages (if not differently indicated). Individuals who have no professional degree at entry into unemployment are categorized as "unskilled" and as "skilled" otherwise.

Table 4: Sectoral transition matrix: From previous job to mini-job

Sector of previous job	Sector of mini-job				
	Constr.	Prod.	Retail	Services	Others
Construction	75.2	⋆	⋆	13.7	⋆
Production	18.3	28.1	17.0	31.4	⋆
Wholesale/Retail	⋆	⋆	35.6	42.3	⋆
Private sector services	⋆	⋆	9.8	76.1	⋆
Others (public sector, agriculture)	⋆	⋆	⋆	25.3	54.5

Note: Depicted is the sectoral distribution of mini-jobs during unemployment conditional on the sector of the previous jobs; all statistics are in percentages (if not differently indicated). In total, we observe 911 mini-jobs. For instance, among all treated individuals who previously worked in the construction sector, 75.2% also take up a mini-job in the same sector.
⋆ To secure data anonymity cells with less than 20 observations are not shown.

Table 5: Sectoral transition matrix: From mini-job to subsequent job

Sector of mini-job	Sector of subsequent job				
	Constr.	Prod.	Retail	Services	Others
Construction	82.4	8.0	⋆	⋆	⋆
Production	⋆	62.8	⋆	⋆	⋆
Wholesale/Retail	⋆	⋆	42.5	34.9	⋆
Private sector services	8.1	9.4	8.4	68.7	5.4
Others (public sector, agriculture)	⋆	⋆	⋆	26.3	58.9

Note: Depicted is the sectoral distribution of subsequent jobs conditional on the sector of the mini-job during unemployment; all statistics are in percentages (if not differently indicated). In total, we observe 911 transitions. For instance, out of all unemployed individuals who have a mini-job in the construction sector, 82.4% also find regular employment in the same sector.
⋆ To secure data anonymity cells with less than 20 observations are not shown.

Table 6: Transition from UE (with mini-job) to RE within same firm

	All	Timing of transition to employment ≤ 12 months	> 12 months
All transition to RE	911	617	294
Within same firm (in %)	45.0	52.0	30.3
Direct transition to RE	484	395	89
Within same firm (in %)	56.2	60.0	39.3

Note: Depicted is the share of treated transitions from unemployment to employment which take place within the same firm, i.e., the mini-job during unemployment and the subsequent regular job are within the same firm. UE - Unemployment, RE - Regular employment.

Table 7: Baseline estimation results

	Transition UE to RE		Transition RE to UE		Linear wage equation	
	(1)	(2)	(3)	(4)	(5)	(6)
Mini-Job	0.129***	0.020	0.021	−0.234***	−0.075***	−0.003
	(0.037)	(0.049)	(0.046)	(0.065)	(0.010)	(0.009)
Unobs. Het. (P=9)	No	Yes	No	Yes	No	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level. The estimation also includes control variables for duration dependence, seasonal dummies, individual socio-demographics, information on last job and local macroeconomic conditions. The complete set of coefficients including the distribution of the unobserved heterogeneity are available on request. The correlations between the different components of the unobserved heterogeneity are reported in the Appendix B in Table B.1. UE - Unemployment, RE - Regular employment.

Table 8: Treatment effect heterogeneity with respect to observed characteristics

	Transition UE to RE (1)	Transition RE to UE (2)	Linear wage equation (3)
Mini-Job	−0.095	−0.357***	−0.029**
	(0.077)	(0.102)	(0.014)
Mini-Job × Ln(Age)	−0.141	−0.060	0.036
	(0.187)	(0.248)	(0.037)
Mini-Job × Unskilled	0.016	0.009	0.038***
	(0.081)	(0.103)	(0.014)
Mini-Job × Construction	−0.013	0.161	0.036**
	(0.085)	(0.111)	(0.016)
Mini-Job × Local UE-Rate	0.013	−0.024	−0.007**
	(0.016)	(0.020)	(0.003)
Mini-Job × Same Sector	0.167**	0.110	−0.001
	(0.078)	(0.101)	(0.015)
Unobs. Het. (P=9)	Yes	Yes	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level. The estimation also includes control variables for duration dependence, seasonal dummies, individual socio-demographics, information on last job and local macroeconomic conditions. Individuals who have no professional degree at entry into unemployment are categorized as "unskilled". "Same sector" indicates that the mini-job was taken up within the same sector (construction, production, wholesale/retail, private sector services, others) as the last regular job. The reference person is an individual of mean age located in a region with the mean local unemployment rate, not working in the construction sector and not being unskilled. UE - Unemployment, RE - Regular employment.

Table 9: Treatment effect heterogeneity with respect to elapsed unemployment duration

	Transition UE to RE (1)	Transition RE to UE (2)	Linear wage equation (3)
Mini-Job	−0.102 (0.066)	−0.206** (0.086)	−0.013 (0.012)
Mini-Job × 7-12 months	0.125 (0.096)	0.026 (0.123)	0.038** (0.018)
Mini-Job × 13-24 months	0.406*** (0.101)	−0.126 (0.142)	0.020 (0.019)
Mini-Job × 25-36 months	0.171 (0.141)	0.007 (0.258)	−0.015 (0.030)
Unobs. Het. (P=9)	Yes	Yes	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level. The estimation also includes control variables for duration dependence, seasonal dummies, individual socio-demographics, information on last job and local macroeconomic conditions. UE - Unemployment, RE - Regular employment.

Table 10: Simulated Durations and Initial Daily Wages

	Inflow into UE		After 12 months of UE	
	No Mini-Job (i)	Mini-Job (ii)	No Mini-Job (iii)	Mini-Job (iv)
Unemployment Duration	13.07 (0.17)	13.21 (0.55)	28.64 (0.24)	26.94 (0.46)
Employment Duration	15.31 (0.63)	17.32 (0.82)	9.58 (0.58)	12.94 (0.85)
Wages	65.29 (0.31)	64.83 (0.61)	58.76 (2.32)	57.51 (2.78)

Note: The simulations are based on the specification allowing for treatment effect heterogeneity with respect to elapsed unemployment duration. In scenarios (i) and (ii) we simulate the outcomes from month 1 onwards. In scenarios (iii) and (iv) we assume that the individuals have been unemployed for 12 months. The reported results refer to the unemployment durations including the first 12 months. All simulations are performed for the average individual in our sample. Standard errors are computed using parametric bootstrap based on 250 draws from the covariance matrix of the estimated parameters.

Figures

Figure 1: Hazard functions

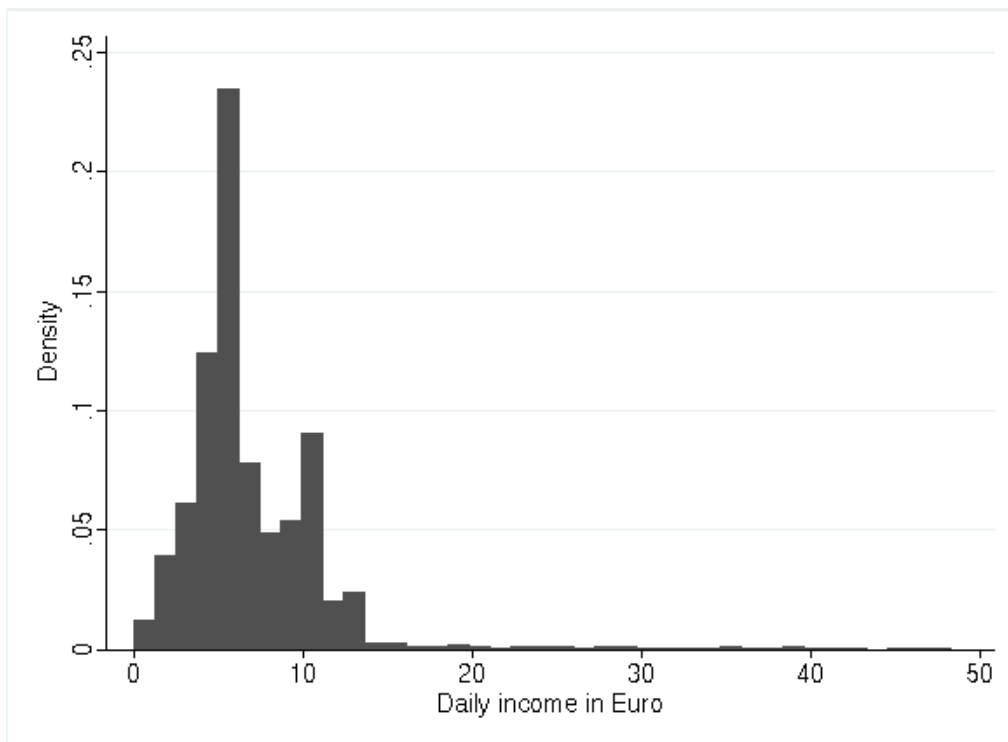| Transition UE to RE	Transition UE to ME
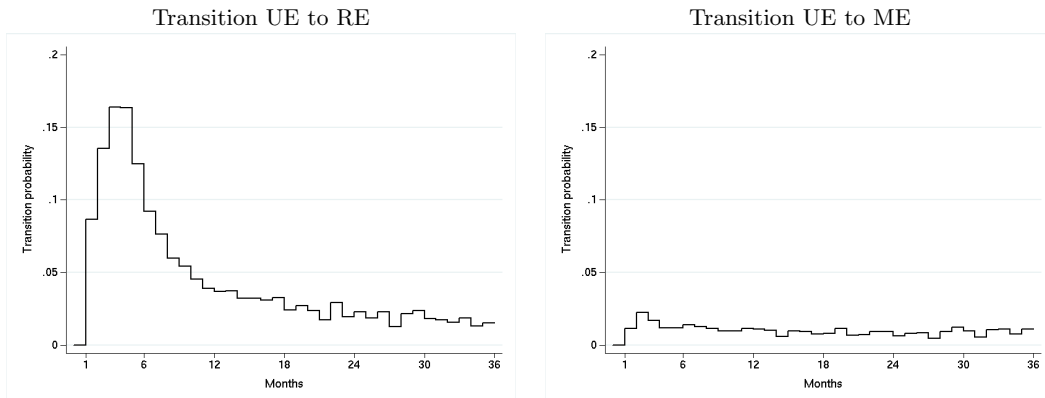
Note: Depicted are unconditional transitions probabilities. UE - Unemployment, ME - Marginal employment, RE - Regular employment.

Figure 2: Income distribution of mini-jobs during unemployment

Note: The mean and median of the income distribution amount to 6.9 and 5.4 Euro respectively; whereby these daily incomes correspond to 207 and 164 Euro per months.

A Appendix

Table A.1: Alternative definition of unemployment: Baseline estimation results

	Transition UE to RE		Transition RE to UE		Linear wage equation	
	(1)	(2)	(3)	(4)	(5)	(6)
Mini-Job	0.178***	0.098**	0.008	−0.169***	−0.075***	0.001
	(0.034)	(0.047)	(0.042)	(0.063)	(0.009)	(0.009)
Unobs. Het. (P=9)	No	Yes	No	Yes	No	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level.

Table A.2: Alternative definition of unemployment: Effect heterogeneity

	Transition UE to RE (1)	Transition RE to UE (2)	Linear wage equation (3)
Mini-Job	0.016	−0.271***	−0.027*
	(0.072)	(0.093)	(0.014)
Mini-Job × Ln(Age)	−0.089	−0.127	0.055
	(0.172)	(0.216)	(0.038)
Mini-Job × Unskilled	0.048	0.009	0.051***
	(0.076)	(0.090)	(0.015)
Mini-Job × Construction	−0.075	0.061	0.024
	(0.080)	(0.102)	(0.016)
Mini-Job × Local UE-Rate	0.020	−0.023	−0.006**
	(0.014)	(0.017)	(0.003)
Mini-Job × Same Sector	0.130*	0.118	0.005
	(0.073)	(0.088)	(0.015)
Unobs. Het. (P=9)	Yes	Yes	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level. "Same sector" indicates that the mini-job was taken up within the same sector as the last regular job.

Table A.3: Alternative definition of unemployment: Treatment effect and elapsed unemployment duration

	Transition UE to RE (1)	Transition RE to UE (2)	Linear wage equation (3)
Mini-Job	−0.076	−0.194**	−0.009
	(0.065)	(0.083)	(0.013)
Mini-Job × 7-12 months	0.162*	0.028	0.035*
	(0.091)	(0.110)	(0.019)
Mini-Job × 13-24 months	0.566***	−0.013	0.021
	(0.093)	(0.121)	(0.019)
Mini-Job × 25-36 months	0.330***	0.093	−0.014
	(0.125)	(0.203)	(0.030)
Unobs. Het. (P=9)	Yes	Yes	Yes

Note: Depicted are estimation results using an alternative definition of unemployment. Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level.

Table A.4: Treatment effect heterogeneity with respect to the transition within a firm

	Transition UE to RE		Transition RE to UE		Linear wage equation	
	(1)	(2)	(3)	(4)	(5)	(6)
Mini-Job	0.022	−0.099	−0.242***	−0.307**	0.016	−0.020
	(0.049)	(0.066)	(0.077)	(0.120)	(0.010)	(0.016)
Mini-Job in same firm			0.009	0.145	−0.041***	0.010
			(0.099)	(0.149)	(0.013)	(0.019)
Interaction with elapsed unemployment duration						
Mini-Job × 7-12 months		0.128		0.120		0.077***
		(0.096)		(0.120)		(0.023)
Mini-Job × 13-24 months		0.407***		0.116		0.046*
		(0.101)		(0.177)		(0.024)
Mini-Job × 25-36 months		0.172		0.097		0.020
		(0.141)		(0.291)		(0.040)
Mini-Job in same firm × 7-12 months				−0.144		−0.116***
				(0.247)		(0.036)
Mini-Job in same firm × 13-24 months				−0.665**		−0.124***
				(0.281)		(0.039)
Mini-Job in same firm × 25-36 months				−0.130		−0.122**
				(0.636)		(0.056)
Unobs. Het. (P=9)	Yes	Yes	Yes	Yes	Yes	Yes

Note: Coefficients are statistically significant at the * 10%, ** 5%, *** 1% level.

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