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Abstract

This paper analyzes the impact of job creation schemes (JCSs) on job search outcomes in the context of the turbulent East German labor market in the aftermath of the German reunification. High job destruction characterized the economic environment. JCSs were heavily used in order to cushion this development. Using data from 1990-1999 and building upon the timing-of-events approach, we estimate multivariate discrete time duration models taking selection based on both observed and unobserved heterogeneity into account. Our results indicate that participation in JCSs increases the unemployment duration mainly due to locking-in effects. However, twelve months after the program start the significantly negative impact on the job finding probability vanishes. We find evidence for effect heterogeneity. Our results suggest that female and highly skilled participants leave unemployment quicker than other groups, which results in highly skilled women benefiting from participation. However, we find no significant impact on post-unemployment employment stability. Our results are robust to allowing for random treatment effects. Also taking into account endogenous participation in training programs, endogenous censoring, or multiple treatment effects do not change the results.

JEL Classification: C41, J64, J68

Keywords: Active labor market policy, job creation schemes, unemployment duration, employment stability, timing-of-events model, East Germany, transition economy, structural change

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1 Introduction

This paper analyzes the impact of job creation schemes (*Arbeitsbeschaffungsmaßnahmen*, JCSs) on job search outcomes in the context of the turbulent East German labor market in the aftermath of the German reunification. The East German economy plunged into a deep recession immediately after the German reunification in 1990. The transition from a centrally planned to a market-based economic system led to plant closures and mass-layoffs, leading to a sharp increase in the unemployment rate from virtually zero in 1990 to about 10% in 1991. Active labor market policies (ALMP) were implemented on a large scale to fight the unemployment crisis. Hereby, JCSs that offer temporary work opportunities for the unemployed in the public and nonprofit sector played a prominent role. These schemes reached an all-time high in 1992 when on average 388,000 individuals were employed in JCSs and expenditures of the German Federal Government and the German Federal Employment Agency amounted to 10.4 billion DM (7.8 billion € in 2015 prices) in East Germany (Spitznagel (1992)). This sum is equivalent to 4.4% of the East German GDP.[1]

There are at least two potential channels how JCSs might improve the employment situation of participants. To fix ideas, we are arguing in the framework of a labor market with search frictions (for a more formal analysis see the Supplemental Material of Crépon and van den Berg (2016)). By providing work experience JCSs can increase participants' attachment to the labor market. This stronger bond might motivate the participants to intensify their search effort for a regular job. At the same time JCSs can provide the participant with the ability to signal their positive work attitude. Both, increased search effort and the signaling ability have a positive impact on the job offer arrival rate and the ability to stay on a regular job. The second channel consists of the potential ability of JCSs to shift the wage offer distribution for the participants. Naturally, job seekers become more attractive for employers if their human capital is raised and JCSs offer a number of possibilities to achieve this. Participants acquire cognitive skills by learning–on–the–job, work experience and short training courses, which are sometimes offered in the context of JCSs. Being placed in a work context by way of JCS participation can also foster soft skills.

As Crépon and van den Berg (2016) show both, an increased job offer arrival rate and a shift in the wage offer distribution due to participation in ALMP, increases the exit rate from unemployment compared to the situation before participation.

The effectiveness of a participation in ALMP might depend on the state of the economy. In periods with low job destruction rates and relatively high job offer arrival rates the opportunity costs of participating in an ALMP might be relatively high, i.e., searching for a job could be more beneficial because the probability of finding a regular job is high. In contrast to that, in periods with low job offer arrival rates positive effects of ALMP will carry more weight, as a

[1] ANBA (*Amtliche Nachrichten der Bundesagentur für Arbeit*), 1993 and Statistisches Jahrbuch für die Bundesrepublik Deutschland, 1993.

continued job search is less rewarding. The role of the state of the economy is probably more relevant for longer programs like JCSs and training. They offer the possibility to keep in contact to the labor market as it needs time until the economy is back to a higher level of employment. For evidence of more positive effects of training programs in periods of high unemployment rates see for example Lechner and Wunsch (2009a) and Heinrich and Mueser (2015). In line with this, Forslund, Fredriksson, and Vikström (2011) argue that programs with strong locking-in effects should be rather used in an economic downturn, because the cost of forgoing search time is lower than in an economic upturn.

These considerations are particularly relevant if the economy is not only characterized by high job destruction rates but also undergoes a major structural change. Structural change often involves depreciation of human capital. For the unemployed who are not able to use, for example, learning-on-the-job to stop the depreciation, JCSs might be a particularly helpful instrument. Consequently, JCSs have quite some leverage to improve the situation of the participants. This leverage might depend on the level of the human capital. Dynamic complementarities in human capital on which the recent literature focuses (see for example Almlund, Duckworth, Heckman, and Kautz (2011)) mean in this context that high skilled individuals might be particularly affected by depreciation and in turn might be able to benefit most from participation in JCSs.

There exist a number of empirical studies evaluating the employment effects of JCSs for stable, rather matured market economies.[2] The general notion is that JCSs do not have positive effects. However, there are some signs for effect heterogeneity. Some papers conclude that long-term unemployed gain from participation in JCSs, whereas others not (see for example Caliendo, Hujer, and Thomsen (2008a) vs. Hujer and Thomsen (2010)). Quite stable results exist with respect to positive effects for hard-to-place[3] women in West-Germany (Caliendo, Hujer, and Thomsen (2008b) and Hohmeyer and Wolff (2012)). Note that only a small number of these studies investigate whether there is effect heterogeneity with respect to educational level. Those who do distinguish by education level, do not find significant differences between different educational levels (see for example Caliendo, Hujer, and Thomsen (2008b)).

The state of evidence is different for economies that underwent a major shock, as it was the case during the transformation process. There exist only few studies that evaluate the employment effects of JCSs and those come to rather diverse results. Concerning the impact of JCSs in East Germany for the period after the reunification, Hübler (1997) and Kraus, Puhani, and Steiner (2000) conclude that JCSs have a rather negative impact on the employment prob-

[2]See for example Cockx and Ridder (2001) for Belgium, Bonnal, Fougère, and Sérandon (1997) for France, Lalive, van Ours, and Zweimüller (2008) for Switzerland and for Germany Hohmeyer and Wolff (2012) and Lechner and Wunsch (2009b) as well as the series of papers using an administrative sample of unemployed in 2000 (see Hujer, Caliendo, and Thomsen (2004), Caliendo, Hujer, and Thomsen (2006), Hujer and Zeiss (2007), Caliendo, Hujer, and Thomsen (2008a), Caliendo, Hujer, and Thomsen (2008b), Hujer and Thomsen (2010)). For overview studies see for example Bergemann and van den Berg (2008) and Card, Kluve, and Weber (2010).

[3]Measured for example by a high number of unsuccessful placement propositions or dependency on welfare benefits.

ability of the participants, while Eichler and Lechner (2002) find a substantial decline in the unemployment probability due to participation in JCSs in the period after program end.

The evidence is similarly scarce when considering other transformation countries. One exception is Lubyova and van Ours (1999), who evaluate JCSs for the time from 1991 to 1996 in Slovakia. They find positive effects on the job finding probability for JCSs in the public sector, while JCSs in the private sector that typically had a longer duration seem to reduce the exit rate to regular work. In a related paper, van Ours (2004) finds evidence that part of the difference in the effects are driven by locking-in effects of JCSs, and that those are stronger for men than for women. Kluve, Lehmann, and Schmidt (1999) study the effects of different ALMP in the period from 1992 to 1996 in Poland and they find evidence for reduced employment rates mainly among male participants in JCSs.[4] None of these studies investigates whether the effects differ by level of human capital.

A remarkable result of many studies on JCSs, independent of whether JCSs are taking place in stable or turbulent economies, is that women benefit more than men. This seems to be particularly the case in countries with a high female labor force participation. In their overview article, Bergemann and van den Berg (2008) argue that participation in JCSs might help to overcome statistical discrimination.

Our analysis is based on the Labor Market Monitor Sachsen–Anhalt (LMM–SA), which is a survey on the working age population of the East German state of Sachsen–Anhalt. We use the last three waves (1997, 1998, 1999) of the survey, which include retrospective monthly calendars on the complete labor market history, including participation in ALMP since the reunification. This calendar offers unique possibilities for the empirical analysis of program participation in the years after the German reunification. Our observation period starts in 1990, shortly before the reunification, and ends in 1999.

The program was in place in all regions in the state of Sachsen–Anhalt, and the data does not contain instrumental variables which could be used to identify causal effects. We therefore estimate discrete time duration models following the timing-of-events approach (Abbring and van den Berg (2003)). This approach allows to control for dynamic selection into the treatment based on both observed and unobserved characteristics. We estimate the impact of JCSs on the probability of finding a job and on the probability of retaining employment. This approach has two major advantages in particular in view of evaluating a program in an unstable economy. Firstly, the way we allow for unobserved heterogeneity does not require controlling for past employment outcomes or using past employment outcomes in order to estimate differences-in-differences (as e.g. Caliendo, Hujer, and Thomsen (2008a) or Eichler and Lechner (2002)). Besides a lack of availability of detailed data on employment histories before 1990, this type of data might contain relatively little information for the prediction of future outcomes in our

[4]Based on Polish data Puhani (2002) presents similar findings applying matching estimators. His findings based on duration models indicate significantly negative effects for men and women. However, the estimated specifications are very restrictive. For example, he does not control for selection into the treatment and the models assume a homogenous treatment effect over time spent in unemployment.

observation period. The unemployment rate in the socialistic German Democratic Republic (GDR) was close to zero and a large share of the human capital lost its value during the transformation process. Therefore, our application using the timing-of-events approach delivers new insights into the effectiveness of JCSs.

The second major advantage of our approach is the focus on transition rates. This takes automatically into account that the program does not take place in a stationary environment. Bergemann, Fitzenberger, and Speckesser (2009) show for the case of training in East Germany that using transition rates as success indicator is more appropriate in such a nonstationary environment as compared to the use of unconditional employment rates as it is often done in the literature. Furthermore, estimating the effects on transition rates is more informative because they deliver detailed information about the functioning of JCSs; notably, whether the program helps participants to find a regular job and whether the program helps to stay in a regular job. This is particularly interesting for the German case, as the regulatory framework sets down that JCSs should help to improve the employment situation notably in these two dimensions.

The studies closest to ours are van Ours (2004) and Eichler and Lechner (2002). Eichler and Lechner (2002) evaluate the effectiveness of JCSs in Sachsen-Anhalt for the time period 1992 to 1996 based, as the present analysis, on data of the LMM-SA. The authors do not exploit the monthly retrospective calendar but the panel structure of the data using the waves from 1992 to 1997. In this way they can only identify labor market states at the time of the interviews. Eichler and Lechner (2002) apply a conditional difference–in–differences approach with the unemployment probability as the outcome variable of interest. The estimator is aligned on the labor market state observed directly before the participation. This can affect their estimates if the employment situation is characterized by a temporary (random) deterioration (a phenomenon that is also captured under the heading Ashenfelter's dip following Ashenfelter (1978)); this randomness in the employment situation is automatically captured in our transition rate model. Moreover, our timing-of-events approach is able to take into account that individuals might enter the programs at a later point in time. An additional innovation constitutes our focus on effect heterogeneity beyond gender, which is able to deliver new insides on the functioning of JCSs.

The evaluation of van Ours (2004) also builds upon the timing-of-events approach, but he solely focuses on the transition rate to work. Moreover, he investigates effect heterogeneity only with respect to gender. We investigate effect heterogeneity with respect to selected further characteristics like education, and estimate models allowing for effect heterogeneity with respect to unobserved characteristics following Richardson and van den Berg (2013). Additionally, we estimate specifications controlling for endogenous participation in training programs and investigate the effects of multiple treatments.

Our results suggest strong negative locking-in effects during program participation. In a model with homogeneous treatment effects, the negative treatment effect vanishes one year after the program start. Furthermore, we show that women and highly skilled participants leave unemployment quicker than other groups, which results in highly skilled women benefiting

from participation. Additional results suggest that JCSs do not influence employment stability.

The rest of the paper is structured as follows. Section 2 describes the East German labor market situation and the institutional settings of JCSs. Section 3 presents the data and descriptive statistics. Section 4 specifies the empirical model and discusses the underlying assumptions. Section 5 presents the results of the empirical analysis and Section 6 concludes.

2 Institutional Background

2.1 Economic Development in East Germany

On the eve of the German reunification in 1990, the economic situation in East Germany was quite desolate. The centrally planned economy of the GDR was characterized by inefficient production processes, obsolete technologies and over-staffing. Following a policy of full employment, the GDR had a labor force of about 10 million in 1989 and unemployment was almost nonexistent. In contrast, the modern market-oriented economy of the Federal Republic of Germany had a labor force of about 28 million and a rate of registered unemployment of 7.9% in 1989 (Federal Employment Agency, 2014).[5]

In this new environment existing East German firms faced enormous difficulties to compete. They could rarely cover their variable costs at the prevailing market prizes. In addition, their former home market broke away as East Germans diverted their spending towards West German products. Production in 1991 only reached two-thirds of its 1989 level. Four years of high growth rates followed in East Germany. However, since 1996 the economy was basically stagnating again.

The government reacted with setting up large labor market programs in order to cushion the effects of economic restructuring. Shortly after the reunification the main emphasis was put on instruments that were easy to implement. Short-time work and early retirement schemes were predominant. However, already in 1991, a substantial part of the East German labor force participated in active labor market programs to keep the official unemployment rate - which does not include program participants - from skyrocketing. By correcting the number of unemployed by the number of participants in ALMP programs, unemployment rates in East Germany amounted to 25.3% in 1991, peaked at 35.3% in 1992 and decreased to a value of 23.7% in 1999 (see Table 1). In 1991, 209,000 individuals participated in JCSs and 280,000 in training programs. Participation in ALMP measures peaked in 1992 with over 800,000 individuals participating on average in full-time programs. From 1993 onwards, the number of participants began to shrink due to policy changes and financial restrictions. However, training and JCSs remain important components of policy interventions in East Germany until the early 2000s.

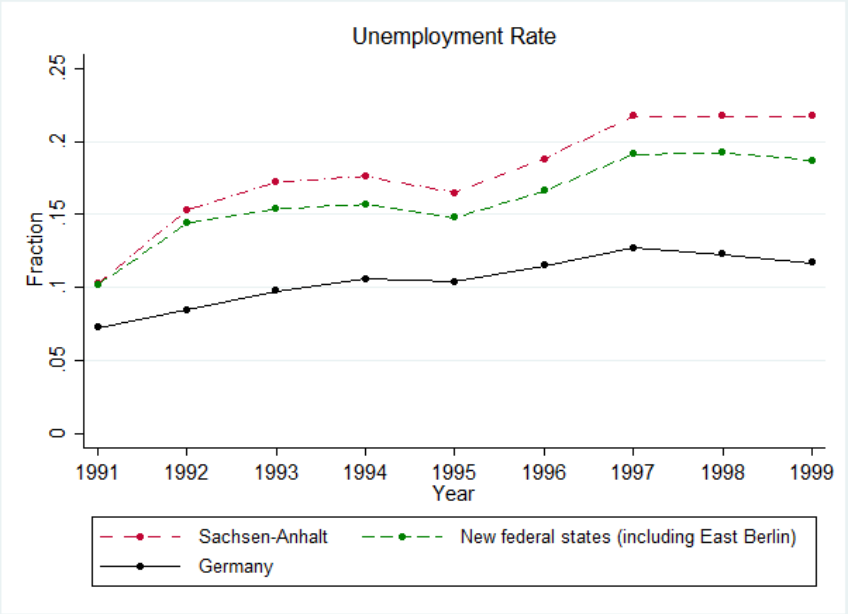
Despite the heavy use of ALMP, unemployment increased drastically. During the period

[5]For more detailed information on the economic development of East Germany see von Hagen, Strauch, and Wolff (2002), Burda and Hunt (2001) and Wunsch (2005).

1990-1992, regular employment was reduced from a yearly average of over 9 million jobs down to just under 6 million jobs and the unemployment rate rose from virtually zero in 1990 to more than 10% in 1991. From 1991 onwards, it exceeded the average unemployment rate for Germany as a whole (see Figure 1).

Our analysis is based on data gathered in the new federal state of Sachen-Anhalt. In 1999, 2.7 million individuals lived in Sachsen-Anhalt which corresponds to 3% of the population in Germany and to 22% of the population of the new federal states without Berlin (Federal Statistical Office, 2014). Figure 1 shows that the unemployment rate in Sachsen-Anhalt exceeded the average of East Germany over the whole observation period. These figures were mainly driven by the high concentration of sectors like agriculture, electrical industry, trade, mining and chemical industry. After reunification, many companies in these fields had to close down due to the loss of trading partners in the East and inefficient production processes.

Figure 1: Unemployment rate in Germany 1991–1999



Source: Federal Employment Agency, 2014.

A factor that should not be neglected when discussing the economic situation in East Germany is the emigration that set in after the fall of the wall. In 1989 and 1990 almost 400,000 individuals, which is about 2% of the East German population, migrated from East to West Germany each year (Kröhnert and Skipper (2010)). The threat of mass emigration was a popular argument for a quick catch-up of East German wages and for an implementation of large ALMP programs among both politicians and union leaders. Indeed, the migration situation changed after 1990. Emigration reduced substantially and was increasingly matched by immigrating West Germans. In 1997, East-West migration reached a minimum with 13,000 individuals. Since then, emigration from the new federal states has increased again.

2.2 Background and Aims of JCSs

When the West German Employment Promotion Act (*Arbeitsförderungsgesetz*, AFG) was transferred to East Germany a number of additional regulations were introduced to take into account the special situation of the East German economy. Those exceptions meant, among others, less restrictive rules for participation in programs of ALMP shortly after reunification. In the following section, we describe the eligibility rules and some important implementation details of the two different job creation programs which were realized in East Germany. We focus on the institutional regulations in force during the time before the Employment Promotion Act was replaced by the new Social Law Book III in 1998. This time period covers the main part of our observation period.[6]

In this study, the phrase *job creation scheme* includes two different types of programs which were realized in East Germany after the reunification: traditional JCSs (*Allgemeine Maßnahmen zur Arbeitsbeschaffung*, see §§91-96 AFG) and Productive Wage Subsidies East (*Produktive Lohnkostenzuschüsse Ost*, see §249h AFG).[7] The latter were introduced in January 1993 and offered temporary employment opportunities in activity areas like social services or environmental redevelopment. Both job creation programs intended to create additional temporary jobs primarily in the public or non–profit sector for the time of the subsidy and were similarly handled by the labor offices. They differed, however, with respect to the level of the subsidy, the program duration and the activity areas.

The government pursued several objectives by implementing JCSs in East Germany in the period after reunification. First, in the course of the transformation process, JCSs should simply provide jobs and income for unemployed individuals and those who were at risk of becoming unemployed. In this way the threat of social hardship could be reduced and the official unemployment rate could be lowered. Second, they were used as means to invest in the East German industrial infrastructure. Especially in the time of 1993–1996, this aim was emphasized by the large scale provision of ordinary productive wage subsidies with their restricted activity areas. The third objective which over time increasingly gained importance was the traditional aim of ALMP measures. The employment subsidies should help the participants to find regular jobs. In addition, the AFG emphasized that especially those JCSs should be supported which help creating *stable* employment relationships. This paper evaluates whether JCSs help to find and retain regular employment. Hereby, traditional JCSs and ordinary subsidies will be jointly evaluated. Unfortunately, data limitations make it impossible to distinguish between these two different program types (see Section 3.1).

[6]Further information and data on JCSs in East Germany in the early 1990s can be found for example in Brinkmann and Völkel (1992) and Spitznagel (1992). Only few additional changes concerning JCSs took place with the introduction of SGB III, see for example Wunsch (2005).

[7]In 1998 these subsidies were renamed to Structural Adjustment Measures (*Strukturanpassungsmaßnahmen*).

2.3 Institutional Provisions of JCSs

The implementation of the two types of JCSs involved the following steps. A project organizing institution, which could be a firm, a public authority or a charity, had to create at least one job within a project. This project needed to be beneficial for the community and had to be additional in the sense that it would not be carried out without the subsidy. Formally, after approval of a project, the local labor office should choose the participants. Surveys in labor offices showed that the time elapsing between the application of a project organizing institution and the actual program start was on average three months (Völkel (1994)). In East Germany so-called "Societies for Employment Promotion and Structural Development" (*ABS-Gesellschaften*) often acted as large scale organizers of JCSs. In the early 90s these societies had a significant influence on the selection of participants. They had a preference for young educated men (Brinkmann and Völkel (1992)).

Participation in a JCS was often financially attractive for unemployed individuals. The wage paid during program participation had to be equal to the wage set by collective wage agreements between the unions and employers organizations for similar but unsubsidized work (*Tariflohn*). The subsidy given to the employer covered part of (or fully) the wage costs. Participants received a fixed term work contract, which induced regular social security contributions. As a consequence the participant renewed or prolonged his or her eligibility period for unemployment benefits. During participation the local labor office and the participant should continue their search for a regular job. The program ended in case a regular job or a suitable training program was found. More recently, JCSs can be used to test the willingness to work of unemployed jobseekers in Germany, see for example Hohmeyer and Wolff (2012), who study the impact of JCSs on German welfare recipients based on a sample from 2005. In our context, with high job destruction rates and low job offer arrival rates, the test of willingness to work was, however, neither an explicit nor implicit goal of JCSs (see for example Spitznagel (1992)). Moreover, the increased income compared to UI benefit payments made participation in JCSs for most of the unemployed job seekers attractive.

The length of traditional JCSs was typically 12 months. In some cases extensions of up to 24 months or even of up to 36 months were possible if a permanent job was offered subsequently by the organizer of JCSs. Productive Wage Subsidies East could be granted even longer. It can be granted up to 48 months for employees that are older than 50, handicapped people or in case a permanent job was offered by the program-supporting employer. The subsidy is not transferable to other employers. It is exclusively paid to the employer who set up the JCS.

The implementation details depended on the type of the subsidy program and the point in time it took place. Formally, participation in traditional JCSs required that the person was unemployed and entitled to some kind of unemployment payment just prior to participation. In addition, a person needed to have been unemployed for at least 6 months within the last 12 months. The eligibility criteria for Productive Wage Subsidies East were less strict. Besides

being eligible for some kind of allowance, a participant needed to have been unemployed for 3 months, or needed to have had finished a traditional JCS, or enter from short-time work.

The local labor offices could depart from the above mentioned participation criteria. In particular, the rules with respect to the previous unemployment duration have not been applied strictly in East Germany. This is especially true for the period directly after the unification. Also shortly after the unification, it was common practice after plant's closure to collectively put the work force of the plant into a so-called Mega-JCS. This program involved, for example, closing down the obsolete plant or cleaning-up the environmental damage produced by the plant. We do not consider participation in Mega-JCSs in our main specification as these programs are not primarily aiming at the integration into regular employment.

This practice and the influence of the large scale ABS-Societies on the selection of participants were the main reasons for the deviations from the target group of traditional JCSs. Unemployed older than 50 or younger than 25 and without professional education, long-term unemployed and, as a special regulation for East Germany, also women belonged to the target group. It should be mentioned that for older participants an additional small scale job creation program existed. Albeit being similar to traditional JCSs this program solely intended to bridge the time until retirement (*Maßnahmen zur Arbeitsbeschaffung für ältere Arbeitslose* §§97-99 AFG). In order to avoid the analysis of pre-retirement effects, we will exclude elderly from our analysis (see Section 3.1). In the mid 90s, the allocation of JCSs became more in line with the predefined target groups.

In April 1997 an additional productive wage subsidies program was implemented: Productive Wage Subsidy for Business Enterprises (*Lohnkostenzuschüsse Ost für Wirtschaftsunternehmen*, see §249h AFG) which was designed to subsidize temporarily regular jobs. This program of ALMP will not be considered here as it might have qualitatively different effects from JCSs.

2.4 Participation and Costs of JCSs

Table 1 shows that the number of program participants peaked in 1992 when 388,000 individuals were employed in traditional JCSs in the new federal states (NFS). In this time period high participation rates were mainly realized by Mega-JCSs, where the workforce of closing firms were collectively put into a job creation program. Thereafter, policy changes and financial restrictions led to decreasing yearly stocks. Between 1993 and 1997 the stock of participants in traditional JCSs fluctuated around 200,000 while the stock of participants in Productive Wage Subsidies East fluctuated around 90,000 per year in East Germany. From 1998 onwards, the number of jobs created via traditional JCSs was lower than the number created via Productive Wage Subsidies East. This development was mainly driven by the introduction of the Productive Wage Subsidies for Business Enterprises in April 1997.

The relatively high unemployment rate in Sachsen-Anhalt compared to the other new federal

Table 1: Participants in JCSs (in thousands), 1991-1999

Year	Traditional JCSs			Productive Wage Subsidies East			Underemployment Rates in %	
	NFS	SA	$\frac{SA}{NFS}(in\%)$	NFS	SA	$\frac{SA}{NFS}(in\%)$	NFS	SA
1991	208.7	35.7	17.1	.	.	.	25.3	24.8
1992	388.1	88.0	22.7	.	.	.	35.3	37.3
1993	237.5	56.4	23.7	22.5	.	.	32.3	34.4
1994	192.5	40.0	20.8	87.7	21.0	24.0	29.7	30.3
1995	205.8	41.0	19.9	106.5	23.2	21.8	26.4	27.6
1996	191.5	40.0	20.9	86.2	17.6	20.4	24.2	27.2
1997	154.5	33.0	21.4	80.1	17.1	21.4	24.0	27.0
1998	151.8	27.0	17.8	162.4	29.5	18.2	24.1	26.7
1999	168.0	30.0	17.9	180.0	29.0	16.1	23.7	26.6

Notes: JCS: Job creation scheme. SA: Sachsen-Anhalt. NFS: New federal states including East Berlin. Underemployment = unemployed + full-time equivalents of short-time work + training participants + JCS participants + early retirement participants. Underemployment rate = underemployment in % of labor force (employed and unemployed) + training participants + early retirement participants (see the official definitions of the underemployment rate of the Federal Employment Agency).
Source: ANBA (*Amtliche Nachrichten der Bundesagentur für Arbeit*) 1992-2000, IAB (Institut für Arbeitsmarkt- und Berufsforschung, Nürnberg) Zahlen-Fibel 7.2.2, 7.2.3 and 7.2.4.

Table 2: Expenditures on JCSs by the German Federal Employment Agency (in million DM), 1991-1999

Year	NFS	SA	$\frac{SA}{NFS}(in\%)$
1991	3075	612	20
1992	5083	1664	33
1993	6905	1388	20
1994	4722	1680	36
1995	7109	1734	24
1996	8156	1701	21
1997	6703	1422	21
1998	5453	1054	19
1999	5681	1117	20

Notes: JCS: Job creation scheme. SA: Sachsen-Anhalt. NFS: New federal states including East Berlin.
Source: ANBA (*Amtliche Nachrichten der Bundesagentur für Arbeit*) 1992-2000.

states (see Figure 1) did not result in a higher share of participants in JCSs in the 90s. The number of participants in JCSs in Sachsen-Anhalt amounted to 20% of the total number of participants in all new federal states in the time period considered for both kinds of job creation measures.

Table 2 shows that the expenditures on JCSs by the German Federal Employment Agency for both kinds of programs fluctuate around 5 million DM (3.7 billion € in 2015 prices) and reached an all-time high in 1996 when costs amounted to more than 8 million DM (6.0 billion € in 2015 prices) in East Germany. In total, JCSs counted more than 2.5 million participants and produced expenditures of more than 52 billion DM (39.0 billion € in 2015 prices) in the period 1991-1999 in East Germany.

3 Data and Descriptive Statistics

3.1 Data Set and Sample Selection

The data used stem from the last three years (1997-1999) of the Labor Market Monitor Sachsen-Anhalt (LMM-SA). The LMM-SA is a survey of the working-age population living in the new federal state of Sachsen-Anhalt with around 6.000 survey participants each year.[8]

Similar to other surveys, the LMM-SA provides individual information on socio-economic characteristics like age and professional education. As an important innovation, the LMM–SA introduced in the years 1997-1999 a retrospective monthly employment calendar that goes back until 1990, enabling us to analyze JCSs over a long time period after the reunification.

Recall data over such a long time span can suffer from recall errors. Paull (2002) documents the international evidence. Due to recall error she notes a tendency to report too many labor market transitions and at the same time to underreport short unemployment spells. However, Bachmann and Schaffner (2009) find on the basis of retrospective surveys going back at most 2 years that this is less of a problem for the German survey GSOEP.

Although our survey covers a longer time span, we argue that the set up of the questionnaire is such that our data also suffers less from recall compared to other data recording similarly long time periods. Firstly, the survey participants are asked to remember their employment history starting with the historic year of 1990, in which the political and economic system of East Germany changed drastically. The validity of recall error can be strongly improved by such a combination of biographic and historic events (Loftus and Marburger (1983)). Second, the data is collected in a chronological order, which is regarded as the best technique for collecting life history data in a single survey (Sudman and Bradburn (1973)). Furthermore, we try to use broadly defined labor market states, such that recall errors can cancel out. This is par-

[8]The response rate of 32% (Ketzmerik and Wiener (1999)) is in line with other innovative surveys. For example the response rate of the German Internet Panel amounts to 19% (Blom, Gathmann, and Krieger (2015)), and the response rate of the GSOEP innovation refreshment sample F to 51% (Däubler (2002)).

ticularly relevant for the definition of the 'out of the labor market' state and 'unemployment'. Paull (2002) for example finds that women tend to redefine unemployment to being 'out of the labor force'. In our main analysis we aggregate these two states to being 'unemployed'. The aggregation is supported by the observation that being 'out of the labor force' is a rare event in East Germany for prime aged individuals. Labor force participation is historically very high in East Germany. However, we also present a sensitivity analysis where the 'out of the labor force' state is treated as a censoring event. One potential problem with our data could be that some JCSs are reported as regular employment. This is comparable to the tendency that private training programs are reported as ALMP training programs, see Ketzmerik (2001). However, we do not have a benchmark data set with which we can investigate this issue. As long as this is not systematically related to the success of the program this should not bias our results.

Our data source allows us to distinguish the following combined categories of the labor market status on a monthly basis: *in education*, *employed* (including full-time employed, part-time employed and self-employed), *unemployed* (combined with out of the labor force), *in training*, *in JCS*, *in maternal leave* and *in retirement*.[9]

Our sample focuses on individuals that are between 25 and 50 years old in January 1990 and that had been employed before the Monetary, Economic and Social Union went into effect in June 1990. This allows us to analyze the effect of JCSs for individuals who belonged to the active labor force of the GDR and who were hence fully affected by the transformation process and subsequent introduction of ALMP programs.[10] At the same time, this sampling criteria allows us to exclude individuals who are close to retirement and might use ALMP programs as a bridge to retirement.

Table A.2 in the Appendix presents an overview of the variables used in this study. Based on these data we construct a sample of inflows into unemployment based on individuals whose labor market history is observable until at least September 1997 without interruption. We consider unemployment spells starting in January 1991 or later only if there exists a prior employment spell of at least one month.[11]

This analysis exploits information on 2,235 individuals who experience at least one unemployment spell between January 1991 and the end of the observation period, which can be September 1997, October 1998 or December 1999.[12] In total, the data include 3,864 unemployment spells. Thus, several individuals experience multiple spells and the average number of spells per individual amounts to 1.7. Transitions to other destinations than to employment are

[9]For more details on the data set and their use see for example Bergemann, Fitzenberger, and Speckesser (2009) and Ketzmerik (2001) as well as Eichler and Lechner (2002) on earlier waves.

[10]See Table A.1 for the number of observations dropped by each sample selection step. Note that the data collecting institute provided us with a retrospective questionnaire data set, where already only those were selected who gave a full account of their employment history; these were about 95% of all interviewees, see Ketzmerik and Wiener (1999).

[11]Due to data restrictions on the local unemployment rates that are included as controls in the analysis, we have to exclude unemployment spells starting before January 1991.

[12]We also consider persons as unemployed if they indicated to be in a training program for at most 1 month.

treated as right censored. Thus, if an individual enters an alternative ALMP program like training before finding regular employment, the spell is also considered as censored at the point in time the individual enters the alternative program. As a sensitivity analysis, we estimate a model with endogenous right-censoring. In this specification, we model transitions to other states than employment as a competing risk. We additionally estimate specifications in which we define periods of training participation as unemployment and models in which we consider participation in training programs as an alternative treatment. For these specifications, unemployment continues during training participation. Moreover, unemployment spells are right censored in case the observation period ends before an exit out of unemployment can be observed.

In case of treatment, we observe the exact moment of the entry into the program and the actual program duration. However, we do not have any information on the planned participation duration in a JCS. In our model specifications, the time spent in a JCS is assumed to contribute to the unemployment duration. Although program participants may search for a job with reduced effort, they still do search, hence they should be treated as unemployed. In our main specification, an unemployment spell is defined as right censored at the moment a second entry into JCSs is observed. We additionally estimate specifications which model the selection into the second treatment and which estimate a corresponding additional treatment effect.

The phrase *job creation schemes* (JCSs) includes all variants of public employment programs, although they are partly conceptually different, as mentioned in Section 2.2. As it is unclear whether programs starting after April 1997 are JCSs or productive wage subsidies for regular jobs, we will only use information on program participation that started before April 1997 and treat entries after April 1997 as right censored. The baseline specification of the analysis excludes participants in Mega-JCSs, identified as those individuals who enter the program directly after employment. We find a high concentration of Mega-JCSs in Sachsen-Anhalt in the early 90s. In 193 cases a direct transition from employment to a JCS can be observed. In a sensitivity analysis we are going to investigate the effects of both traditional and Mega-JCSs.

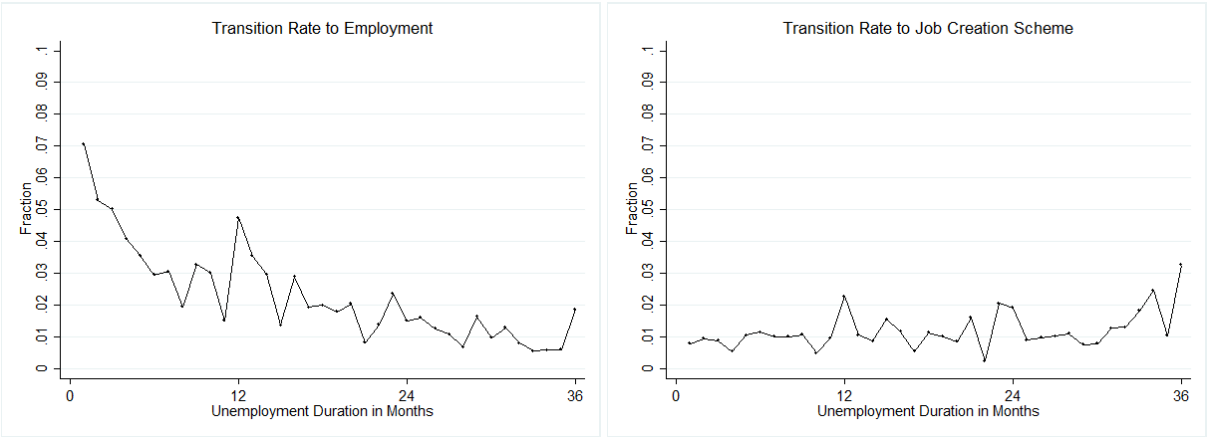
3.2 Labor Market Transitions and Durations

We observe that around 11% of the unemployment spells include a period of participation in a JCS (see Table A.3 in the Appendix). About half of the spells without treatment and 26% of the spells with treatment end in a transition into regular employment. 23% of the unemployment spells that are observed to include participation in a JCS are followed by a period of participation in a training program and 16% are followed by a second participation in JCSs. For 23% no transition can be observed within the observation period.

Figures 2 and 3 present non-parametric Kaplan-Meier estimates of the hazard rates based on information of the first unemployment spell. Figure 2 contains the empirical exit rate from unemployment into employment which is highest at the beginning of the unemployment spell and then starts to decline. After a second peak at an unemployment duration of 12 months which

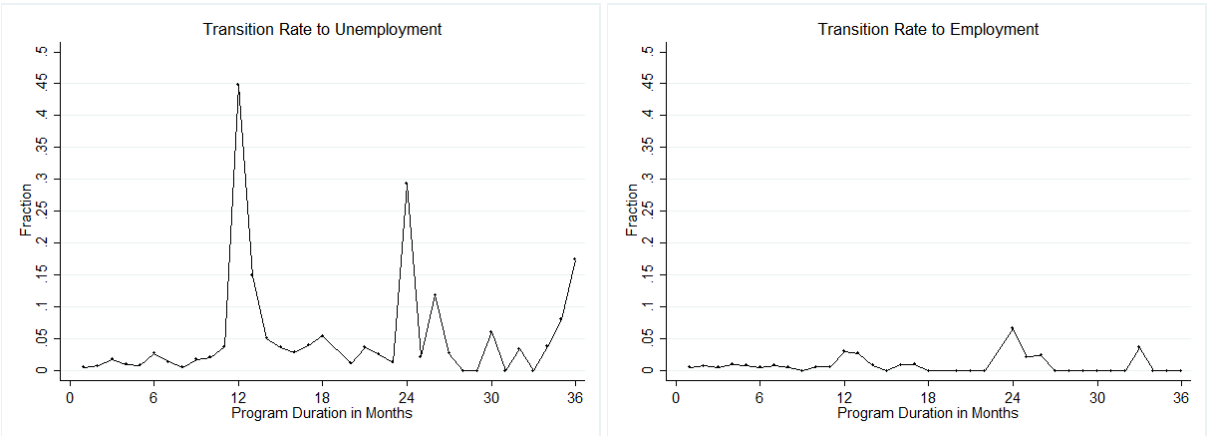
could be caused by the expiration of unemployment benefits, the exit rate circulates around 1.5%. The conditional probability of entering a JCS increases to a level of around 2.3% after one year of unemployment. In the subsequent period the hazard rate has a slight positive trend. Figure 3 shows the empirical exit rate from the program to unemployment and employment, respectively. Both plots reveal strong peaks at 12 and 24 months indicating that a substantial share of participants re-enters unemployment and some participants enter employment directly after the program has expired.[13]

Figure 2: Transition from Unemployment to Employment and to Job Creation Schemes



Notes: Empirical exit rates are based on the first unemployment spell.
Source: LMM-SA, 1997-1999, own computations.

Figure 3: Transition from Job Creation Scheme to (Un)employment



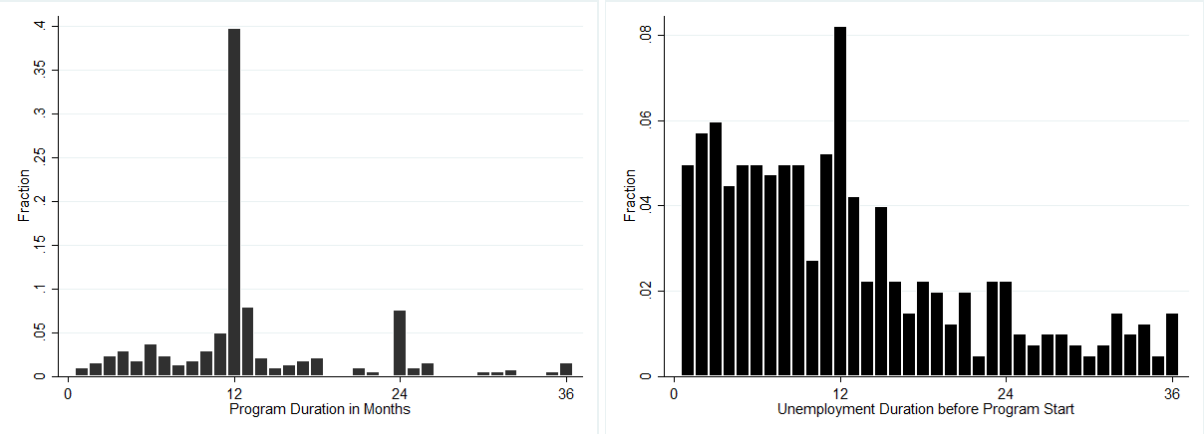
Notes: Empirical exit rates are based on the first unemployment spell.
Source: LMM-SA, 1997-1999, own computations.

A JCS typically lasts 12 months. The left panel in Figure 4 shows that around 40% of all JCSs end after one year and only a few last longer than 24 months. The peaks at 12 and 24 months indicate that many individuals exploit the program to the full extent which

[13]Table A.4 in the Appendix presents summary statistics of the duration of unemployment, of subsequent employment and of JCSs separately for spells that end with a transition to employment, spells that end with a transition to another labor market state and right censored spells due to the end of the observation period.

can be interpreted as a sign of locking-in effects. The right panel in Figure 4 displays the distribution of the moment of the program start in the sample of treated individuals. While the largest share of individuals enters the program after exactly 12 months in unemployment (around 8% of all program participants), we have rather equal shares of entries ranging from 3% to 6% in the first 11 months. The distribution of program timing and the transition probabilities from unemployment to JCSs over time shown in Figure 2 underline that we face a dynamic treatment setting with possible entries over the full unemployment spell.

Figure 4: Distribution of Program Duration and Unemployment Duration before Program Start



Notes: The distribution of program durations (left panel) is based on treated individuals for whom the duration is completely observable.
Source: LMM-SA, 1997-1999, own computations.

3.3 Descriptive Statistics of Observable Characteristics

Table 3 shows descriptive statistics of the observed covariates for all individuals and separately for program participants and nonparticipants. The values of these variables are constant over the observation period. They are measured at the date of the interview with the exception of age which refers to the year 1990.

About half of the unemployed in our sample are women. 60% of the unemployed that participate in a JCS during their first unemployment spell are female. In total, the largest fraction of unemployed individuals is between 45 and 50 years old in 1990. One third of the program participants are 45 to 50 years old.

Furthermore, we include a set of dummy variables indicating the professional education of the unemployed. The comparatively small number of individuals without or with partly vocational training arises from the obligation to perform a vocational training (*Berufsbildungspflicht*) in the former GDR. Table 3 shows that about half of the unemployed individuals have achieved a vocational training and one-fifth exhibit a university degree. The share of unemployed with a high professional education is similar for participants and for nonpartici-

Table 3: Descriptive Statistics of Covariates in %

	All	Participants	Nonparticipants
Ages 25-29	18.1	11.1	19.1
Ages 30-34	19.8	20.6	19.7
Ages 35-39	21.5	18.1	22.0
Ages 40-44	15.7	17.1	15.5
Ages 45-50	24.9	33.1	23.7
Female	52.3	59.6	51.2
Male	47.7	40.4	48.8
No Vocational Training	1.7	4.2	1.3
Partly Vocational Training	2.2	3.1	2.1
Vocational Training	50.9	49.8	51.1
Advanced Vocational Training	7.3	4.9	7.6
Technical College	15.7	16.0	15.7
University Degree	22.2	22.0	22.2
Total	**2,235**	**287**	**1,948**

Notes: Descriptive statistics are based on the first unemployment spell. The highest professional education level is measured at the interview date. Age is measured in January 1990.
Source: LMM-SA, 1997-1999, own computations.

pants.[14]

In addition, the list of covariates included in our estimations contains year and quarter dummies, regional dummies, monthly unemployment rates by labor market district, and a time-varying variable capturing the distance from the expiration date of unemployment benefit claims.[15]

4 Empirical Model

We are interested in the causal impact of entering a JCS on the unemployment duration and subsequent employment stability. Individuals are defined to be treated if they enter a JCS in month t of the unemployment spell, from the corresponding month t onwards. 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 following the timing-of-events approach (Abbring and van den Berg (2003)).[16] We have monthly information about different employment states

[14]The highest professional education level is measured at the day of the interview. For 14 individuals in our sample we observe an unemployment spell before individuals reenter the educational system. For those individuals we adjust the educational level measured at the time of the interview by the time spent in the educational system since the corresponding unemployment spell. In a robustness check we exclude those individuals from the estimation sample. The results do not change.

[15]The unemployment rates are corrected for the number of participants in ALMP programs and hence are larger than the official numbers.

[16]For a detailed discussion of the advantages and disadvantages of the approach, see van den Berg and Vikström (2014).

and estimate discrete time duration models. Abbring and van den Berg (2003) provide a proof for continuous time models (for identification in dynamic discrete models see Heckman and Navarro (2007)). In a second step we investigate the subsequent employment stability of program participants and nonparticipants by introducing a third transition process similar to van den Berg and Vikström (2014). In addition, we estimate models allowing for a random treatment effect following Richardson and van den Berg (2013) and models with two treatments (JCSs and training), whereby we allow the probability of entering one treatment to depend on the participation in another treatment. None of these model extensions leads to different results. Therefore, in the following we focus on the description of our main econometric model.

Our data set contains multiple unemployment spells for some individuals, which facilitates identification and estimation of the joint distribution of the unobserved heterogeneity variables (Honoré (1993)). Moreover, our data set includes time-varying variables such as the local unemployment rate which provide a more robust source of identification than time-invariant covariates (Gaure, Røed, and Zhang (2007)). Lagged time-varying variables act as exclusion restrictions. They have an impact on the survival probability until a time t, but conditional on observed and unobserved characteristics lagged values do not have any impact on the transition probabilities in t. Intuitively, individuals with the same observed characteristics x in period t but different values of lagged time-varying variables should only have a different transition probability if the composition with respect to unobserved heterogeneity is different. This has been pointed out earlier by for example Eberwein, Ham, and LaLonde (1997), and Brinch (2007) provides a theoretical discussion of identification. Brinch (2007) shows that in the presence of time-varying covariates mixed hazard rate models are identified without the proportional hazard rate assumption.

4.1 Durations until employment and until treatment

The transition probability of leaving unemployment for a job $\theta_u(t)$ and the probability of entering a JCS $\theta_p(t)$ are assumed to vary with observed characteristics x_t, the unobserved heterogeneity terms v_u and v_p, respectively and the elapsed unemployment duration t. Additionally, the probability of leaving unemployment depends on the treatment status in period t. We assume that the unobserved heterogeneity is constant over time, i.e. across repeated spells of unemployed individuals, and uncorrelated with observed characteristics. $\theta_u(t)$ and $\theta_p(t)$ can be expressed by complementary log log specifications:

$$\theta_u(t|x_t', v_u, t_p) = 1 - \exp(-\exp(\lambda_u(t) + x_t'\beta_u + \mathbf{1}(t \geq t_p)\delta_u + v_u)) \quad (1)$$

$$\theta_p(t|x_t', v_p) = 1 - \exp(-\exp(\lambda_p(t) + x_t'\beta_p + v_p)) \quad (2)$$

$\lambda_u(t)$ and $\lambda_p(t)$ capture the duration dependencies and the vectors β_u and β_p capture the influence of observed covariates. δ_u corresponds to the effect of being treated on the probability

of finding a job. The treatment effect might vary depending on the time since the treatment. In our baseline model, we allow for a time-varying treatment effect by specifying two intervals following the start of the treatment in period t_p: $(t_p \leq t \leq t_p + c_1)$ and $(t > t_p + c_1)$. The hazard rate is shifted by δ_{u_1} in the first c_1 months after program start. After a program duration of c_1 months, the hazard rate is shifted by δ_{u_2}. We additionally estimate models with more than two time intervals for the treatment effect, models allowing for effect heterogeneity with respect to selected observed characteristics, and models with treatment effects depending on the point in time the treatment starts.

As described in Subsection 2.3, eligibility for program participation requires in principle at least 3-6 months of unemployment experience. These rules have not been applied strictly in East Germany, and, consequently, we observe in our data quite some transitions into the JCS although individuals have not been eligible with respect to the criterion based on the previous unemployment duration (53 cases). Nonetheless, these rules might introduce a violation of the proportionality assumption of the transition rate model. Therefore, we include two additional dummy variables indicating the non-eligibility according to these rules. The first dummy variable is relevant for the years 1991 and 1992. From 1993 onwards, depending on the program scheme, individuals should have been at least 6 months unemployed in the previous 12 months or their current unemployment spell should have lasted for at least 3 months. We include a second dummy variable for this period which is one if the stricter criterion of 6 months is not fulfilled.[17]

For identification – similar to alternative micro-econometric approaches like matching – it is important that the unemployed job seekers do not anticipate the exact moment a JCS starts. This no-anticipation assumption implies that the future realization of the moment of entry into treatment does not affect the probability of leaving unemployment for a job before the moment the treatment starts.[18] It is likely that this assumption holds in our context. As discussed in Subsection 2.3, the case worker decides about participation. He or she has to place his candidates as early as possible and has to check potential alternative job offers. Moreover, the gap between program admission and actual start of the program is rather small. Surveys among caseworkers indicate that the time span between the application of an employer for funding of the JCS and the actual program start was on average three months (Völkel (1994)). Hence, the time span between the point in time the individuals are informed about program start and actual program start should be on average less than three months. One important determinant of the program participation might be the expiration date of benefit entitlements, since benefit claims can be

[17] We additionally estimate models with two dummies for the period from 1993 onwards, to capture the differential rules for the two programs, and we allow for some observed characteristics to have differential effects on the transition probability to JCSs if individuals are not eligible based on the unemployment criterion. These alternative specifications do not change our main results (see Tables S.3 and S.4 in the Supplementary Appendix).

[18] It is important to note that the no-anticipation assumption does not exclude that individuals know the probability distribution of future events conditional on observable and unobservable characteristics. Individuals may change their optimal behavior to determinants of the treatment process, but not to the realizations of future treatments.

prolonged by participation in a JCS. We are able to account for this mechanism by constructing a variable capturing the distance until the individual expiration date.

It should be pointed out that the treatment effect is defined within an environment where the ALMP is present. Consequently, as a common shortcoming of ALMP evaluation studies, we can not capture equilibrium effects (see Crépon and van den Berg (2016)), i.e. we do not focus on how nonparticipants are affected by the program (for example spillover effects) and how the effect of participants is influenced by the existence of the program. However, our approach takes into account that the treatment could be given at a later point in time. Our framework also allows for ex-ante effects that is ex ante knowledge of the existence of the program and ex ante knowledge of the individual distribution of time to treatment.

4.2 Employment stability

We additionally investigate the impact of the treatment on the subsequent employment stability. The transition probability from employment to unemployment $\theta_e(t)$ can be expressed by:

$$\theta_e(t|x, v_e, t_u, t_p) = 1 - \exp(-\exp(\lambda_e(t) + x_t'\beta_e + \mathbf{1}(t_u \geq t_p)\delta_e + \gamma_1 t_u + \gamma_2 t_u^2 + v_e)) \tag{3}$$

$\lambda_e(t)$ captures the duration dependence in employment. The probability of reentering unemployment depends on observed characteristics x_t, unobserved heterogeneity v_e, and on the realized unemployment duration t_u. The unobserved characteristics are allowed to be correlated with the unobserved factors v_p and v_u. The treatment effect δ_e captures the impact of program participation during the previous unemployment spell.

4.3 Distribution of unobserved heterogeneity and likelihood function

We specify the joint distribution G of the unobserved heterogeneity terms v_u, v_p and v_e to be discrete with M support points. The associated probabilities are given by:

$$Pr(v_u = v_u^m, v_p = v_p^m, v_e = v_e^m) = p_m, \; for\, m = 1, ..., M. \tag{4}$$

To force the class probabilities to be between zero and one and to sum up to one, we use a multinomial logit parameterization of the class probabilities

$$p_m = \frac{\exp(\omega_m)}{\exp(\sum_{m=1}^{M} \omega_m)} \; with \; \omega_1 = 0, \; for\, m = 1, ..., M. \tag{5}$$

For a model with $M = 2$, G would be described by 4 parameters, for $M = 3$ we estimate 8 parameters, etc. This approach allows for a flexible covariance matrix for the unobserved heterogeneity. For similar strategies for modeling the unobserved heterogeneity, see for example Aitkin (1999), Crépon, Ferracci, Jolivet, and van den Berg (2010) and Caliendo, Künn, and

Uhlendorff (2016). Our model selection with respect to the number of mass points is based on the bivariate duration model. We increase the number of mass points until we cannot improve the model fit anymore. The evaluation of the model fit is based on the Akaike Criterion (AIC). The likelihood contribution of individual i for given v_u^m, v_p^m, v_e^m in period t can be expressed by $l_{it}(x_{it}, v_u^m, v_p^m, v_e^m)$ and the Log-likelihood for the sample with N individuals is given by:[19]

$$\ln L = \sum_{i=1}^{N} \ln \left(\sum_{m=1}^{M} p_m \prod_{t=1}^{T} [l_{it} | x_{it}, v_u^m, v_p^m, v_e^m] \right) \tag{6}$$

5 Results

We start with presenting the results based on a bivariate duration model consisting of the duration until entry into a JCS and the duration until entry into employment. In the baseline specification, we specify a treatment effect for the first 11 months after the start of the JCS and for the period from 12 months onwards after the start of the JCS. The choice of this cut-off value is motivated by the typical program duration of 12 months and allows us to investigate potential locking-in effects.[20]

In a second step we introduce effect heterogeneity with respect to the point in time the treatment starts, the elapsed treatment duration and selected observed characteristics. In a third step we present results for a model with three equations: the transition rate from unemployment into the program, from unemployment into employment and from employment back into unemployment. Fourth, we estimate models with a second treatment, the participation in training programs. Next, we allow for effect heterogeneity with respect to unobserved heterogeneity (random treatment effects) and investigate the sensitivity of our results with respect to different choices about the definition of the sample, the unemployment state and about the way we deal with repeated spells of unemployment and shared unobserved heterogeneity. Finally, we investigate whether a model allowing for endogenous right-censoring leads to different results.

5.1 Baseline Results

We start with a discussion of the model selection in terms of the number of mass points for the heterogeneity components. This selection is based on a comparison of the model fit. We in-

[19] For the models allowing for random treatment effects we introduce an additional unobserved term v_{jcs}^m. For models taking a second treatment (training participation) into account the model is extend by an additional transition rate from unemployment to training, which depends on the unobserved term v_t^m.

[20] This choice is linked to the construction of our dependent variable. The dependent variable for a transition from unemployment to employment equals one in the last month of the unemployment spell if an individual starts working in the next month. In this way, we are able to estimate the probability for a transition from unemployment to employment in every month of the unemployment spell. This means if a direct transition to regular employment occurs after 12 months of participation in a JCS, the dependent variable equals one in month 12 after program start. Hence, the specification of the treatment effect for the first 11 months and after 11 months after program start captures the potential locking-in effects of a JCS with a typical duration of 12 months.

crease successively the number of mass points until we cannot improve the model fit, evaluated on basis of the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), anymore. In our application, the smallest value of the AIC and the BIC is reached in the specification with three unobserved mass points (see Table B.1 in the Appendix). In comparison to the model without unobserved heterogeneity, we estimate in this specification six additional parameters for the distribution of unobserved heterogeneity.[21] For the different transition processes we choose a flexible specification of the duration dependence based on eight time intervals.

In Table 4 we present the parameter estimates for the baseline model. The correlation between the unobserved heterogeneity terms v_p and v_u is -0.43. This negative correlation implies that we have a negative selection into treatment based on unobservables: individuals that are more likely to participate in a JCS, are in general less likely to find a job. However, with a standard error of 0.49 this negative correlation is not statistically significant from zero.

The main parameters of interest are the treatment effects of entering a JCS depending on the time since program start. In the first 11 months since start of the program, the estimated coefficient is with -1.23 negative and significant. This effect states that the transition rate to employment is reduced by 71% $(\exp(-1.23)-1)$ in the first 11 months after start of participation. From month 12 after program start onwards, the treatment effect vanishes. This result indicates that locking-in effects seem to be important. During program participation, the job finding probability is significantly reduced and after a typical program duration of 12 months the effect becomes positive but insignificant.

5.2 Heterogeneous Treatment Effects

We now consider a more flexible time-varying specification of the treatment effect. In line with the typical program durations of 12 and 24 months and inspired by the peaks in the transition rate from the program participation into employment (see Figure 3), we allow for five different treatment effects dependent on the elapsed treatment duration. δ_{u_1} measures the effect of JCSs for the period $t_p \leq t \leq t_p + 11$, δ_{u_2} for the period $t_p + 12 \leq t \leq t_p + 13$, δ_{u_3} for the period $t_p + 14 \leq t \leq t_p + 23$, δ_{u_4} for the period $t_p + 24 \leq t \leq t_p + 25$ and finally δ_{u_5} for the period $t > t_p + 25$.

Very similar to the baseline model, the estimated treatment effects indicate that the hazard rate is significantly lower by 70% in the first 11 months after start of participation (Panel A in Table 5). In month 12 and 13, the point estimate is positive but insignificant, followed by an estimated effect close to zero in months 14 to 23 after program start. The hazard rate increases significantly by 271% 24 to 25 months after entering a JCS. After 25 months, the effect is

[21] Figure B.1 in the Appendix presents the empirical exit rate from unemployment to work during the first unemployment spell jointly for program participants and nonparticipants and additionally the predicted monthly transition rates based on the estimated parameters. The predicted hazard rate fits well with the average of the empirical hazard rate and does a good job of describing the duration dependence.

Table 4: Baseline Estimation Results

	Transition $U \rightarrow E$		Transition $U \rightarrow JCS$	
Effect of JCS in months 1 - 11 after program start	-1.23***	(0.21)		
Effect of JCS in months > 11 after program start	0.23	(0.23)		
Not Eligible for JCS 1991-1992			0.36	(0.28)
Not Eligible for JCS 1993-1999			-0.65**	(0.26)
Unobserved heterogeneity:				
v_1	-4.81***	(0.62)	-7.46***	(1.16)
$v_2 - v_1$	1.67***	(0.19)	-0.44	(0.30)
$v_3 - v_1$	3.26***	(0.26)	-0.12	(0.37)
ω_2	0.34	(0.30)		
ω_3	-0.62**	(0.27)		
p_2	0.48			
p_3	0.18			
corr(v_u,v_p)	-0.43	(0.49)		
Duration dependence:				
4-6 months	0.03	(0.08)	0.18	(0.20)
7-9 months	-0.04	(0.10)	0.39	(0.25)
10-12 months	-0.03	(0.12)	0.69***	(0.25)
13-18 months	-0.08	(0.13)	0.43	(0.27)
19-24 months	-0.39**	(0.16)	0.31	(0.31)
25-36 months	-0.52***	(0.20)	0.24	(0.31)
> 36 months	-0.66***	(0.23)	-0.70*	(0.38)
Individual characteristics:				
Ages 30-34	0.07	(0.16)	0.20	(0.32)
Ages 35-39	0.09	(0.17)	0.50	(0.31)
Ages 40-44	-0.14	(0.18)	0.44	(0.31)
Ages 45-50	-0.40**	(0.19)	0.67**	(0.32)
Ages > 50	-1.16***	(0.20)	0.89***	(0.34)
Female	-1.10***	(0.08)	-0.08	(0.11)
Partly Vocational Training	-0.41	(0.39)	-0.23	(0.47)
Vocational Training	1.01***	(0.30)	-0.02	(0.35)
Advanced Vocational Training	1.00***	(0.34)	-0.13	(0.42)
Technical College	0.97***	(0.32)	0.12	(0.37)
University Degree	1.17***	(0.31)	0.37	(0.36)
Regions:				
Dessau	0.24	(0.21)	-0.25	(0.23)
Halberstadt	0.11	(0.23)	-0.30	(0.25)
Halle	0.47**	(0.21)	-0.90***	(0.31)
Magdeburg	0.28	(0.20)	-0.18	(0.22)
Merseburg	0.29	(0.21)	-0.15	(0.24)
Sangerhausen	0.18	(0.23)	0.20	(0.26)
Stendal	0.31	(0.22)	-0.17	(0.26)
Dummy for remaining unemployment benefit claims	-0.23**	(0.09)	-0.66***	(0.17)
Remaining unemployment benefit claims	-0.03***	(0.01)	0.01	(0.01)
Unemployment rate	-0.01	(0.01)	-0.02	(0.03)
N	2,235			

Notes: JCS: Job creation scheme, U: Unemployment, E: Employment. Standard errors are in parentheses. Current year and quarter dummies are not reported. Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.

Source: LMM-SA, 1997-1999, own computations.

Table 5: Time Dependent Effect of JCS

	Coefficient	Standard Error
Panel A. Effect of JCS dependent on Time since Program Start		
Effect of JCS in months 1 - 11 after program start	-1.22***	(0.21)
Effect of JCS in months 12 - 13 after program start	0.34	(0.32)
Effect of JCS in months 14 - 23 after program start	-0.06	(0.27)
Effect of JCS in months 24 - 25 after program start	1.31***	(0.38)
Effect of JCS in months $>$ 25 after program start	0.47	(0.36)
Panel B. Effect of JCS dependent on Year of Program Start		
Start occurs in year 1991 - 1992		
Effect of JCS in months 1 - 11 after program start	-1.16***	(0.34)
Effect of JCS in months $>$ 11 after program start	0.32	(0.32)
Start occurs in year 1993 - 1997		
Effect of JCS in months 1 - 11 after program start	-1.25***	(0.26)
Effect of JCS in months $>$ 11 after program start	0.18	(0.25)
Panel C. Effect of JCS dependent on Elapsed Unemployment Duration at Time of Program Start		
Start occurs in months 1 - 12 of unemployment		
Effect of JCS in months 1 - 11 after program start	-1.17***	(0.25)
Effect of JCS in months $>$ 11 after program start	-0.01	(0.27)
Start occurs in months $>$ 12 of unemployment		
Effect of JCS in months 1 - 11 after program start	-1.48***	(0.40)
Effect of JCS in months $>$ 11 after program start	0.59**	(0.28)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). The number of units making a transition from JCS to employment in the corresponding specification can be found in Table S.1 and S.2 of the Supplementary Appendix. Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.

Source: LMM-SA, 1997-1999, own computations.

still positive but not statistically significant. These results confirm the presence of locking-in effects: individuals have a significantly reduced job finding probability during participation. The treatment effect becomes positive and partly significant after the JCS has finished, which is typically after 12 or 24 months. However, this positive impact on the transition rate to work is not long-lasting.

In an alternative specification, we estimate treatment effects depending on whether program entry occurs in the years 1991-1992 or in 1993-1997. The results in Table 5 Panel B show that the effects of participating in a JCS are stable over time.

We additionally allow the treatment effect to depend on the elapsed unemployment duration at the moment of the program entry. We distinguish between program start in the first 12 months of unemployment and after 12 months of unemployment. Table 5 Panel C presents the corresponding treatment effects. The point estimates indicate strong locking-in effects independent of the elapsed unemployment duration. These effects are stronger for participants who enter a JCS after month 12 of their unemployment spell. Unemployed who start participating after one year of unemployment seem to benefit from participation: after a treatment duration of 12 months, they are significantly more likely to find a job compared to nonparticipants.

A potential explanation for this finding is that especially long-term unemployed workers are affected by human capital depreciation and that for them being (re-)attached to the labor market has a relatively large value, while for individuals who just entered unemployment these channels are less relevant, yet.

Table 6: Effect of JCS dependent on Observed Characteristics

		Coefficient	Standard Error
Effect of JCS in months 1 - 11 after program start		-1.80***	(0.34)
Effect of JCS in months $>$ 11 after program start		-0.31	(0.35)
Effect of JCS	$\times$ Female	0.52*	(0.27)
Effect of JCS	$\times$ Age > 45	0.01	(0.26)
Effect of JCS	$\times$ High skilled	0.68***	(0.26)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). The number of units making a transition from JCS to employment in the corresponding specification can be found in Table S.1 of the Supplementary Appendix. Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

In a next step we investigate effect heterogeneity with respect to selected observed characteristics. We estimate the treatment effect in the first 11 months after start of the JCS and the subsequent period and allow for a common shift of both treatment effects depending on the age, the gender and the skill level. For women and high skilled participants we find a significantly positive shift in the treatment effect indicating that these individuals seem to suffer less from locking-in effects and are more likely to find a job after a typical program duration of 12 months

than male and low/medium skilled participants (see Table 6), whereby the effect for females is statistically significant only at the 10% level. We find no evidence for effect heterogeneity with respect to the age of the participants. A joint test suggests that the effect of JCSs in the first 11 months is insignificant while the effect 11 months after the start of the program becomes significantly positive for high skilled women. We additionally estimate a model allowing for an interaction effect of being high skilled and being a female. The results are reported in Table B.2 in the Appendix and joint tests based on this specification lead to similar conclusions. High skilled women seem to benefit from the participation in JCSs, while a JCS increases the unemployment duration especially for low- and medium-skilled men. We additionally estimate a model in which we interact the observed characteristics with both time-varying treatment indicators. The results are reported in Table B.3 in the Appendix. For none of the observed characteristics we find significantly different coefficients for the two periods. In line with that, a comparison of the Log-likelihood values suggests that the restricted model is the preferred specification. For females, both coefficients are very similar (0.56 and 0.51). For the high skilled group we find a relatively large and significant coefficient for the first 11 months after program start (1.10). The second coefficient for this group is still positive (0.49), but with a p-value of 0.11 not statistically significant anymore. Similar to the restricted model, a joint test still suggests that the effect of a JCS is significantly positive for high skilled women 11 months after the start of the program.

These results are in line with the theoretical idea that high skilled individuals are particularly affected by depreciation and in turn are able to benefit most from participation in JCSs. Moreover, the results confirm the previous finding in the literature that women might benefit more from participation in JCSs than men.

5.3 Subsequent Employment Stability

In this section we report estimation results based on a model with three transition rates: the transition rate from unemployment to employment, from unemployment into the program and from employment back to unemployment. Table 7 presents the estimation results for the baseline specification. The estimated treatment effects on the exit rate to work are quite similar to the results we obtain with the baseline specification with two transition rates. We do not find any evidence for an impact on the employment stability. We also do not find evidence for effect heterogeneity.[22] However, it is important to note that some subgroups become rather small because only around 50% of the spells end in employment. Therefore, the results with respect to the effect heterogeneity have to be interpreted with caution.

[22]Results of the models with effect heterogeneity are reported in the Supplementary Appendix (see Tables S.5 and S.6).

Table 7: Effect of JCS for Model with Subsequent Employment Stability

	Transition $U \to E$		Transition $E \to U$	
	Coef.	SE	Coef.	SE
Effect of JCS in months 1 - 11 after program start	-1.20***	(0.21)	0.28	(0.25)
Effect of JCS in months $>$ 11 after program start	0.17	(0.21)	0.00	(0.27)

Notes: JCS: Job creation scheme, U: Unemployment, E: Employment. Standard errors (SE) are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). Additionally, we control for the previous unemployment duration and the previous unemployment duration squared for the transition rate from employment to unemployment. Coefficients (Coef.) are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

5.4 Multiple Treatment Effects

In this subsection we present estimation results of a model specification which allows for multiple treatment effects: we investigate the impacts of two treatments, participation in a JCS and participation in training. To be precise, we estimate three transition rates: the transition rate from unemployment to employment, the transition rate from unemployment to a JCS and the transition rate from unemployment to training. We allow for correlations between these three transition processes. With this specification we are able to test whether our previous results change when we take into account that some unemployed might participate in a training program before or after participation in a JCS. Our data suggests that 8% of all unemployment spells include treatment only in terms of participation in a JCS and 19% only in terms of participation in training. For 2% of all unemployment spells we observe a participation in a JCS followed by a period of training and 3% had a period of training before entering a JCS.

Table 8 presents the estimation results for this model. Panel A shows the results for a specification where we only allow for a direct treatment effect of training and JCSs, separately in the first 11 months and in more than 11 months after start of participation, for the transition rate from unemployment to employment. Panel B presents the results for a specification where we allow for a direct treatment effect of training (JCSs), separately in the first 11 months and in more than 11 months after start of participation, for the transition rate from unemployment to employment and for the transition rate from unemployment into JCSs (training). Our findings indicate that our estimated effects of participating in a JCS do not change when taking participation in training into account. For both programs we observe a reduced impact on the probability of entering the other program during the first 11 months after program start. For the training program, we observe an increased probability for entering the JCS after this period. Moreover, the training program seems to have first a negative and after some time a significantly positive impact on the transition rate to work.[23]

[23]This result is in accordance with the results found by Bergemann, Fitzenberger, and Speckesser (2009).

In our main specification, we treat an unemployment spell as right censored at the moment a second participation in a JCS is observed. We additionally estimate a specification where we model the selection into a second JCS and allow for an impact of a second JCS within the same unemployment spell. The estimated treatment effects are not affected by taking multiple treatments into account (see Table S.7 in the Supplementary Appendix).

Table 8: Multiple Treatment Effects

	Transition $U \rightarrow E$		Transition $U \rightarrow JCS$		Transition $U \rightarrow Training$	
	Coef.	SE	Coef.	SE	Coef.	SE
Panel A. Specification 1						
Effect of JCS in months 1 - 11 after program start	-1.10***	(0.20)				
Effect of JCS in months $>$ 11 after program start	0.19	(0.19)				
Effect of Training in months 1 - 11 after program start	-0.71***	(0.14)				
Effect of Training in months $>$ 11 after program start	0.89***	(0.15)				
Panel B. Specification 2						
Effect of JCS in months 1 - 11 after program start	-1.22***	(0.21)			-2.02***	(0.37)
Effect of JCS in months $>$ 11 after program start	0.05	(0.21)			0.31	(0.20)
Effect of Training in months 1 - 11 after program start	-0.83***	(0.15)	-1.88***	(0.36)		
Effect of Training in months $>$ 11 after program start	0.68***	(0.16)	0.47**	(0.20)		

Notes: JCS: Job creation scheme, U: Unemployment, E: Employment. Standard errors (SE) are in parentheses. These specifications include the same list of covariates as the baseline specification (see Table 4). The first specification (Panel A) includes four unobserved mass points (M=4) and the second (Panel B) three (M=3). Coefficients (Coef.) are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

5.5 Sensitivity Analysis

In a first sensitivity analysis we extend on the analysis with respect to the heterogeneity of treatment effects. We additionally allow for a random coefficient for the treatment effect similar to Richardson and van den Berg (2013). In this model, we allow both treatment effects to vary with respect to unobserved heterogeneity. For simplicity, we assume that the random coefficient is the same for the two treatment effects. The random component is allowed to be correlated with the unobserved heterogeneity in the transition rates from unemployment to employment and from unemployment into the treatment. For the model with M=3 we estimate two additional

parameters, i.e., we estimate treatments effects which are specific for each of the three latent groups. It turns out that the model fit, evaluated on the basis of the AIC and the BIC, does not improve compared to a model with a homogenous treatment effect. This implies that the model not allowing for random treatment effects is the preferred specification.[24]

We perform several modifications of the unemployment and treatment definition to check the robustness of our results. An overview of the estimated treatment effects for the different specifications can be found in Table 9. All these sensitivity analyses are conducted for the bivariate duration model consisting of the duration until treatment and duration until transition to work.

First, we include participants in Mega-JCSs in our analysis. This type of JCS is described in Section 2.3. These cases are defined by a direct transition from employment into the program. The data reveal 193 participations in Mega-JCSs. We estimate two different specifications: first, we include an "artificial" month of unemployment only for Mega-JCS participants and second, we extend each unemployment spell by an "artificial" month of unemployment. In both cases, the optimal model specification is based on four mass points and we find a significant negative treatment effect in the first 11 months after program entry. After 11 months after program entry, the effect is still negative but insignificant in the first specification and negative and significant at the 10% level in the second specification. The negative point estimate might stem from longer program durations of Mega-JCSs compared to other types of JCSs: the mean program duration amounts to 25 months and the median to 22 months.

In a further specification we treat unemployment spells that end in a transition into nonemployment as right censored. We observe 17 transitions to nonemployment in our observation period. Again, our results are robust. Moreover, we define periods in training with previous and subsequent unemployment as periods in unemployment. As a consequence the number of unemployment spells decreases and the length of unemployment spells increases. The estimated effect of participating in a JCS are very similar to our main specification.

Next, we investigate how the results change if we control for previous unemployment experience and if we assume that the unobserved heterogeneity is not constant over the different unemployment spells. For this we allow for an impact of the previous number of unemployment spells and the cumulated lagged unemployment duration in a flexible way. We include two dummies for the number of previous unemployment spells, one if we observe one previous unemployment spell and another dummy variable indicating whether we observe more than one previous unemployment spell. Additionally, we include four dummy variables for the cumulated lagged time spent in unemployment. In the first model where we assume independent unobserved heterogeneity the model with two discrete groups (M=2) is the preferred specification (see Table S.8 in the Supplementary Appendix). While we get a slightly more positive view of the treatment effects based on this specification, the overall picture is rather stable. Once we

[24]Results of the model with a random coefficient for the treatment effect are reported in the Appendix (see Table B.4). The Log-likelihood of this model specification amounts to -9,161.2.

Table 9: Sensitivity Analysis

	Coefficient	Standard Error
Panel A. Inclusion of Mega-JCS specification 1		
Effect of JCS in months 1 - 11 after program start	-1.00***	(0.17)
Effect of JCS in months $>$ 11 after program start	-0.12	(0.20)
Panel B. Inclusion of Mega-JCS specification 2		
Effect of JCS in months 1 - 11 after program start	-1.09***	(0.17)
Effect of JCS in months $>$ 11 after program start	-0.37*	(0.20)
Panel C. Transition to nonemployment treated as right censored		
Effect of JCS in months 1 - 11 after program start	-1.25***	(0.21)
Effect of JCS in months $>$ 11 after program start	0.23	(0.23)
Panel D. Periods in training defined as periods in unemployment		
Effect of JCS in months 1 - 11 after program start	-1.07***	(0.21)
Effect of JCS in months $>$ 11 after program start	0.14	(0.22)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. These specifications include the same list of covariates as the baseline specification (see Table 4). The first and the second specification (Panel A and B) include four unobserved mass points (M=4) and the third and the fourth (Panel C and D) three (M=3). Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

allow for common unobserved heterogeneity across different spells of the same individuals, all dummy variables capturing previous unemployment experience are much smaller and not statistically significant anymore (see Table S.9 in the Supplementary Appendix). Moreover, the treatment effects are very similar compared to the main specification. Comparing the model fit with the model assuming independent unobserved heterogeneity clearly suggests that the model using multiple unemployment spells is the preferred specification.

The final sensitivity analysis deals with potentially endogenous right-censoring. See for example Cockx and Picchio (2012) for a transition model taking endogenous right-censoring into account. Our main specification is based on the assumption that right-censoring is – conditional on observed characteristics – random. We investigate whether a model allowing for endogenous right-censoring leads to different results. In this specification, we define a residual and absorbing state which includes transitions to training, JCS after April 1997 and to a second JCS in the same unemployment spell, and transitions to education, maternity leave and retirement. We jointly estimate our main specification with the transition process to this residual state. The results are reported in Table B.5 in the Appendix. The estimated treatment effects are stable. Moreover, we do not find evidence that the unobserved heterogeneity terms in the transition process from unemployment to the absorbing state are statistically significant. This suggests that endogenous right-censoring is not a problem for our specification.

6 Conclusions

JCSs are used in many countries in order to fight high unemployment. This paper focuses on JCSs in East Germany during very turbulent economic times, notably the aftermath of the German reunification in 1990. We provide a comprehensive empirical analysis of the employment prospects of participants in JCSs based on data of an inflow sample of unemployed workers in one East German state (Sachsen-Anhalt). We use the timing-of-events approach that is very well suited, particularly given the institutional context of our evaluation. Firstly, we do not need to rely on the informational content of the employment history of individuals in order to be able to control of unobserved heterogeneity and secondly, the focus on transition rates might be more appropriate given the economy is not in a stable equilibrium.

We analyze whether participation in JCSs has an impact on both the probability of finding a job and the subsequent employment stability. The econometric analysis is based on multivariate duration models. We estimate bivariate models based on the transition rates from unemployment to JCSs and from unemployment to work. We also estimate models with three transition processes taking additionally into account the transition rate from employment back to unemployment. Our approach allows to control for selection into treatment based on observable and on unobservable characteristics.

In this study, we focus on individual employment outcomes. This is a common approach in the literature on evaluating ALMP. In the context of JCSs it is important to keep in mind that this approach does not capture the potential value of the work carried out within JCSs. Moreover, we focus on the impact of participating in JCSs on the transition rate from unemployment to work. This implies that we ignore potential spillover effects on the employment probabilities of the workers who are not participating in JCSs. However, especially in times of massive job destruction and high unemployment rates, the locking-in effects of JCSs might at least partly reflect a rearrangement of the job queue. If participation of some job-seekers has an impact on the job queue in the short run and increases or stabilizes the human capital of the participants in the medium run, negative locking-in effects have to be interpreted with caution. Analyzing these potential spillover effects in combination with locking-in effects is an interesting topic for future research.

In parts our findings are in accordance with results in more stable economies. We find on average strong locking-in effects of participation in JCSs. As found before, this strong negative effect on the probability of finding a regular job vanishes after the typical program duration of one year and stays close to zero thereafter. However, in contrast to findings in more stable economies our results suggest that female and highly skilled participants leave unemployment quicker than other groups. This is in line with the idea that high skilled workers might be more strongly affected by human capital depreciation and therefore participation in JCSs has a stronger impact on them. Moreover, it confirms previous findings that women seem to benefit more from JCSs. Another important result which is new to the literature concerns the stability

of jobs after participation. We do not find that the job retention rates are influenced by JCSs; not on average and also not if effect heterogeneity is taken into account. Additionally, we find weak evidence that long-term unemployed also gain from participation in JCSs.

These results add to the so far scarce evidence on the effectiveness of JCSs in transformation economies. The findings show that it is important to not transfer the negative evaluation results on JCSs that are found for stable and rather matured economies to situations that are more turbulent. In situations with high job destruction rates other and/or additional labor market groups might benefit from participation in JCSs. It seems likely that this conclusion transfers to other economic crises than the transformation process.

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Appendix

A Data and Descriptive Statistics

Table A.1: Sample Selection

Selection Criteria	Resulting Number of Observations
Fully observed labor market history and year of birth	10,715
Aged between 25 and 50 years in January 1990	6,088
Employed in June 1990	5,529
No missings in education variable	5,466
Final sample on individual level:	
Having at least one unemployment spell starting since 1991	2,235

Source: LMM-SA, 1997-1999, own computations.

Table A.2: Definition of Variables

Variable	Definition	Time-varying?
Effect of JCS in months 1 - 11 after program start	Dummy for participating in a JCS in months 1 - 11 after program start	Time-varying
Effect of JCS in months > 11 after program start	Dummy for participating in a JCS in months > 11 after program start	Time-varying
Not eligible for JCS 1991-1992	Dummy for not being eligible for participating in a JCS in 1991-1992 according to the Employment Promotion Act (less than 6 months unemployed in last 12 months)	Time-varying
Not eligible for JCS 1993-1997	Dummy for not being eligible for participating in a JCS in 1993-1997 according to the Employment Promotion Act (less than 6 months unemployed in last 12 months)	Time-varying
Individual characteristics:		
Age Groups	Dummies for being in corresponding age group during observation period	Time-varying
Ages 25-29	Aged between 25 and 29	Time-varying
Ages 30-34	Aged between 30 and 34	Time-varying
Ages 35-39	Aged between 35 and 39	Time-varying
Ages 40-44	Aged between 40 and 44	Time-varying
Ages 45-50	Aged between 45 and 50	Time-varying
Ages >50	Aged 50 and older	Time-varying
Female	Dummy for being female	Constant

...

Table A.2: Definition of Variables *(Continuation)*

Variable	Definition	Time-varying?
Professional Education	Dummies for highest professional education level	Constant
No Vocational Training	No Vocational Training	Constant
Partly Vocational Training	Partly Vocational Training (*Teilfacherbeiter*)	Constant
Vocational Training	Vocational Training (*Facharbeiter*)	Constant
Advanced Vocational Training	Advanced Vocational Training (*Meister, Techniker*)	Constant
Technical College	Technical College (*Fachschule*)	Constant
University Degree	University Degree (*Universität, Fachhochschule*)	Constant
Regions:	Dummies for living in one of eight labor market districts of Sachsen-Anhalt	Constant
Dessau	Dessau	Constant
Halberstadt	Halberstadt	Constant
Halle	Halle	Constant
Magdeburg	Magdeburg	Constant
Merseburg	Merseburg	Constant
Sangerhausen	Sangerhausen	Constant
Stendal	Stendal	Constant
Wittenberg	Wittenberg	Constant
Year Dummies	Dummies indicating the current year, ranging from 1991-1998	Time-varying
Quarter Dummies	Dummies indicating the current quarter of the year	Time-varying
Unemployment rate	Monthly unemployment rates by labor market districts	Time-varying
Dummy for remaining unemployment benefit claims	Dummy for months of remaining unemployment benefit claims	Time-varying
Remaining unemployment benefit claims	Months of remaining unemployment benefit claims	Time-varying

Notes: JCS: Job Creation Scheme. The time constant explanatory variables are measured at the date of the interview.
Source: LMM-SA, 1997-1999, own computations.

Table A.3: Labor Market Transitions in %

Stage 1		Stage 2			Stage 3	
3,864 unemployment spells	⇒	JCS	**10.7** (415)	⇒	Employment	**26.3** (109)
					2^{nd} JCS	**15.9** (66)
					Training	**22.9** (95)
					JCS after April 1997	**9.2** (38)
					Education	**0.5** (2)
					Maternal Leave	**1.2** (5)
					Retirement	**0.7** (3)
					RC (September 1997)	**13.7** (57)
					RC (October 1998)	**3.9** (16)
					RC (December 1999)	**5.8** (24)
	⇒	Employment	**47.6** (1,643)			
		Training	**23.9** (825)			
		JCS after April 1997	**3.7** (128)			
		Education	**0.3** (12)			
		Maternal Leave	**0.3** (11)			
		Retirement	**1.0** (36)			
		RC (September 1997)	**7.1** (245)			
		RC (October 1998)	**3.6** (124)			
		RC (December 1999)	**12.3** (425)			

Notes: JCS: Job creation scheme. RC: Right-censoring due to end of observation period which can be September 1997, October 1998 or December 1999 depending on the wave of the survey. Absolute values are in parentheses. Transitions to training and to JCSs that started after April 1997 are treated as right censored.
Source: LMM-SA, 1997-1999, own computations.

Table A.4: Summary Statistics of Unemployment Spells

				Quantiles				
	N	Mean	SD	Min	25%	50%	75%	Max
Number of spells per individual	2,235	1.7	1.0	1	1	1	2	7
Transition U → E								
Unemployment duration	1,752	9.1	10.3	1	2	5	12	85
JCS duration	109	13	9	1	7	12	13	60
Subsequent employment duration (complete spell)	863	17	17	1	5	12	23	104
Subsequent employment duration (right censored spell)	889	38	28	1	13	33	60	107
Transition U → Other LMS								
Unemployment duration	1,221	16	15	1	5	12	22	95
JCS duration	209	15	9	2	12	12	16	59
RC due to end of observation period								
Unemployment duration	891	22	23	1	6	14	31	107
JCS duration	97	17	13	1	12	12	22	60

Notes: JCS: Job creation scheme, U: Unemployment, E: Employment, LMS: Labor Market State. RC: Right-censoring. SD: Standard deviation. Complete employment spells end with a transition to another labor market state within the observation period.
Source: LMM-SA, 1997-1999, own computations.

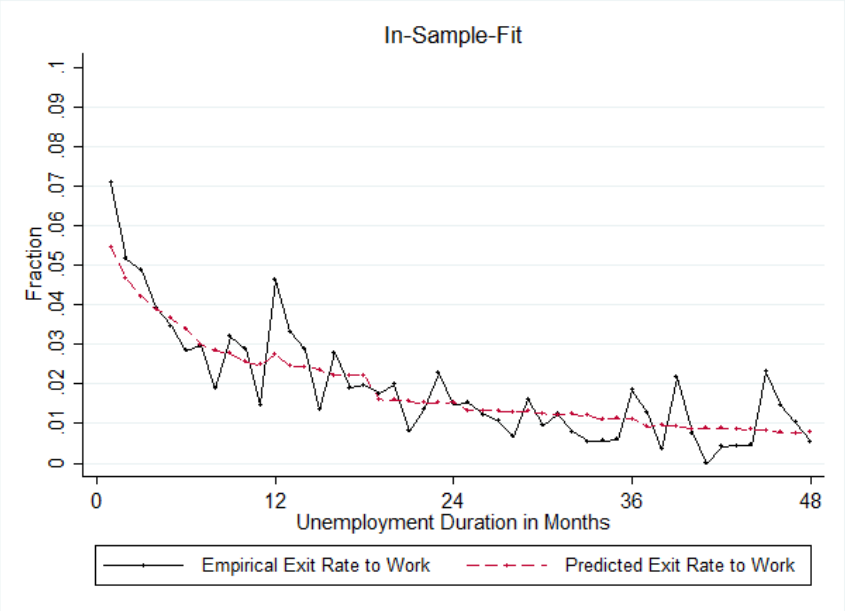
B Estimation Results

Table B.1: Model Fit depending on the Specification of the Unobserved Heterogeneity

Unobserved Heterogeneity (UH)	No UH	2 Mass Points	3 Mass Points	4 Mass Points
Log-likelihood	-9,300.4	-9,178.8	-9,161.3	-9,160.2
AIC	18,764.9	18,527.5	18,498.6	18,502.3
BIC	19,233.3	19,013.0	19,001.3	19,022.1

Source: LMM-SA, 1997-1999, own computations.

Figure B.1: Empirical and Predicted Exit Rate to Work



Notes: Empirical exit rates are based on the first unemployment spell.
Source: LMM-SA, 1997-1999, own computations.

Table B.2: Effect of JCS for High Skilled Women

	Coefficient	Standard Error
Effect of JCS in months 1 - 11 after program start	-1.80***	(0.37)
Effect of JCS in months > 11 after program start	-0.33	(0.36)
Effect of JCS × Female	0.63	(0.39)
Effect of JCS × High skilled	0.81**	(0.41)
Effect of JCS × Female × High skilled	-0.34	(0.52)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

Table B.3: Effect of JCS dependent on Observed Characteristics

	Coefficient	Standard Error
Effect of JCS in months 1 - 11 after program start	-2.20***	(0.49)
Effect of JCS in months > 11 after program start	-0.19	(0.37)
Effect of JCS in months 1 - 11 after program start × Female	0.56	(0.44)
Effect of JCS in months > 11 after program start × Female	0.51	(0.32)
Effect of JCS in months 1 - 11 after program start × Age > 45	0.36	(0.44)
Effect of JCS in months > 11 after program start × Age > 45	-0.12	(0.31)
Effect of JCS in months 1 - 11 after program start × High skilled	1.10***	(0.42)
Effect of JCS in months > 11 after program start × High skilled	0.49	(0.30)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

Table B.4: Effect of JCS dependent on Unobserved Characteristics

	Coefficient	Standard Error
Effect of JCS in months > 11 after program start	1.44***	(0.28)
Effect of JCS	-1.03*	(0.53)
Unobserved heterogeneity in treatment effect:		
$v_2 - v_1$	0.32	(0.30)
$v_3 - v_1$	-0.64**	(0.27)

Notes: JCS: Job creation scheme. Standard errors are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). Coefficients are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.

Table B.5: Effect of JCS for Model with Endogenous Right-Censoring

	Transition $U \rightarrow E$		Transition $U \rightarrow Other\ LMS$	
	Coef.	SE	Coef.	SE
Effect of JCS in months 1 - 11 after program start	-1.16***	(0.21)	-1.42***	(0.23)
Effect of JCS in months $>$ 11 after program start	0.30	(0.22)	0.72***	(0.13)

Notes: JCS: Job creation scheme, U: Unemployment, LMS: Labor Market State. Standard errors (SE) are in parentheses. This specification includes the same list of covariates as the baseline specification (see Table 4) and includes three unobserved mass points (M=3). Coefficients (Coef.) are statistically significant at the *10%, ** 5% and *** 1% level.
Source: LMM-SA, 1997-1999, own computations.