

# Employment Effects of the Provision of Specific Professional Skills and Techniques in Germany\*

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## Abstract

This paper analyzes the employment effects of a particular type of public sector sponsored training in Germany for participants whose spell of receiving unemployment benefits starts in 1993 and who were employed shortly before. Based on administrative data on employment, periods of transfer payments, and participation in training programmes, we carefully identify the provision of specific professional skills and techniques (SPST) in order to analyze the effects of a well defined treatment. SPST programs provide additional skills and specific professional knowledge in short-term and medium-term courses, so they should have a good chance to enhance the employability of an unemployed person. Such courses comprise about 16% of all public sector sponsored training programmes during the 90's. The empirical analysis

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uses kernel matching based on the estimated propensity score to estimate the average treatment effect on the treated of SPST programmes starting during 1 to 6, 7 to 12, and 13 to 24 months of unemployment. We evaluate the employment effects up to 36 months after the begin of the program. We perform the analysis separately for East and West Germany. Matching proceeds in two steps. After estimating the propensity score for the start of participation in one of the three time intervals, we only match individuals whose unemployment period started in the same calendar month and who are still unemployed without interruption until the month before treatment. Unemployed individuals who participate in the programme in a later time interval are used as members of the control group for the earlier time interval for participation. The empirical results show a negative look-in effect for the period right after the begin of the program and a significantly positive treatment effects on employment rates of about 10 percentage points and above during the second year after the begin of the program. The qualitative nature of the results is quite similar for the three time intervals of unemployment considered and for West and East Germany. The positive effects tend to persist almost completely until the end of our evaluation period. The lock-in effects are weaker and the positive treatment effects later on are stronger in West Germany compared to East Germany.

**Keywords:** training programme, employment effects, administrative data, matching, timing of events

**JEL:** C 14, C 23, H 43, J 64, J 68

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Regulation of further training</b>	<b>2</b>
2.1	Programmes . . . . .	2
2.2	Changes in regulation . . . . .	4
2.3	Participation . . . . .	5
<b>3</b>	<b>Social insurance data</b>	<b>6</b>
3.1	Employment and benefit data . . . . .	7
3.2	Monitoring data for training and merged data . . . . .	8
3.3	Types of further training . . . . .	9
3.3.1	Target specific types of further training . . . . .	10
3.3.2	Identifying further training in merged data . . . . .	12
3.4	Descriptive Statistics . . . . .	15
<b>4</b>	<b>Evaluation Approach</b>	<b>22</b>
4.1	Static Binary Treatment . . . . .	22
4.2	Extension to Dynamic Setting . . . . .	26
<b>5</b>	<b>Empirical Results</b>	<b>29</b>
5.1	Descriptive Evidence on SPST Training Spells . . . . .	29
5.2	Propensity Score . . . . .	31
5.3	Treatment Effects . . . . .	33
<b>6</b>	<b>Conclusions</b>	<b>36</b>
	<b>References</b>	<b>38</b>
	<b>Appendix</b>	<b>41</b>

# 1 Introduction

Over the last decade, a number of studies have been conducted regarding the effectiveness of further training as part of active labor market policy in Germany, see Speckesser (2004, chapter 1) as a recent survey. Practically all the studies make use of the micro data of panel surveys (such as the German Socio-Economic Panel [GSOEP]). Although these data are rich with respect to informative covariates, the evaluation studies summarised in these surveys suffer from severe shortcomings with respect to the quality of the treatment information and to the precision of the employment history before and after treatment. Besides, most evaluation studies only assess the effects of such policies in East Germany. Finally the samples sizes of these studies are on average small and do neither allow the researcher to evaluate the effects of any heterogeneous treatment nor of treatments which are explicitly offered to specific target groups. As a conclusion of all these shortcomings of the available data, the use of alternative data is necessary.

This evaluation study is an attempt to take advantage of register data on employment generated by the mandatory social which is merged with administrative data on unemployment and participation in active labor market programs generated by the Federal Labor Office (*Bundesagentur für Arbeit*). Our data set merges register data with benefit data and with survey data obtained from the local offices of the Federal Employment Office for *participants* in further training programmes for the period 80-97 offering rich information about quite heterogeneous courses: further training consists of a) the provision of specific professional skills, b) complete retraining of the employed to a new formal degree for a different profession, c) short-term courses which increase the search effectiveness of the individuals or d) German language courses for the immigrants.

While the literature in the past evaluates the employment effects for quite heterogeneous training programs, this paper is able to focus on quite a specific type of training which is defined by its economic purpose. Based on our classification on types of training above, we evaluate in this paper the employment effects of the most important type, the provision of specific professional skills.

Since we use administrative data, which is non-experimental by its nature, the paper makes use of a conditional independence assumption purporting that the employment outcome for the treated and the non-treated populations in case of non-treatment are the same on average conditional on a set of covariates which cover socio-economic characteristics, the previous employment history of the individu-

als, the begin of unemployment, and the elapsed duration of unemployment. The analysis uses the popular propensity matching approach adjusted to a dynamic setting building on the recent work by Frederiksson and Johansson (2003) and Sianesi (2004). In a dynamic setting, one has to take account of the timing of events, see also Abbring and van den Berg (2003, 2004).

The remainder of the paper is structured as follows: Section 2 gives a short description of the institutional regulation and the basic participation figures of Active Labor Market Policy. Section 3 focusses on the different options of further training, their target groups and course contents. Section 4 describes the methodological approach taken to estimate the treatment effects. The empirical results are discussed in section 5. Section 6 concludes. The final appendix provides further information on the data and detailed empirical results.

## 2 Regulation of further training

### 2.1 Programmes

For the period of our data, further training in Germany is regulated on the basis of the Labour Promotion Act (*Arbeitsförderungsgesetz*, AFG) and is offered and coordinated by the German Federal Employment Service (Bundesanstalt für Arbeit, BA). It aims at ensuring or improving occupational flexibility, career advancement and the prevention of skill shortages. However, following the persistent unemployment after the 70's, the programmes of further training change their character from a preventive ALMP rather towards an intervention policy offered to unemployed and those who are at severe risk of becoming unemployed.

The increasing number of unemployed entering these programmes changed the aims of the programmes from the skill-upgrading programmes that were focused to the employed to short-term programmes in which individuals are taught new technologies and partial enhancement of existing skills for occupational re-integration. Although many changes concerning benefit level and eligibility groups were implemented the traditional policies further training, retraining and integration subsidy - remained unchanged until 97. In the following, we give a short description of the programmes:

- **Further** training includes the assessment, maintenance and extension of skills,

including technical development and career advancement (*Weiterbildung*). The duration of the courses depends on individual pre-dispositions, other co-financing institutions and adequate courses provided by the training suppliers.

- **Retraining** enables vocational re-orientation if a completed vocational training does not lead to adequate employment (*Umschulung*). Re-training is supported for a period up to 2 years and aims at providing a new certified occupational skill.
- As third programme of further training, the **integrations subsidies** (*Einarbeitungszuschuss*) offer financial aid to employers providing employment to workers who have been unemployed or directly threatened by unemployment. It offers the grant for an adjustment period until the supported persons reach full proficiency in their job (up to 50% of the standard wage in the respective occupation).
- In 79, **short-term training** was introduced under §41a AFG aiming to “increase prospects of integration”. With this programme, skill assessment, orientation and guidance should be offered to unemployed. The curricula under this programme are usually short-term lasting from two weeks up to two months and are intended to increase the placement rate of the unemployed.

Except for the integration subsidy in which participants are paid the standard salaries, participants in full-time courses are granted an income maintenance (*Unterhaltsgeld*) if the conditions of entitlement are satisfied. To qualify, persons must meet the requirement of being previously employed for a minimum duration during a set period of time, i.e. at least 1 year in contributory employment or receipt of unemployment benefit or subsequent unemployment assistance.

The income maintenance amounts to 67% of wages for participants with at least one dependent child, otherwise 60% which is equivalent to the unemployment benefit. However, benefits used to be much higher for the 80's and early 90's with up to 80% of previous net earnings granted. If a person does not fulfil the requirement of previous employment, but had received unemployment assistance until the start of the measure, an income maintenance may be paid as well. While participating on the FuU schemes, participants re-qualify for unemployment insurance payments providing additional incentives to them to participate in programmes. The BA bears all the costs of further training incurred directly through the training scheme, especially including course fees.

## 2.2 Changes in regulation

**Programme changes** Over the 80's and 90's policy changes are implemented in the AFG regulation on further training. The major change is the termination of the "programme to increase the prospects of integration" (*Programme zur Verbesserung der Vermittlungsaussichten*, § 41a) in 92 when another programme substitutes it, which is no longer considered as part of further training but of the general placement activity: participants starting this programme after 92 are then recorded as unemployed while being treated.

**Changes to benefit level** Other important changes concern the level of the income maintenance. Starting from a level of 80% for participation in a programme, it is reduced to 75% for individuals with and 68% for those without children in 82. In 84, further reductions lead to levels of 68%/ 63% of the previous net earnings, which then is revised when the level increased back to 73%/70% in 86. After 91, migrants do no longer receive income maintenance because a special income maintenance scheme is implemented for this target group. Up to 92, participants in language courses are a substantial quantity of the ALMP participants - not only in language courses, but also in occupational skill adjustment programmes. In 94 finally, the level of benefits for participants in any programme of further training was reduced to 65%/60% of their previous earnings which corresponds also to the current benefit level.

The grant of income maintenance always depends on the type of promotion, whether it is a "necessary" participation because of individual unemployment or severe risks of becoming unemployed or whether participation is considered as "advisable" in terms of future employment and earnings effects for the participants. An entitlement for the payment of income maintenance is only given associated with "necessary" participation, however, the judgement about whether the programme is advisable or necessary lies in the responsibility of the individual employment office.

**Further training for the employed ended** Further training offered to the employed or offered to unemployed without satisfying the condition of "necessary" training often consists of training provided to the employed for upper professional training and career advancement ("advisable training"). In the 80's, individuals participating under advisable training are also granted income maintenance payments and reimbursed for any course fees by the BA.

The “advisable” promotion of further training terminates in 94. After 94, mainly unemployed participants start a programme of further training, although especially in East Germany the participation under the weak criterion of “threatened by unemployment” still allows employed participants directly to start an ALMP programme. Given these differences in the participation structure of FuU and changes in the legislation decreasing the incentives for employed individuals to participate in either one of these schemes, FuU can be considered to be a programme mainly focusing on the unemployed.

## 2.3 Participation

Among the three FuU programmes, the general further training scheme (*Berufliche Weiterbildung*) is the most important in both East and West Germany. Starting with a total of 232,500 participants in 80, 70% of all participants started a further training scheme, whereas only 14% (32,600) begin a programme under the Integration subsidy (*Eingliederungszuschüsse*) scheme. New entrants into retraining summed up to 37,900 (*Berufliche Umschulung*, about 16% of total). On average, participant stock is about 89,300 in 80. In 85, participant entries are 60% higher in total. By then the further training programmes amounting to 80% of all participant entries. Between 80 to 90, participation increases to 514,600, 74% of these are entries in further training programme. The retraining programme has on average participation increases to 63,300 in 90 from 37,900 in 80.

When labour market policy is extended to East Germany, participation peaks at 887,600 entries in East Germany in 92 and 574,700 in West Germany and then declines to 378,400 in West Germany and 269,200 in East Germany in 96. Over the years further training increases its share to 77% in West and 76% in East Germany. The share of participants in retraining amounts to 20% in West and 18% in East Germany.



Table 1: Participation in further training until 1997

Year	Annual entries			Annual average stocks	
	Total	Further training	Retraining	Integration	Subsidy
1980	232,5	162,4	37,9	32,6	89,3
1985	371	298,2	45,1	27,7	114,9
1990	514,6	383,4	63,3	67,9	167,6
1991					
West:	540,6	421,2	70,5	48,9	189
East:	705,3	442,8	129,9	132,6	76,7
1992					
West:	574,7	464,5	81,5	28,7	180,6
East:	887,6	591	183,1	113,5	292,6
1993					
West:	348,1	266	72,2	9,9	176,8
East:	294,2	181,6	81,5	31,1	309,1
1994					
West:	306,8	224,9	73,1	8,8	177,9
East:	286,9	199,1	68,6	19,2	217,4
1995					
West:	401,6	309,7	81,8	10	193,3
East:	257,5	184,3	52,8	26,4	216,1
1996					
West:	378,4	291,6	77,3	9,5	203,6
East:	269,2	204,1	48,1	17	205

Source: Amtliche Nachrichten der Bundesanstalt für Arbeit, several volumes

### 3 Social insurance data

The subsequent evaluation study is based on social insurance data and on data for training participants: On the one hand, the IAB Employment Subsample (IABS) consists of insurance register data for each employee recorded by the German social insurance system. Individuals in dependent employment are usually subject to the mandatory social insurance system. The IABS additionally reports episodes, which individuals spent in unemployment related to benefit payments (see Bender, Haas,

Klose 2000). On the other hand, the German Employment Service used to report the structure, contents, duration and benefit payment for participants in further training schemes in a monthly survey as a result of internal and external monitoring objectives (FuU-data, see Bender et al. 2004).

### 3.1 Employment and benefit data

The core data for this evaluation are drawn from the **Employment Subsample** (*Beschäftigtenstichprobe* BST) of the Institute for Employment Research (IAB). The BST is a 1% random sample drawn from the mandatory employment register data for all employees who are covered by the social security system over the period 75-97. Social insurance contributions are compulsory for dependent employees earning above a minimum wage that is free of social insurance contributions. However, among the dependent employees specific groups working marginal part-time basis and civil servants are excluded. Although these groups are not sampled, the IABS covers more than 80% of the German labour force.

The second important source apart from the information of the BST is the **benefit payment register** (*Leistungsempfängerdatei* [LED]) of the Federal Employment Service. These data consist of spells for individuals who receive certain benefit payments from the BA. Besides unemployment benefit or assistance, these data also record very detailed information about income maintenance payments related to the participation in further training schemes.

Since the basic sampling of the IABS results from the employment register, only individuals who experience at least one spell of dependent employment between 75-97 are sampled. This sampling implies that one should restrict the analysis to entrants into programmes from unemployment that were previously employed because the control group does not allow to construct a non-treatment outcome for treated individuals who did not experience registered unemployment before. The IABS samples roughly 1% of the overall dependent employment and benefit receipt, resulting to 591,627 individuals in the period 75-97 for both East and West Germany and to 8,293,879 spells.<sup>1</sup>

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<sup>1</sup>The IABS as available from the German central archive for empirical social research however does not report the receipt of benefit if the BST reports employment at the same time. In such a case participants may be recorded as employed e.g. while having an internship. This implies a structural underreporting of the treatment, and we merged the IABS a second time with the original benefit data, so payments parallel to dependent employment are included (resulting in an

## 3.2 Monitoring data for training and merged data

The participation data are collected for all participants in further training, retraining, integration subsidies and language courses in Germany (FuU-data) for internal monitoring and statistics on the contents of further training that were regularly published. These data report information about the type of courses, the intended integration objectives and rough information about the contents of the courses with respect to the skills provided. They provide an overview about the persons in FuU-programmes, the type of programme, the aim of the courses, the type of training (whether the training takes place in classrooms or “on the job”), the carrier of the programme and the beginning and ending of the treatment and again personal characteristics of the participants (information about sex, age, nationality, the region in which the programme takes place, the educational attainment, the employment status before treatment and other important characteristics). The data also indicate the type of income maintenance paid during the participation in a programme. Sample size of the FuU-data amounts 54,767 individuals corresponding to 72,983 spells of treatment in the period 80-97 (for West Germany, and 91-7 for the new federal states). In principle, individuals receiving training related benefits that are sampled in the IABS should be part of the FuU-data <sup>2</sup>.

These data were merged to the IABS data by the social insurance number and additional covariates. Merged data supply an integrated evaluation data base consisting of comparable, longitudinal information for treatment and control group that covers all participants in further training, retraining, integration subsidies and short-term training courses as well as language training.

In addition to merging the different files, numerous corrections are implemented in order to increase the quality of the data: Inconsistencies of both files occurred with respect to the reported level of education and occupational status, the year of birth and the family status were removed. The correction of the variable providing information on the level of school and professional education is especially important for this study, because we assume the individual skills to be the decisive reason for an assigned into treatment. As the information of the individual’s vocational training is provided by the employers, we suppose it to be the level of education, which is necessary to fulfil the individual’s precise job, but the individual’s formal

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integrated data denoted as IABSLED in the following

<sup>2</sup>However, there are exceptions to this: Since we find participants without any payments of incomes maintenance, using of the merged data is the only option to fully identify treatment group

skill level may lie above this position. A detailed description of the correction can be found in Bender et al. (2004, chapter 3).

### 3.3 Types of further training

The basic regulation of further training provides only a very basic framework, but does not define specific treatments with respect to integration targets or specific target groups. Very different treatments can be implemented under the same regulation (e.g. training for career advancement or short-term courses for very long-term unemployed are both reported as “further vocational training”). Before turning to an empirical analysis, we discuss which specific types of further training may occur and how types such can be identified in the data. It is required to identify such coherent types of further training in the data as there might be very heterogeneous groups of participants. In the following, we discuss which types of training might occur based both (i) on the type of treatment as reported in the FuU-data as well as (ii) the labour market status (employed/unemployed) in combination with a specific treatment as recorded in the benefit data.

This typology establishes a socio-economic framework under which we can identify relatively coherent treatments for the period of observation, by considering both the information on the type of treatment available in the FuU-data (see Lechner, Miquel, Wunsch 2003 for an in-depth description of the information provided) and the closeness to internal labour markets as indicated by the IABS-data on employment status. Previous descriptions<sup>3</sup> on the types of treatment do not distinguish treatments providing basic social skills or skills preparing the job-search from treatment offering certified professional skills. As this study uses merged data, we can additionally identify how close the treatment is to a firm specific labour market by exploiting the information from the occupational status variable as well as we can distinguish how specific the training is by using all available information from benefit payments and the type of training variable of the FuU-data.

In the end, we find seven different types of further training which we can identify and which differ according to the level of occupational specific skills and closeness to the internal labour market. The following section provides seven different types of further training (referred to as type [a]- [g])

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<sup>3</sup>One of these descriptions based on unmerged FuU-data by Blasche/Nagel (1995) does distinguish whether the training was carried out as an adjustment or a retraining, whether it was a full-time or part-time treatment

### 3.3.1 Target specific types of further training

**(a) Preparation, social skills and short-term training** This type of training provides non-vocational skills in educational institutions or participants are taking part in programmes evaluating their problems in finding regular employment (*Feststellungsmaßnahmen*, § 41a AFG). The training provides skills on a general level and focuses on an improvement of the job search process. In other cases short-term training is implemented as a first stage for continued training, so that the programmes prepare the participants for another further training (*Vorschaltmaßnahmen*). In short-term training, the provision of profession specific skills is supposed to be of minor importance and individuals who enter this type of treatment are supposed to lack fundamental general skills and social skills for job search. We assume these treatments not to provide formal certificates or degrees.

**(b) Provision of specific professional skills and techniques** The objective of this type of further education is the improvement of the starting position in finding a new job by providing additional skills and specific professional knowledge in short-term and medium-term courses. These programmes serve to learn or freshen up of single skills, e.g. computer skills or the new operational practises. They are intended for unemployed or persons at risk of becoming unemployed in order to facilitate integration into full employment.

This type of treatment corresponds to the vast majority of public sector sponsored further training programmes and is usually carried out by external educational institutions. Courses provide classroom training and the acquisition of professional knowledge by working experience. In most cases, participants are provided certificates about the courses, signalling refreshed or newly acquired skills and the amount of theory and work-experience achieved. The treatment is specific to the skills of the first vocational training degree and aims at increasing the individual chances of finding new employment within their profession. Compared to the short-term courses above, this type of training is supposed to influence the matching probability of the unemployed with jobs offered because of formal certificates after training.

**(c) Qualification via the educational system/retraining** This type of training consists of the provision of a new and comprehensive training according to the regulation of the German dual system of vocational training. It is offered to individuals who completed already a first vocational training and face severe difficulties in

finding a new employment within their profession. Retraining is formal vocational training into a certified occupation after the end of a first vocational training. It might however also be offered to individuals without a first formal training. Up to 94, this type of treatment is also accessible to individuals without the formal criterion of "necessity" for career advancement. Participants are then granted an income maintenance as a loan.

Qualification via the educational system/retraining provides widely accepted formal certificates according to the vocational training of the German dual system, which consists of both, theoretical training and work experience. The theoretical part of the training takes place in the public education system. The practical part of the programme is often carried out in firms providing participants work experience in their field, but sometimes also in training establishments of the institutions providing this type of training. This type of treatment aims at the achievement of a formal job qualification in order to improve the job match.

**(d) Training for specific job offers** The main objective of this type of training is the provision of specific occupational and social skills to individuals who intend to accept a job offer and to fulfil the formal requirements for the specific job. Training of this type provides specific skills and qualification as described under (b). Generally individuals pass through short-term courses with specific professional skills in order to meet the requirements for a job offer. The contents such courses are closely linked to the employment, in which individuals are employed afterwards. Usually courses take place in the training division of companies. Contents of the courses also consist of social, personal and methodological knowledge. Compared to training which offers a certification after the end of a programme, this type of training has only little impact on future employment prospects, once the job match with the precise employer is achieved.

**(e) Direct integration in the first labour market** This type of training aims at integration through wage subsidies according to § 49 AFG. Wage subsidies are paid for the employment of formerly long-term unemployed and are intended to decrease the competitive disadvantage of these recruits for the period of familiarisation with the skill requirement of the job. Individuals receive only practical guidance for the employment according to the requirements of the firm and are not provided certifiable qualifications.

**(f) Career advancement subsidy** This type of treatment provides training for individuals who are not unemployed or threatened by unemployment, either as a retraining or as a career advancement in a practised profession. This type of training terminates 94. “Qualification for career advancement” works by providing loans to participants. Although not strictly active labour market policy, career advancement was an important part of public sector sponsored further training in the early 90’s (and before). In this treatment, participants are enabled to obtain an advanced formal degree in their profession above the level of a qualified occupational training (e.g. B.A. business administration).

**(g) Language training** Besides further vocational training, language training is also part of the provision of further training in Germany as regulated by the AFG. The encouragement in participation in courses in German is intended to integrate asylum seekers, displaced persons, ethnic Germans and refugees into the labour market. Participants are provided support for an adequate education in language skills to fulfil regular employment.

### 3.3.2 Identifying further training in merged data

This section describes how the aforementioned types of training can be identified in the merged data.

**Using the benefit information from the LED-data** In the merged data set, we combine the employment and benefit data base provided by the Institute for Employment research (IABS) a second time with the benefit data (LED). As the merged LED-information provides often a number of parallel spells for one IABS spell, it was necessary to match up to three benefit spells to one IABS spell reporting employment or benefit receipt (see Bender et al., 2005, Chap. 3.1).

The merged data consist of the benefit information from the IABS (the variable “original benefit information” [*Leistungsart im Original*] LA1) and three additional variables indicating parallel benefit reception from the original LED data (“parallel original benefit information 1-3” [*Leistungsart im Original 1-3*] L1LA1, L2LA1, L3LA1). These four benefit variables offer valuable information about the type of benefit paid by the employment service in case of training which facilitates the identification of the type of treatment: It indicates whether a treatment is carried out under the further training or the retraining regulation and whether the transfer was

given for full-time or part-time courses, to participants in language training or as a loan for career advancement training. We can identify types of training as discussed above by using these benefit variables, but also by combining this information with other variables of the IABS (especially the variable of the occupational status) and the merged FuU-participation data (see below).

**Type training from FuU-data** In this evaluation study one of the most important advantages compared to survey data is the information about the precise type of training. It allows us to identify homogeneous treatments for the evaluation. In the merging process, up to two parallel FuU-spells are merged to one spell of the IABS data because in many cases the FuU-data provided more than one parallel spell. These two parallel spells provide two variables indicating the type of course (*Maßnahmart* [FMASART1, FMASART2]).

**Combining the information in merged data** Participation in training can be identified by either LED-data or FuU-data. In the best case, both sources deliver the same information about the treatment and one can easily identify the type of treatment from both data sources. However, due to the quality deficiencies in the participation data many participants are not recorded in the FuU-data. In this case, the LED-data helps to identify the treatment on the basis of the benefit variable which allows the identification of specific treatments. In other cases, we observe individual records showing employment in the IABS information and at the same time training in the FuU-data. This is for example the case if the treatment takes place in a firm and individuals are paid a normal salary (e.g. integration subsidy) or if individuals are prepared for precise job offers.

We take advantage of all information from the three parallel benefit spells, the original benefit information as shown in the IABS and the type of treatment as recorded in the two parallel FuU-spells in order to generate the most precise information available with respect to the type of treatment of either the first, the second or the third spell of the LED data compared to the FuU-data. Using all variables also allows us to identify treatments if one of the sources does not record explicable information about treatment: Often it seems as if individuals were granted unemployment benefit while being in a training programme although the legal regulation would imply a receipt of special benefits related to the treatment: At this point again, we use the FuU-data for the identification of the treatment and assume them to be more credible.



**Improving the precision of treatment information** The following approach was chosen in order to ensure that both the information coming from FuU and LED-data are taken into consideration in order to obtain the most precise information of the type of training:

- Since types of treatments (*Maßnahmeart*) are often coded as “other, non-specified programmes” (FMASART1=12 [*Sonstige Anpassungen*]) in the FuU-data, we increase the precision of information about the type of treatment by relying on the second parallel information about the type of training: The second FuU-spell is used if the first FuU-spell is coded as “other adjustment” (“*Sonstige Anpassungen*”) and a second spell includes a code different from 12. Such combined information of FMASART1 and FMASART2 is referred to as FMASART\* in the following.
- If we observe parallel spells from the LED-data that provide contradictory information about the type of benefit paid to the claimant, we identify a treated person when ever one of the three spells of benefit payments provide the information that an income maintenance payment related to training occurred. To put it differently: if the L1LA1-variable indicates unemployment benefit and the second variable (L2LA1) indicates any payment of a training related benefit, then the latter is used for the identification of the treatment status. The aggregated information from the benefit data is referred to as L\*LA1.
- If the benefit variables L\*LA1 show information opposing to a related FuU-spell we use the FuU-information in these cases (e.g. benefits for retraining in the LED data in combination with information about “provision of specific professional skills” in the FuU-data). Another example: The benefit information is coded as 310 corresponding to “further education for resettlers or ethnic German” (EGGUF *Notwendige Fortbildung bei Aus- und Übersiedlern*) and the FMASART\* variables specify the treatment as “vocational exam”, FMASART\* is supposed to be more precise with respect to the type of treatment, and the treatment then will be coded as “integration via the education system”.

### 3.4 Descriptive Statistics

**Type of training and related benefit payments** Table 2 describes the relationship between type of treatment (a) - (g) as defined above and the benefit payment related to treatment for the period 90-7 based on spell data of the merged IABSLED-FuU-data: The types of training are displayed in columns and the benefit information coming from the IABSLED-data in rows. The benefit information is subdivided into several target specific benefit payments. First, we observe quite a substantial number of participants receive unemployment benefit or unemployment assistance while being in further training (indicated by the FuU-data): especially participants in career advancement, short-term training and specific skills-training are receiving unemployment benefit at the time of treatment. Without merging IABSLED to FuU-data, these individuals would not have been identified in the data as participants according to the benefit information implying a structural underestimation of the participation in training.

The next part of table 2 shows in which type of training individuals participate if the benefit information refers to payments for resettlers, German ethnics and refugees. In most cases, these benefits are granted to participants in language courses as expected. However, we also find a substantial number of participants in either the career advancement or the specific skills training.

In case of benefit payments related to short-term training, individuals mainly participate in this type of training, but also to a substantial fraction in retraining and career advancement schemes. If individuals receive income maintenance related to retraining or further vocational training, we observe that many of these individuals also participate in other types of training, e.g. career advancement.

Table 2: Type of treatment and benefit<sup>\*\*</sup> payment

information of income maintenance payment	Type of training								
	Missing <sup>*</sup>	Preparation of social skills and short term training (a)	Specific job knowledge (b)	First labor market education system (c)	Precise jobs (d)	Direct integration (e)	Career advancement (f)	Language training (g)	Total
Match of FuU-data and benefit information was not achieved <sup>***</sup>	1430			1746	7102	2172	8209	232	20909

*Continued on next page*

information of income maintenance payment	T								ype of training
	Missing*	Preparation social skills and short term training (a)	Specific job knowl- edge (b)	First labor market edu- cation system (c)	Precise jobs (d)	Direct in- tegration (e)	Career advance- ment (f)	Language training (g)	Total
Benefit information: Unemployment benefit or unemployment assistance									
Regular unem- ployment bene- fits	9	254	551	135		49	345	7	1350
Unemployment assistance for temporary soldiers			1	1					2
Unemployment assistance which follows unemployment benefits	2	318	202	65		8	146	2	743
Original unem- ployment assis- tance, no claim for unemploy- ment benefits		42	36	4		3	13		98
Benefit information: Resettlers, German Ethnics and Refugees									
Benefits for language edu- cation			1						1
Benefits for further edu- cation for resettlers or German Eth- nics			2041	152		14	125		2332
Income main- tenance for language courses for asylum seekers and refugees								79	79
Income mainte- nance for lan- guage courses for German Ethnics and recipients of welcome benefits								728	728

*Continued on next page*

T

ype of training

information of income maintenance payment	Missing*	Preparation social skills and short term training (a)	Specific job knowl- edge (b)	First labor market edu- cation system (c)	Precise jobs (d)	Direct in- tegration (e)	Career advance- ment (f)	Language training (g)	Total
Benefits for necessary fur- ther education for resettlers or German Ethnics				213			65		278
Benefits for full-time lan- guage courses for resettlers or German Ethnics								426	426
Benefits for part-time lan- guage courses for resettlers or German Ethnics								2258	2258
Benefits for full-time lan- guage courses for asylum seekers and refugees								51	51
Other benefits for resettler								405	405
Benefits for full time language courses for asylum seekers and refugees								1692	1692
Benefit information: Income maintenance related to short-term training									
Income mainte- nance amount- ing to unem- ployment ben- efits for neces- sary short-term training in §41 a		5							5

Continued on next page

information of income maintenance payment	T								Total
	Missing*	Preparation social skills and short term training (a)	Specific job knowl- edge (b)	First labor market edu- cation system (c)	Precise jobs (d)	Direct in- tegration (e)	Career advance- ment (f)	Language training (g)	
Full income maintenance because of unemployment or in danger of loosing the job for necessary short-term training in §41 a		514		4		1	255		774
Income maintenance amounting to unemployment assistance for necessary short-term training in §41 a		595	6	478		2	9		1090
Short-term training for resettlers or German Ethnics		451		3			1		455
Benefit information: Income maintenance related to further vocational training									
Income maintenance for further education, unemployment benefit and conditions for income maintenance not met, income maintenance amounting to unemployment benefits paid			62	3			14		79
Income maintenance for necessary further education for unemployed persons or persons whose jobs are in danger			3963	195		2	744	3	4907

*Continued on next page*

T

ype of training

information of income maintenance payment	Missing*	Preparation social skills and short term training (a)	Specific job knowl- edge (b)	First labor market edu- cation system (c)	Precise jobs (d)	Direct in- tegration (e)	Career advance- ment (f)	Language training (g)	Total
Income maintenance amounting to unemployment assistance because of necessary further education due to unemployment or in danger of losing the job as of 1.1.94			369	22			83	27	501
Income maintenance for part time further education 44 IIB			221				2	9	232
Benefit information: Income maintenance related to retraining									
Income maintenance for retraining of unemployed persons whose jobs are in danger				1913			91	4	2008
Income maintenance amounting to unemployment benefits because of retraining of former unemployed persons				27			2		29
Income maintenance amounting to unemployment assistance because of retraining of former employed persons				161			15		176

Continued on next page

information of income mainte- nance payment	T								Total
	Missing*	Preparation social skills and short term training (a)	Specific job knowl- edge (b)	First labor market edu- cation system (c)	Precise jobs (d)	Direct in- tegration (e)	Career advance- ment (f)	Language training (g)	
Income mainte- nance for part time jobs and retraining				927		1	51	1	980
Benefit information: Income maintenance as a loan for advisable training									
Income mainte- nance paid as loan for advis- able further ed- ucation							2050	3	2053
Income mainte- nance paid as loan for advis- able retraining							19		19
Benefit information not valid (due to coding errors or employment)									
No valid code	920	218	10	170			351	5	1674
Benefit infor- mation not valid (e.g. employment)	377				2		2		381
Total	2738	2397	7643	6239	7102	2254	12599	5923	46715

\* Missing values originate from codes which were obsolete in the 90s, but which occur nevertheless for unknown reasons (e.g. benefit information L\*LA1 = 315), from an illogical combination of short term training according to §41a and employment at the same time which could not be interpreted as further training or from codes in the participation data which were not supposed to occur in the 90s (e.g. FMASART\*=22, 23).

\*\* Coding referring the 90's (see Appendix for details)

\*\*\* In most cases, the training information refers to the participation information from FMASART\*, which however does not match to a related benefit information from the IAB-SLED data (mismatch). In these cases, the training is carried out while individuals were in contributory employment. This usually happens if individuals are granted a career advancement subsidy (39% of all cases). See Bender et al. (2005) for further sources of failure in matching

**Descriptive Statistics** Participation figures in the different types of further training for the years 90-97 are shown in table 3 based on spell data. These figures result

from the aforementioned assumptions of sections 2.1 and the identification of the treatments in the data set as defined under 2.2: The most important group consists of the participants in career advancement training amounting to one quarter of all treatment spells. Usually, these persons are employed while participating.

Table 3: Participation in further training by type of treatment

	Frequency	Percentage	Cumulated percentage
Missing *	2738	5.9	5.9
Preparation, social skills and short-term training	2379	5.1	11.0
Provision of specific professional skills	7463	16.0	27.0
Integration via education system	6239	13.4	40.3
Training for specific jobs	7102	15.2	55.5
Direct integration (wage subsidy)	2254	4.8	60.4
Career advancement	12599	27.0	87.3
Language training	5923	12.7	100.0
Total	46715	100.0	

\*: Missing values originate from codes which were obsolete in the 90's but occur nevertheless for unknown reasons (e.g. benefit information L\*A1 = 315), from an illogical combination of short-term training according to §41a and employment at the same time which could not be interpreted as further training or from codes in the participation data which were not supposed to occur in the 90's (e.g. FMSART\* = 22,23).

For the types of training besides career advancement as defined above, the most important category is the “provision of specific professional skills”-training on which



we will concentrate in the following with 7,463 spells for the 90's. Almost equally important as this programme is participation in the retraining programme with 13.4% of all spells and "training for specific jobs" with 15.2% of all spells. Language training courses are also an essential part of further training, with 12.7% of all spells. Direct integration and the short-term training programmes are less important with around 5% of all training spells.

## 4 Evaluation Approach

We analyze the employment effects of the provision of specific professional skills and techniques (SPST) at the individual level. Specifically, we estimate the average treatment effect on the treated (TT), i.e. the differential impact the treatment shows for those individuals who participate in a SPST course. We take the 1993 inflow sample into unemployment and we distinguish three types of treatment depending upon the month in which the SPST course starts relative to the elapsed unemployment duration. We estimate the TT for participation in SPST against the comprehensive alternative Non-participation in SPST which includes participation in another program of active labor market policy.

### 4.1 Static Binary Treatment

Our empirical analysis is based upon the potential-outcome-approach to causality (Roy, 1951, Rubin, 1974), see the survey Heckman/LaLonde/Smith (1999). We estimate the TT in the binary treatment case.<sup>4</sup> The individual treatment effect is the difference between the treatment and the nontreatment outcome whereby the latter is not observed for the treated individuals. Estimating the TT therefore requires estimating the expected nontreatment outcome for the treated individuals. This estimation of the counterfactual is based upon the observed outcomes of the nontreated individuals. In order to provide a valid estimate, we have to take nontreated individuals that are comparable to the treated individuals regarding their expected nontreatment outcome. We apply a stratified version of the widely used method

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<sup>4</sup>The framework can be extended to allow for multiple, exclusive treatments. Lechner (2001) and Imbens (2000) show how to extend standard propensity score matching estimators for this purpose.

of propensity score matching to achieve comparability. The matching method is modified to take account of the different starting times of the program.

TT is given by

$$(1) \quad E(Y^1|D = 1) - E(Y^0|D = 1) ,$$

where the treatment outcome  $Y^1$  and the nontreatment outcome  $Y^0$  are the two potential outcomes and  $D$  denotes the treatment dummy. Our outcome variable of interest is a dummy variable for employment, possibly conditional on employment in the previous month resulting in a transition dummy. The observed outcome  $Y$  is given by  $Y = DY^1 + (1 - D)Y^0$ . The evaluation problem consists of estimating  $E(Y^0|D = 1)$  since the counterfactual outcome in the nonparticipation situation is not observed for the participating individuals ( $D = 1$ ). Thus, identifying assumptions are needed to estimate  $E(Y^0|D = 1)$  based on the outcomes for nonparticipants ( $D = 0$ ). We apply a propensity score matching estimator to control for the dynamic selection effect.

Assuming the Conditional Mean Independence Assumption (CIA)

$$(2) \quad E(Y^0|D = 1, X) = E(Y^0|D = 0, X)$$

implies that the nontreatment outcome of the participants and of the nonparticipants are now comparable in expectation when conditioning on  $X$ . Then, to estimate the expected nonparticipation outcome for the participants with observable characteristics  $X$ , it suffices to take the average outcome for nonparticipants with the same  $X$ . This is the basis of the popular matching approach, see Heckman/Ichimura/Todd (1998), Heckman/Ichimura/Smith/Todd (1998), Heckman/LaLonde/Smith (1999), or Lechner (1998). This approach estimates the expected nontreatment outcome for a participant  $i$  with characteristics  $X$  by the fitted value of a nonparametric regression in the sample of nonparticipants at point  $X$ . The nonparametric regression can be represented by a weight function  $w_{N_0}(i, j)$  that gives the higher weight to nonparticipants  $j$  the stronger his similarity to participant  $i$  regarding  $X$ . For each  $i$ , these weights sum up to one over  $j$  ( $\sum_{j \in \{D=0\}} w_{N_0}(i, j) = 1$ ). The estimated TT is then

$$(3) \quad \frac{1}{N_1} \sum_{i \in \{D=1\}} \left\{ Y_i^1 - \sum_{j \in \{D=0, ue_j = ue_i\}} w_{N_0}(i, j) Y_j^0 \right\} ,$$

with  $N_0$  the number of nonparticipants  $j$ ,  $N_1$  the number of participants  $i$ , and  $ue_i, ue_j$  is the calendar month of the the begin of the unemployment spell  $i, j$ , respectively.

Matching estimators differ with respect to the weights attached to members of the comparison group. The most popular approach in the literature is nearest neighbor matching using the outcome of the closest nonparticipant ( $j(i)$ ) as the comparison level for participant  $i$ , see Heckman/LaLonde/Smith (1999) and Lechner (1998). In this case,  $w_{N_0}(i, j(i)) = 1$  for the nearest neighbor  $j(i)$  and  $w_{N_0}(i, j) = 0$  for all other nonparticipants  $j \neq j(i)$ . Following Heckman, Ichimura, Smith, Todd (1998), we implement a different matching approach using a nonparametric local linear kernel regression to estimate the expected nonparticipation outcome of participants with certain characteristics, see also Pagan/Ullah (1999). This amounts to specifying the weight function based on a kernel function which has as its argument the distance in terms of characteristics of the individuals. This so called kernel matching has a number of theoretical advantages compared to nearest neighbor matching. The asymptotic properties of kernel based methods are straightforward to analyze and it has been shown that bootstrapping provides a consistent estimator of the sampling variability of the estimator in (3) even if matching is based on closeness in generated variables (this is the case with the popular method of propensity score matching which will be discussed below), see Heckman/Ichimura/Smith/Todd (1998) or Ichimura/Linton (2001) for an asymptotic analysis of kernel based treatment estimators. We are not aware of similar results for nearest neighbor matching.

It is difficult to match with respect to a high-dimensional vector of observable characteristics  $X$  (“curse-of-dimensionality”), see Pagan/Ullah (1999). Therefore, the evaluation literature uses extensively the result of Rosenbaum and Rubin (1983) that the CIA in equation (2) implies that participants and nonparticipants become comparable in expectation when conditioning on the treatment probability  $P(X)$  (propensity score) as a function of the observable characteristics  $X$ , i.e.

$$(4) \quad E(Y^0|D = 1, P(X)) = E(Y^0|D = 0, P(X))$$

provided  $0 < P(D = 1|X) < 1$ . This result reduces the matching problem to one dimension effectively using the “closeness” in the propensity score as the weighting scheme. However, the propensity score has to be estimated. We implement kernel matching based on the estimated propensity score. We take account of the sampling variability in the estimated propensity score by applying a computationally quite expensive bootstrap method to construct the standard errors of the estimated treatment effects. To account for autocorrelation over time, we use the entire time path for each individual as block resampling unit. All the bootstrap results reported in this paper are based on 200 resamples.

For the local linear kernel regression in the sample of nonparticipants, we use the Gaussian kernel, see Pagan/Ullah (1999).<sup>5</sup> Standard bandwidth choices (e.g. rules of thumb) for pointwise estimation are not advisable here since the estimation of the treatment effect is based on the average expected nonparticipation outcome for the group of participants, possibly after conditioning on some information to capture the heterogeneity of treatment effects. Since averaging pointwise estimates reduces the variance, it is clear that the asymptotically optimal bandwidth should go to zero faster than an optimal bandwidth for a pointwise estimate, see Ichimura/Linton (2001) on such results for a different estimator of treatment effects.<sup>6</sup>

To choose the bandwidth, we use the leave-one-out cross-validation procedure suggested in Bergemann et al. (2004) mimicing the estimation of the average expected nonparticipation outcome for each period. First, for each participant  $i$ , we identify the nearest neighbor  $nn(i)$  in the sample of nonparticipants, i.e. the nonparticipant whose propensity score is closest to that of  $i$ . Second, we choose the bandwidth to minimize the sum of the period-wise squared prediction errors

$$\sum_{t=T_0}^{T_0+35} \left[ \frac{1}{N_{1,t}} \sum_{i=1}^{N_{1,t}} \left( Y_{nn(i),t}^0 - \sum_{j \in \{D=0, ue_j = ue_{nn(i)}\} \setminus nn(i)} w_{i,j} Y_{j,t}^0 \right) \right]^2$$

where the prediction of employment status for  $nn(i)$  is not based on the nearest neighbor  $nn(i)$  himself and  $T_0 = 1, 7, 13$  is the first calendar month in the interval for unemployment duration (1–6, 7–12, 13–24) during which the treatment begins. For the local linear regression, we only use those unemployment spells starting in the same month as for  $nn(i)$ . The optimal bandwidth affecting the weights  $w_{i,j}$  through the local linear regression is determined by a one-dimensional search. The resulting bandwidth is sometimes larger and sometimes smaller than a rule-of-thumb value for pointwise estimation, see Ichimura/Linton (2001) for similar evidence in small samples based on simulated data. Since our method for the bandwidth choice is computationally quite expensive, it is not possible to bootstrap it. Instead, we use the bandwidth found for the sample in all resamples.

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<sup>5</sup>A kernel function with unbounded support avoids some of the problems involved with local linear kernel regression, namely, that the variance can be extremely high in areas where there is not a lot of data, see Seifert/Gasser (1996) and Frölich (2001) for a critical assessment of local linear kernel regression.

<sup>6</sup>This is also the rationale for researchers using nearest neighbor matching with just the closest neighbor thus focussing on minimizing the bias.

## 4.2 Extension to Dynamic Setting

We use the above framework for the binary treatment case in a dynamic context. Our basic sample consists of individuals who start a unemployment spell with transfer payments in 1993 and who had been employed before. These individuals can participate in an SPST program at different points of time in their unemployment spell. Both the type of treatment and the selectivity of the treated individuals may depend upon the exact starting date of the program. Abbring and van den Berg (2003) and Frederiksson and Johansson (2003) interpret the start of the program as an independent random variable in the “timing of events”. In a similar vein, Sianesi (2004) argues for Sweden that all unemployed individuals are potential future participants in active labor market programs, a view which is particularly plausible for countries with comprehensive systems of active labor market policies like Sweden or Germany. Unemployed individuals are not observed to participate in a program either because their participation takes place after the end of the observation period or because they leave the state of unemployment either by finding a job or by moving out of labor force.

Frederiksson and Johansson (2003) emphasize that it would be incorrect to undertake a static evaluation analysis following the previous subsection by assigning unemployed individuals to a treatment group and a nontreatment group based on the treatment information observed in the data. Consider the case of analyzing treatment irrespective of the actual starting date during the unemployment spell. If one assigns individuals who find a job later during the observation period to the control group, one would effectively condition on future outcomes when defining the treatment indicator. This might lead to an upward bias in the estimated treatment effect. The opposite might occur as well when future participants, whose participation starts after the end of the observation period, are assigned to the control group. This might possibly lead to a upward bias in the estimated treatment effect.

The above discussion implies that a purely static evaluation of SPST programs is not warranted.<sup>7</sup> Therefore, we extend the static framework presented above in the

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<sup>7</sup>Under certain assumptions, drawing random starting times of the program is a valid alternative to use in this context, see e.g. Lechner (1999) and Lechner et al. (2004) for this approach. However, this does not overcome all of the problems discussed here and we prefer to consider the timing of events explicitly. Introducing a random timing of the program starts among the nonparticipants is not attractive to us because of the fact that this adds noise to the data, that the drawn starting time might be impossible in the actual situation of the nontreated individual, and that this does

following way. We analyze the employment effects of SPST program participation among unemployed workers. Our basic sample consists of workers who started an unemployment spell receiving transfer payments by the Federal Labor Office in 1993 and who had been employed shortly before.

We distinguish between treatment starting during month 1 to 6 of the unemployment spell, treatment starting during month 7 to 12, and treatment starting during month 13 to 24. Because our data end in 1997, we do not analyze treatments starting later than month 24. We estimate the probability of treatment given the unemployment lasts at least as long to make individual 'eligible'. For the treatment during month 1 to 6, we take the total sample of unemployed and estimate a probit model for participation. The nontreatment group includes the unemployed who either never participate in SPST or who start treatment after month 6. For the treatment during month 7 to 12 or month 13 to 24, the basic sample consists of those unemployed who are still unemployed in the first month of the period considered, i.e. in month 7 and 13, respectively. We estimate a probit of participating during the considered time interval of elapsed unemployment duration using all individuals who are still unemployed in the first month of the period. Ideally, one would estimate a separate probit model for different starting dates of unemployment and separate starting dates of the programs, as suggested in Sianesi (2004). However, the number of observations would be too small for these separate probit regressions. Therefore, we pool the treatment probit for all inflows into unemployment in the three treatment periods. However, when matching treated and non-treated individuals, we impose perfect alignment in the starting month of the unemployment spell and the elapsed unemployment duration at the start of the program.

We implement a stratified matching approach in the next step. First, we match participants and nonparticipants whose unemployment period starts in the same calendar month. A second requirement is that the nonparticipants is still unemployed in the month before the treatment starts. This way, we only match nonparticipants who might have started a treatment in the same month as the participants. The expression for the nontreatment outcome for the participants is then obtained through the local linear regression on the estimated propensity score among this narrow set of nonparticipants matched to the participants. This way, we obtain a perfect alignment in calendar time thus avoiding drawing random starting times of

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not take the timing of events seriously. Of course, our approach also has its costs, as will be spelled out below.

the program.

Our estimated TT parameter has to be interpreted in a dynamic context. We analyze treatment conditional that the unemployment spell has lasted at least until the start of the treatment and that no SPST program participation has occurred before. Therefore, the estimated treatment parameter is

$$(5) \quad \begin{aligned} & E(Y_\tau^1 | D_t = 1, U \geq t - 1, D_1 = \dots = D_{t-1} = 0) \\ & - E(Y_\tau^0 | D_t = 1, U \geq t - 1, D_1 = \dots = D_{t-1} = 0) , \end{aligned}$$

where  $Y_\tau^1$ ,  $Y_\tau^0$  are the treatment and nontreatment outcomes, respectively, in periods  $\tau \geq t$ ,  $D_t$  is the treatment dummy for treatment starting in month  $t$  of unemployment, and  $U$  is the duration of unemployment. Conditioning on past treatment decisions and outcomes, the treatment parameter for a later treatment period is not invariant with respect to changes in the determinants of the exit rates from unemployment or the treatment propensity in the earlier phase of the unemployment spell. This is an unavoidable consequence of modelling the heterogeneity with respect to the starting time of the treatment relative to the length of elapsed unemployment. Then both the treatment group and the group of nonparticipants at the start of the treatment are affected by the dynamic sorting effects taking place before, see Abbring and van den Berg (2004) for a recent discussion of this problem in the context of estimating duration models. Thus, the estimated treatment parameter depends dynamically on treatment decision and outcomes in the past. This problem appears in all studies taking the timing of events seriously, see e.g. Abbring and van den Berg (2003), Fredriksson and Johanson (2003), Sianesi (2004). It can be avoided by assuming the treatment effect to be constant over the duration of elapsed unemployment at the program start,<sup>8</sup> as done by some studies using the timing-of-events approach for estimating duration models, though this would not be attractive in our context.

Using propensity score matching in the stratified manner, we estimate the treatment parameter in (5) allowing for heterogeneity in the individuals treatment effects and for an interaction of the individuals treatment effects with the dynamic sorting taking place. To make this a valid exercise, we assume the following dynamic version of the conditional mean independence assumption (DCIA) to hold for our inflow sample into unemployment

$$(6) \quad E(Y_\tau^0 | D_t = 1, U \geq t - 1, D_1 = \dots = D_{t-1} = 0, X)$$

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<sup>8</sup>Or any other type of suitable uniformity or homogeneity assumption for the treatment effect.

$$= E(Y_\tau^0 | D_t = 0, U \geq t - 1, D_1 = \dots = D_{t-1} = 0, X) ,$$

where  $X$  are time-invariant (during the unemployment spell) characteristics and  $Y_\tau^0$  is the nontreatment outcome in periods  $\tau \geq t$  (see also Sianesi, 2004, p. 137, for a similar discussion). We effectively assume that conditional on  $X$ , conditional on being unemployed until period  $t - 1$ , and conditional on not receiving treatment before  $t$  treated and nontreated individuals (both referring to treatment in period  $t$ ) are comparable in their nontreatment outcomes in period  $t$  and later.

The treatment parameter in (5) is an interesting one in a world where it is decided each month whether to start treatment in the next month or whether to postpone treatment to the future (Sianesi, 2004). In addition, exits from unemployment in a certain month are not known in the month before they take place. Anticipation effects might invalidate this analysis, when the actual job arrival or the actual treatment is known months before. The former might introduce a downward bias in the estimated treatment effect while the latter might introduce an upward bias. This is a problem in any of the analyses based on the timing-of-events approach.<sup>9</sup> However, it is not a problem if individuals anticipate the chances or the determinants of one of these events as long as this occurs in the same way for treated and nontreated individuals conditional on  $X$  and the duration of elapsed unemployment in  $t$ .

By construction, treated individuals and their nontreated counterparts serving as controls exhibit the same unemployment duration until the begin of the treatment. We investigate whether they differ in time-invariant unobserved characteristics by analyzing employment differences during 12 month before the start of the unemployment spell.

## 5 Empirical Results

### 5.1 Descriptive Evidence on SPST Training Spells

Our empirical analysis is performed separately for West and East Germany. We restrict the data to the 25 to 55 years old in order to avoid issues related to education

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<sup>9</sup>In future research, we plan to investigate the sensitivity of the results based on different assumptions regarding the timing of potential anticipation effects, i.e. assuming that job arrivals or treatment participation are anticipated at most a certain number of months before the actual event takes place.



or vocational training as well as early retirement. The analysis is based on the inflows from employment into unemployments which are associated with the start of a transfer payment by the Federal Labor Office in 1993. We observe 12320 such spells in West Germany and 7297 in East Germany. The analysis is based on spells, i.e. the sample involves more than one spell for individuals for whom we observe multiple unemployment spells with transfer payments in 1993 and short employment spells between. An SPST treatment is associated with an unemployment spell if the individual does not start employment before the begin of the treatment occurs. Therefore, in cases with multiple unemployment spells, a treatment after the begin of the second unemployment spell is only associated with the second unemployment spell but not with the first one. For the first unemployment spell we record no treatment and the outcome is set to not employed during the second unemployment spell and while receiving treatment. Note that the same individual can not serve as a comparison person because of the perfect alignment in calendar time when estimating 5.

Table 4 shows the number of spells involving SPST treatment before any exit to employment depending on the elapsed duration of unemployment at the beginning of the treatment. There are 751 treatment spells in West Germany and 971 in East Germany. Among those, 171 in West Germany and 217 in East Germany start during the first six months of unemployment, 147 and 227, respectively, during month 7 to 12, 260 and 373, respectively, during the second year of unemployment, and 173 and 154, after two years of unemployment. SPST programs tend to start on average at a slightly longer elapsed duration of unemployment in West Germany compared to East Germany. Table 5 contains descriptive informations on the starting dates. The average starting date is 16.6 months for West Germany and 15.1 months for East Germany. Considering the evidence for the three quartiles, the difference in the average arises mainly from the upper part of the distribution, i.e. late starting dates are later for West Germany than for East Germany. Since the data for our analysis ends with December 1997 and we analyze the employment outcome during 36 months after the begin of the treatment, we only consider the treatments starting during the first 24 month of unemployment. Table 5 provides descriptive information on the duration of training spells. Durations are longer in East Germany compared to West Germany. The average duration is about 2.4 months higher and the difference is slightly higher in the upper part of the distribution (4 month at the upper quartile) compared to the lower part of the distribution (2 months at the lower quartile).

## 5.2 Propensity Score

As the first stage of our propensity score matching approach, we obtain probit estimates for SPST training starting during the three time intervals for elapsed unemployment duration, i.e. 1–6 months (TR16), 7–12 months (TR712), and 13–24 months (TR1324). Tables 6 and 7 report our preferred specifications for West and East Germany obtained after extensive specification testing. The covariates considered are all time-invariant for an individual during the unemployment spell. The variable definitions are given in table 11. Personal characteristics considered are the age at the beginning of the unemployment spell (as five-year age dummies), dummy variables for gender, being a foreigner, state of residence (LAND), and formal education (BIL). We also use the month when the unemployment period starts (UE-ENTRY) and the employment status six and twelve month before the begin of the unemployment spell (PRE-EX6, PRE-EX12). Finally, a number of characteristics of the previous job enter the specification, namely, broad industry indicators (WZW), job status (BER), firm size (GR), and information on earnings in the previous job. In fact, there are three variables containing information on earnings.

Due to the reporting error in earnings and the topcoding issue, no reliable earnings measure exists for all the observations. PENTG is a dummy variable for earnings above the minimum level to be subject to social security taxation.<sup>10</sup> ENTGCENS is a dummy variable for earnings being topcoded at the social security taxation threshold (*Beitragsbemessungsgrenze*). LENTG is log daily earnings in the range between 15 Euro and the topcoding threshold and zero otherwise.

Our specification search starts with using all the covariates mentioned above without interactions. Then those covariates are dropped for which the probit estimator cannot be obtained due to perfect predictions for certain values of the covariates.<sup>11</sup>

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<sup>10</sup>Monthly earnings in 1992 for marginal part-time employees (*Geringfügige Beschäftigung*) below DEM 500 (about 255 Euros) in West Germany and DEM 300 (about 153 Euros) in East Germany are not subject to social security taxation and should therefore not be present in the data. For the entire year, marginal part-time employees were allowed to earn at most 14 times these earnings. However, probably due to recording errors, a number of employment reports exist in the data with zero or very low earnings. Since these informations are not reliable, we only use daily earnings above 15 Euro as a conservative truncation.

<sup>11</sup>Such a situation would contradict the assumption required for propensity score matching that the treatment probability has to lie strictly between zero and one.

For the state, firm size, regional agglomeration, and industry information, we test whether the dummy variables are jointly significant. When insignificance is found, the covariates are dropped. Finally, we test for the significance of interaction effects of gender and age with a number of covariates. Only the significant effects remain in the specification and we did not find inconsistent test results regarding the sequence of tests performed. Finally, we investigate the goodness-of-fit for fairly narrow cells of observations based on the observed covariates. The predicted probabilities for our final preferred specification are in close correspondence to their empirical counterparts and simple goodness-of-fit tests show no rejection. These detailed results are available upon request.

The results for the probit estimates in tables 6 and 7 show that the final specifications differ between the three time intervals and between West and East. Age effects are not significant in most cases except for TR1324 in West Germany. Firm size and industry is important for all treatment types in East Germany but only for early SPST programs (TR16 and TR712) in West Germany. For some covariates, the signs of the effects differs by treatment type, e.g. WZW5 (Construction) in East Germany seems to be associated with later treatment. There are remarkable regional differences in treatment assignment by states, especially in East Germany. Unemployed coming from large firm seem to be more likely to receive treatment. More highly educated individuals are more likely to receive early treatment in East Germany (especially at older ages for TR1324) and TR1324 for older unemployed as well as TR712 for all unemployed in West Germany but there is no such effect for TR16 in West Germany. Foreigners are less likely to receive treatment (only TR16 and TR1324 in East Germany, but the number of foreigners is small here). Unemployed with higher previous earnings are much more likely to receive treatment TR16 and TR1324 in East Germany whereas there are no clear cut effects in West Germany. Also the month of entry into unemployment (seasonal effect) seems to play a role in East Germany but not in West Germany. White collar workers are more likely to receive treatment in a number of cases. Females are less likely to receive TR1324 and TR712 when highly educated in West Germany but more likely to receive TR712 when they were white collar workers before. In East Germany, females are more likely to receive later treatment TR712 and TR1324 in a number of cases. There, younger females are more likely to receive TR712 and females from certain industries (WZW1,WZW2,WZW6) are more likely to receive TR1324. The estimation results show that the determinants of SPST program participation differs strongly by the elapsed unemployment duration.

### 5.3 Treatment Effects

Based on the estimated propensity scores in the previous subsection, we match SPST participants and nonparticipants who started unemployment in the same month and we only use nonparticipants who are still unemployed in the month before treatment starts. The estimated TT is then estimated separately for month  $\tau = 1, \dots, 36$  after the begin of the SPST program according to equation (3) where the expected non-treatment employment outcome is obtained by means of a local linear regression on the propensity score<sup>12</sup> among the nonparticipants considered. A comparison of the estimated propensity score for SPST participants and nonparticipants shows a close overlap for each stratum defined by the month of entry into unemployment and the begin of the SPST treatment.<sup>13</sup> We obtain an estimate for the variance of the estimated treatment effects through bootstrapping the entire observation vector for an observed spell in our inflow sample thus taking account of possible autocorrelation in the outcome variable. Due to the high computation time involved, inference has so far been based on only 200 resamples. As a preprogram test of the matching validity, we also estimate in an analogous way the differences between participants and matched nonparticipants during month 1 to 12 before the treatment. By construction, participants and matched nonparticipants are unemployed between the begin of their unemployment and the begin of the treatment.

As the second test for the quality of matching we apply a standard t-test that assesses whether the means of two groups are statistically different from each other with respect to the observable  $X$ . We construct the observable characteristics of the matched controls based on a local linear model applying the same weighting formula as for the dependent variable and predict the covariates for the matched sample. These “non-treatment characteristics of the treated” are then subject to a simple t-test that is a ratio of the difference between the two means of the treatment and the matched control group (numerator) and the dispersion of the scores (denominator). By means of this, it is an example of the signal-to-noise metaphor: the difference between the means is the signal, the bottom part of the formula is a measure of variability that is essentially noise that may make it harder to see the group difference.

The results of the tests are shown in tables 8-10 in the appendix for the covariates

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<sup>12</sup>We use the fitted index  $X_i\beta$  from the probit estimates.

<sup>13</sup>These results are available upon request.

inserted into the P-Score estimation: We find no significant difference with respect to the observable characteristics between the treated and the matched control, except for one dummy in the case of TR1324 in East Germany. We conclude that the matching procedure was successful in creating a suitable control group with respect to the observable covariates.

Figures 1–6 comprise graphical representations of the evaluation results. Each figure contains a panel of three graphs. The top graph involves the estimated average treatment effect for the treated for month 1 to 36 after the beginning of the treatment and the differences before the month 1 to 12 before the beginning of the unemployment spell. The graph in the middle shows the average employment outcome for the treatment group and the bottom graph shows the average estimated nontreatment outcome based on the matched nonparticipants. We put pointwise 95%–confidence intervals around the estimates.

The estimated treatment effects for months 1 to 36 after the begin of the program are surprisingly similar in qualitative nature across the different setting even though the average employment rates in the middle and bottom graph decline for latter program starts. Treated individuals show an increase in employment rates during the first year and then remain a fairly constant level during the second and third year. Only for late treatment TR1324 in West Germany, we observe a decline of about 10 percentage points (ppoints) after 2.5 years. In West Germany, treated individuals with early treatment TR16 reach an employment rate of about 60% after one year. For TR712, this lies around 50–55% and for TR1324 around 35–40%. The expected average nontreatment outcome converges to a level of around 45% for TR16, around 30–35% for TR712, and around 20–25% for TR1324. As to be expeted, the future employment chances for individuals decline with longer elapsed unemployment duration. Interestingly, the effect of the treatment seems to be quite similar, except for the decline at the end for TR1324. We find a negative look-in effect for the period right after the begin of the program and significantly positive treatment effects on employment rates of about 10 ppoints and above a year after the begin of the program. For TR712 in West Germany, the estimated treatment effect of around 20 ppoints is the highest among the three cases.

Though similar in nature, the results for East Germany show some differences. It takes about 1.5 years for the employment rates to reach their highest level. For TR16, the treatment group reaches an employment rate of about 60%, for TR712 of

about 45–50%, and for TR1324 of about 35%. For TR1324, we see a small decline at the end. The estimated nontreatment employment rates stabilize at a level of about 50% for TR16, about 35–40% for TR712, and about 25–30% for TR1324. Again for TR1324, we observe a small decline at the end. The estimated treatment effects again show a negative look-in effect for the period right after the begin of the program and a significantly positive treatment effect of about 10 points about 1.5 years after the begin of the program. The long-run treatment effect is slightly lower for later treatment TR1324 but still significantly positive.

A comprehensive cost-benefit analysis of the SPST program is not possible mainly for two reasons. First, we lack information on the monetary costs and on transfer payments during the treatment and the unemployment spell. Second, we can not analyze the employment effects after 36 months. As a first step to contrast the initial negative lock-in effects of the programs with the later positive program effect, we calculate the cumulated effects of the program 12, 24, and 36 months after the begin of the program.<sup>14</sup> The cumulated effects are calculated as the sum of the effects depicted in figures 1–6 starting in month 1 and summing up to months 12, 24, and 36, respectively. Table 12 provides the results. The estimated standard errors are based on the bootstrap standard errors for the month specific treatment effects. For West Germany, the cumulated effects after 12 months are still significantly negative for TR16 and positive, but not significant for later treatments. The cumulated effects increase with longer time horizons and become significantly positive after 36 months (for TR712 already after 24 months) at least at a five percent significance level for a one-sided test. For East Germany, the longer duration of the treatment spells results in a stronger significantly negative lock-in effect after 12 months. The cumulated effect is still negative after 24 months but only significantly so for TR712. After 36 months the cumulated effects turn positive but they are still not significant. It is likely that a significantly positive cumulated effect can be found for an even longer time horizon for East Germany. This is not certain, however, since there is a slight tendency for the period specific effects to decline after about 2.5 years and since the standard errors tend to increase with a longer horizon.

It remains to discuss the estimated preprogram effects in figures 1–6 for the twelve months before the begin of the unemployment spell. To be precise, these are the twelve months before the begin of transfer payments by the Federal Labor Office after having lost the job. Individuals may have become unemployed earlier than

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<sup>14</sup>See Lechner et al. (2004) for a similar exercise.

this first month of unemployment period though having had a job in the recent past is a prerequisite for transfer payment. In fact, the employment rate among the treated lies somewhere between 75% and 90% during the twelve months before the start of transfer payments. In month -1, the employment rate is above 80% in all cases, i.e. in the vast majority of cases the start of the transfer payment coincides with the start of the unemployment spell. The estimated preprogram effect, i.e. the difference between the employment rates of the treatment group and the estimated employment rate of similar nontreated individuals, is not significantly different from zero in all cases except in month -1 for TR1324 in East Germany. Even in this case, the rejection is not a strong one, and since all individuals are unemployed in period 0, our preprogram test should focus on the differences during the earlier phase of the twelve months before. For this earlier phase, there is no evidence of systemic differences in employment rates between treated and nontreated individuals after matching. We take this as evidence that time-invariant unobserved heterogeneity does not invalidate our matching approach.

## 6 Conclusions

Based on a unique administrative data set for Germany, which has only been made available recently, we analyze the employment effects of the provision of specific professional skills and techniques (SPST) at the individual level. Specifically, we estimate the average treatment effect on the treated (TT), i.e. the differential impact the treatment shows for those individuals who participate in a SPST course. We take the 1993 inflow sample into unemployment and we distinguish three types of treatment depending upon the month in which the SPST course starts relative to the elapsed unemployment duration. We distinguish between the programmes starting during 1 to 6, 7 to 12, and 13 to 24 months of unemployment. We estimate the TT for participation in SPST against the comprehensive alternative Non-participation in SPST which includes participation in another program of active labor market policy. The analysis is conducted separately for West and East Germany.

The qualitative nature of the results is quite similar for the three time intervals of unemployment considered as well as for West and East Germany. We find negative lock-in effects shortly after the treatment starts. After a while the effects turn positive and they persist almost completely until the end of our evaluation period.

The lock-in effects are weaker and the positive treatment effects later on are stronger in West Germany compared to East Germany. The cumulated employment effects 36 months after the begin of the treatment are significantly positive in West Germany. They are also positive for East Germany but not significantly so. Our study draws a somewhat more positive picture of public sector sponsored training compared to most of the previous studies based on survey data. The results are in the same order of magnitude as found in the study Lechner et al. (2004) based on the same data for the most similar treatment type, though the exact treatment definition, the choice of valid observations, and the employed econometric methods differ a lot between the two studies. However, an overall assessment of the microeconomic effects is not possible since various necessary information for a comprehensive cost-benefit-analysis are lacking in our data set.



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# Appendix

Table 4: Number of SPST Training Spells

	West Germany	East Germany
Training starts during		
1-6 months	171	217
7-12 months	147	227
13-24 months	260	373
>24 months	173	154
of unemployment		
Total	751	971

Table 5: Descriptive Statistics on SPST Training Spells

	West Germany	East Germany
Elapsed Duration of Unemployment in months at begin of Training Spell		
Average	16.6	15.1
25%-Quantile	7	7
Median	14	13
75%-Quantile	23	21
Duration of Training Spell in months		
Average	6.4	8.8
25%-Quantile	3	5
Median	6	9
75%-Quantile	8	12

Table 6: Probit Estimates SPST West Germany

Regressor	Training starts during ...					
	1-6 months		7-12 months		13-24 months	
	of unemployment					
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Intercept	-3.9611	(1.9868)	-12.4284	(2.3547)	-5.3992	(1.9309)
Age30-34	.0405	(.0896)	.1102	(.0970)	.0993	(.0892)
Age35-39	-.0929	(.2404)	.0717	(.1116)	.0795	(.2153)
Age40-44	-.0800	(.2481)	.0140	(.1177)	-.5197	(.2631)
Age45-49	.0146	(.2473)	-.0725	(.1328)	-.5563	(.2854)
Age50-55	-.1939	(.2477)	-.5735	(.1606)	-.9901	(.2897)
WZW3	.2139	(.1317)	.1351	(.1424)		
WZW4	-.0638	(.1678)	.2637	(.1561)		
WZW5	.1036	(.1644)	-.1000	(.1883)		
WZW6	.1595	(.1283)	.0888	(.1378)		
WZW7	-.0396	(.1373)	-.1457	(.1542)		
BER1	-.0683	(.2961)				
BER2	-.1961	(.1767)	.0592	(.2998)	-.0469	(.1467)
BER3	.0944	(.1750)	.0881	(.3072)	-.0136	(.1571)
BIL2			.3085	(.1502)	-.1176	(.0920)
BIL4			.5048	(.2227)	.1334	(.1576)
LAND6	.1228	(.1114)				
LAND7	-.2926	(.1173)				
LAND9	-.4152	(.1529)				
LAND10	.2299	(.1041)				
LAND11	-.2202	(.1087)				
LAND12	-.1769	(.0952)				
GR2	.1229	(.0803)				
GR3	.1322	(.1230)				
GR4	.2825	(.1045)				
Foreigner	-.1675	(.1122)	-.2011	(.1157)	-.2386	(.0885)
Female	-.0621	(.0790)	.3695	(.3556)	-.1690	(.0706)
PENTG	.5940	(.4868)	.0485	(.5396)	.2905	(.4195)
LENTG	-.0210	(.1185)	.1080	(.1344)	-.0103	(.1066)

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Table 6: Probit Estimates SPST &lt;continued&gt;

Regressor	Training starts during ...					
	1-6 months		7-12 months		13-24 months	
	of unemployment					
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
ENTGCENS	-.1249	(.4866)	.4753	(.5508)	-.2105	(.4374)
PRE-EX6	.1134	(.1079)	-.1207	(.1003)	.1100	(.0913)
PRE-EX12	.2125	(.0976)	.1670	(.1028)	.1107	(.0857)
UE-Entry	.0045	(.0088)	.0427	(.0104)	.0156	(.0086)
BER2*Age35-44	-.1138	(.2636)			.1622	(.2265)
BER3*Age35-44	.2850	(.2553)			.3863	(.2363)
BER2*Age45-55	-.3141	(.2759)			.2609	(.2633)
BER3*Age45-55	.2814	(.2602)			.3389	(.2788)
BIL2*Age40-55					.5204	(.1713)
BIL4*Age40-55					.4740	(.2644)
FEM*BER2			-.3513	(.3488)		
FEM*BER3			.2804	(.3359)		
FEM*BIL2			-.4930	(.2123)		
FEM*BIL4			-.5625	(.3247)		
Nobs	12320		8121		5992	

Table 7: Probit Estimates SPST East Germany

Regressor	Training starts during ...					
	1-6 months		7-12 months		13-24 months	
	of unemployment					
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Intercept	3.8672	(1.8963)	-14.6619	(.1465)	-4.8182	(1.9178)
Age30-34	.1303	(.1063)	.2743	(.1995)	.1842	(.1032)
Age35-39	-.1209	(.1191)	-.0703	(.2250)	-.1140	(.1136)
Age40-44	.1626	(.1084)	.2889	(.2020)	.0221	(.1763)
Age45-49	-.0541	(.1269)	.2954	(.2139)	-.0984	(.1823)
Age50-55	.0313	(.1050)	-.0936	(.2078)	-.2088	(.1699)
WZW3	.1144	(.1153)	.2619	(.1412)	.1786	(.2413)
WZW4	-.0740	(.1534)	-.0391	(.1748)	.5548	(.2738)
WZW5	-.3643	(.1443)	-.1562	(.1766)	.3592	(.2393)
WZW6	-.0557	(.1049)	.0912	(.1255)	.3257	(.2152)
WZW7	-.2255	(.1020)	.0045	(.1182)	.5163	(.2035)
BER2	-.2016	(.1282)	-.1154	(.1184)		
BER3	.1142	(.1245)	.2890	(.1140)		
LAND2	-.3239	(.1026)	-.1685	(.1192)	-.1392	(.1062)
LAND3	-.3250	(.1130)	-.2075	(.1223)	-.2607	(.1146)
LAND4	-.1120	(.0967)	-.0339	(.1405)	.0715	(.1035)
LAND5	-.2454	(.1151)	-.3723	(.1388)	-.2070	(.1192)
GR2	.0474	(.0841)	.0641	(.0877)	.2405	(.0837)
GR3	.1366	(.1105)	.0700	(.1168)	.4344	(.1038)
GR4	.2515	(.0999)	.2339	(.1043)	.2049	(.1010)
BIL2	.3443	(.1320)	.2317	(.1129)	.0029	(.1251)
BIL4	.4133	(.1684)	.2762	(.1631)	-.0470	(.2207)
Foreigner	-.5187	(.3831)			-1.0256	(.3841)
R2			-.0322	(.1032)		
R3			-.0574	(.2292)		
R4			-.2557	(.1176)		
Female	-.0759	(.0744)	.3397	(.1904)	.7723	(.2137)
PENTG	-1.2245	(.4480)			-.7781	(.3866)
LENTG	.3858	(.1179)			.2910	(.1044)

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Table 7: Probit Estimates SPST &lt;continued&gt;

Regressor	Training starts during ...					
	1-6 months		7-12 months		13-24 months	
	of unemployment					
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
ENTGCENS	1.1345	(.5139)			1.1531	(.4456)
PRE-EX6	-.2090	(.0959)	-.0894	(.0965)		
PRE-EX12	.1823	(.0935)	-.0971	(.0880)		
UE-Entry	-.0268	(.0085)	.0568	(.0096)	.0112	(.0085)
BIL2*Age4055					.1594	(.1681)
BIL4*Age4055					.5031	(.2748)
FEM*Age30-34			-.0766	(.2393)		
FEM*Age35-39			.2438	(.2627)		
FEM*Age40-44			-.2864	(.2481)		
FEM*Age45-49			-.6133	(.2753)		
FEM*Age50-55			-.0751	(.2470)		
FEM*WZW3					-.3496	(.2990)
FEM*WZW4					-.3898	(.3160)
FEM*WZW5					-.3027	(.3260)
FEM*WZW6					-.1008	(.2488)
FEM*WZW7					-.5145	(.2365)
Nobs	7297		5062		3517	



Table 8: Matching quality SPST West Germany

Variable	Training starts during ...							
	1-6 months				7-12 months			
	Treated	Non-treated	Matched	t-test	Treated	Non-treated	Matched	t-test
Age 30-34	0.24	0.21	0.24	-0.01	0.31	0.20	0.29	0.27
Age 35-39	0.15	0.13	0.14	0.45	0.15	0.13	0.16	-0.11
Age 40-44	0.13	0.12	0.13	0.12	0.14	0.12	0.13	0.10
Age 45-49	0.12	0.10	0.11	0.20	0.08	0.11	0.10	-0.41
Age 50-55	0.10	0.17	0.13	-1.20	0.03	0.21	0.06	-1.54
WZW3	0.23	0.18	0.23	0.07	0.20	0.20	0.20	0.01
WZW4	0.06	0.11	0.06	0.12	0.15	0.11	0.15	0.14
WZW5	0.06	0.10	0.05	0.53	0.07	0.07	0.07	0.11
WZW6	0.39	0.28	0.40	-0.42	0.33	0.28	0.34	-0.24
WZW7	0.19	0.23	0.19	-0.20	0.15	0.22	0.16	-0.09
BER1	0.01	0.01	0.01	-0.11				
BER2	0.33	0.60	0.32	0.25				
BER3	0.56	0.27	0.56	-0.05	0.47	0.58	0.45	0.45
LAND6	0.12	0.07	0.12	0.14	0.43	0.28	0.44	-0.11
LAND7	0.08	0.13	0.08	0.16	0.73	0.67	0.73	0.00
LAND9	0.04	0.09	0.04	-0.03	0.12	0.06	0.13	-0.24
LAND10	0.16	0.08	0.15	0.32				
LAND11	0.11	0.15	0.11	-0.31				
LAND12	0.15	0.20	0.15	0.03				
GR2	0.44	0.44	0.44	0.11				
GR3	0.10	0.11	0.10	0.07				
GR4	0.22	0.17	0.22	-0.06				
Foreigner	0.08	0.18	0.09	-0.44	0.08	0.20	0.08	-0.27
Female	0.43	0.43	0.46	-0.70	0.42	0.46	0.43	-0.38
PENTG	0.98	0.88	0.96	1.41	0.96	0.84	0.94	0.83
LENTG	3.71	3.36	3.63	0.92	3.59	3.16	3.55	0.31
ENTGCENS	0.05	0.03	0.06	-0.47	0.05	0.03	0.06	-0.22
PRE-EX6	0.91	0.82	0.90	0.43	0.80	0.80	0.80	-0.16
PRE-EX12	0.88	0.76	0.88	-0.02	0.85	0.79	0.84	0.08

Table 9: Matching quality SPST West Germany (continued)

Variable	Training starts during ... 13-24 months of unemployment			
	Treated	Non-treated	Matched	t-test
	Treat.	Non-treat	Matched	t-test
Age 30-34	0.23	0.18	0.23	0.04
Age 35-39	0.21	0.12	0.21	0.11
Age 40-44	0.15	0.11	0.14	0.27
Age 45-49	0.14	0.11	0.15	-0.80
Age 50-55	0.09	0.24	0.11	-1.30
WZW3				
WZW4				
WZW5				
WZW6				
WZW7				
BER1				
BER2				
BER3	0.55	0.58	0.56	-0.12
LAND6	0.34	0.28	0.33	0.39
LAND7	0.68	0.65	0.68	-0.07
LAND9	0.11	0.06	0.10	0.20
LAND10				
LAND11				
LAND12				
GR2				
GR3				
GR4				
Foreigner	0.13	0.21	0.13	-0.19
Female	0.36	0.48	0.37	-0.32
PENTG	0.92	0.81	0.91	0.82
LENTG	3.59	3.04	3.57	0.26
ENTGCENS	0.02	0.03	0.02	-0.40
PRE-EX6	0.87	0.80	0.87	0.08
PRE-EX12	0.84	0.79	0.83	0.28

Table 10: Matching quality SPST East Germany\*

Variable	Training starts during ...							
	7-12 months				13-24 months			
	Treated	Non-treated	Matched	t-test	Treated	Non-treated	Matched	t-test
Age 30-34	0.22	0.14	0.20	0.71	0.19	0.13	0.16	1.42
Age 35-39	0.19	0.14	0.19	0.07	0.11	0.13	0.09	1.09
Age 40-44	0.18	0.14	0.17	0.11	0.17	0.13	0.16	0.68
Age 45-49	0.09	0.13	0.09	-0.02	0.13	0.13	0.14	-0.54
Age 50-55	0.18	0.30	0.22	-1.28	0.25	0.34	0.31	-2.38
WZW3	0.14	0.10	0.13	0.18	0.07	0.11	0.07	0.21
WZW4	0.05	0.07	0.05	-0.11	0.09	0.08	0.10	-0.35
WZW5	0.03	0.08	0.03	0.11	0.05	0.07	0.04	0.66
WZW6	0.31	0.25	0.32	-0.45	0.26	0.25	0.28	-0.70
WZW7	0.41	0.37	0.39	0.36	0.42	0.36	0.41	0.32
BER2	0.34	0.58	0.32	0.46				
BER3	0.54	0.29	0.54	-0.16				
LAND2	0.22	0.30	0.24	-0.54	0.25	0.32	0.28	-1.13
LAND3	0.19	0.19	0.18	0.16	0.15	0.18	0.13	1.01
LAND4	0.32	0.26	0.32	0.08	0.37	0.26	0.39	-0.59
LAND5	0.10	0.15	0.11	-0.44	0.12	0.15	0.11	0.34
GR2	0.41	0.45	0.41	0.06	0.46	0.43	0.45	0.37
GR3	0.11	0.13	0.12	-0.02	0.19	0.12	0.19	-0.14
GR4	0.27	0.18	0.26	0.40	0.20	0.20	0.21	-0.51
R2	0.39	0.34	0.38	0.29				
R3	0.02	0.02	0.02	-0.51				
R4	0.10	0.20	0.12	-0.49				
Foreigner					0.00	0.04	0.01	-2.57
female	0.76	0.56	0.76	0.00	0.75	0.59	0.76	-0.36
BIL2	0.84	0.75	0.83	0.55	0.78	0.72	0.76	0.95
BIL4	0.09	0.07	0.10	-0.57	0.08	0.07	0.09	-0.69
PENTG					0.93	0.85	0.91	1.34
LENTG					3.28	2.94	3.18	1.56
ENTGCENS					0.03	0.03	0.04	-0.83
PRE-EX6	0.77	0.81	0.75	0.58				
PRE-EX12	0.70	0.77	0.69	0.38				

\* Results for Participation in East Germany after 1-6 months of unemployment to be included

Table 11: Variable Definitions

Label	Definition
Dummy Variables	
WZW1	Agriculture
WZW2	Basic Materials
WZW3	Metal, Vehicles, Elektronik
WZW4	Light industry
WZW5	Construction
WZW6	Production oriented services, Trade, Banking
WZW7	Consumer oriented services, Organization and soziale services
LAND1	Mecklenburg-VP
LAND2	Berlin-Brandenburg
LAND3	Sachsen-Anhalt
LAND4	Sachsen
LAND5	Thuringen
LAND6	Schleswig-Holstein/Hamburg
LAND7	Niedersachsen-Bremen
LAND8	Nordrhein-Westfalen
LAND9	Hessen
LAND10	Rheinland-Pfalz/ Saar
LAND11	Baden-Wuerttemberg
LAND12	Bayern
BER1	Apprentice
BER2	Blue Collar Worker
BER3	White Collar Worker
BER4	Worker at home with low hours/MISSING
BER5	Part-time working
GR1	Firm Size (employment) missing or < 11
GR2	Firm Size (employment) > 10 and < 200
GR3	Firm Size (employment) > 200 and < 500
GR4	Firm Size (employment) > 500
BIL1	No vocational training degree
BIL2	Vocational Training degree
BIL3	Abitur/No vocational training degree
BIL4	University/College degree
BIL5	No education reported
R1	Rural area
R2	Medium population density
R3	Dense area
R4	Metropolitan area
PENTG	Earnings positive (Earnings > 15 Euro)

<continued on next page>

Table 11: Variable Definitions &lt;continued&gt;

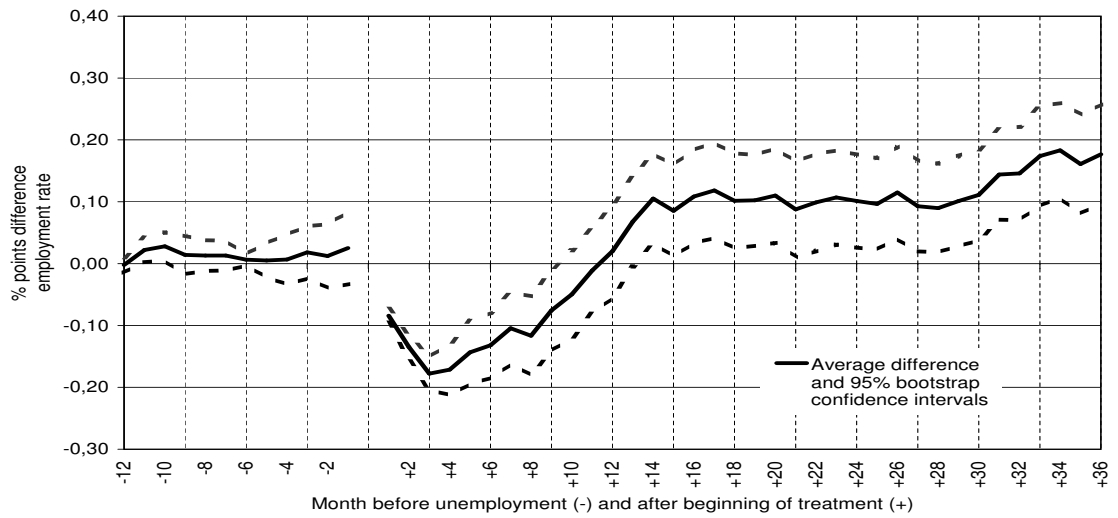
Label	Definition
ENGTCENS	Earnings censored at Social security taxation threshold
PRE-EX6	employed six month before unemployment starts
PRE-EX12	employed six month before unemployment starts
Other Variables	
LENTG	$\log(\text{Earnings})$ for PENTG=1 and ENTGCENS=0

Table 12: Cumulated Average Treatment Effects

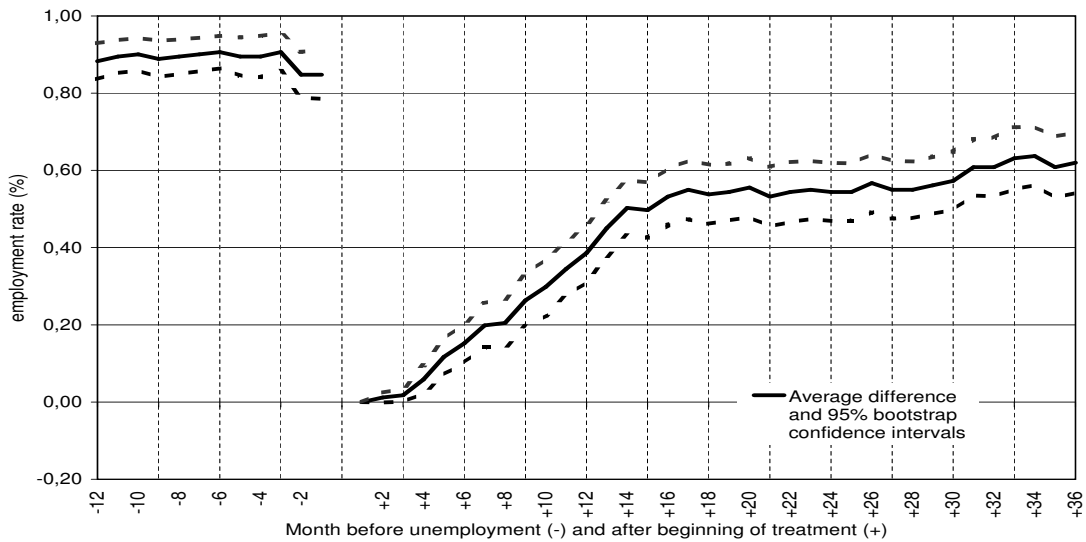
	Training starts during ...					
	1-6 months		7-12 months		13-24 months	
of unemployment						
West Germany						
... after	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
12 months	-1.18070	.2256	.403928	.3542	.061272	.1774
24 months	.013515	.5758	2.90827	.8700	1.52291	.4638
36 months	1.60420	.9234	5.54798	1.26812	3.15718	.7129
East Germany						
... after	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
12 months	-1.62331	.2371	-1.56347	.1758	-1.01759	.1462
24 months	-.660957	.5559	-1.06095	.4308	-.529110	.3535
36 months	.580934	.8246	.246313	.6604	.413204	.5516

Figure 1: SPST Treatment West Germany Month 1-6

Average treatment effect for participants in specific skills with previous unemployment 1-6 months, West Germany



Employment rate for participants in specific skills with previous unemployment 1-6 months, West Germany



Estimated non-treatment employment for participants in specific skills with previous unemployment 1-6 months, West Germany

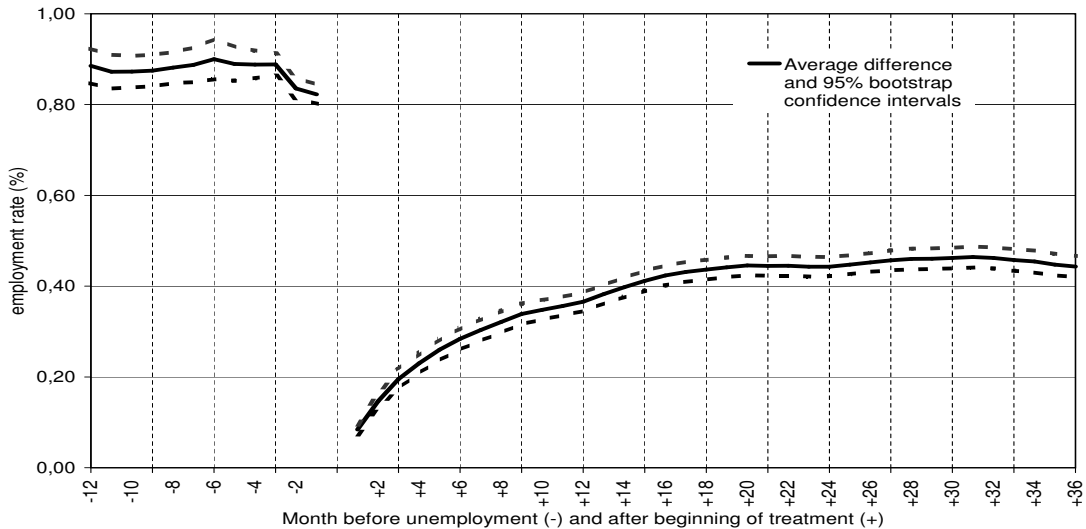


Figure 2: SPST Treatment West Germany Month 7–12

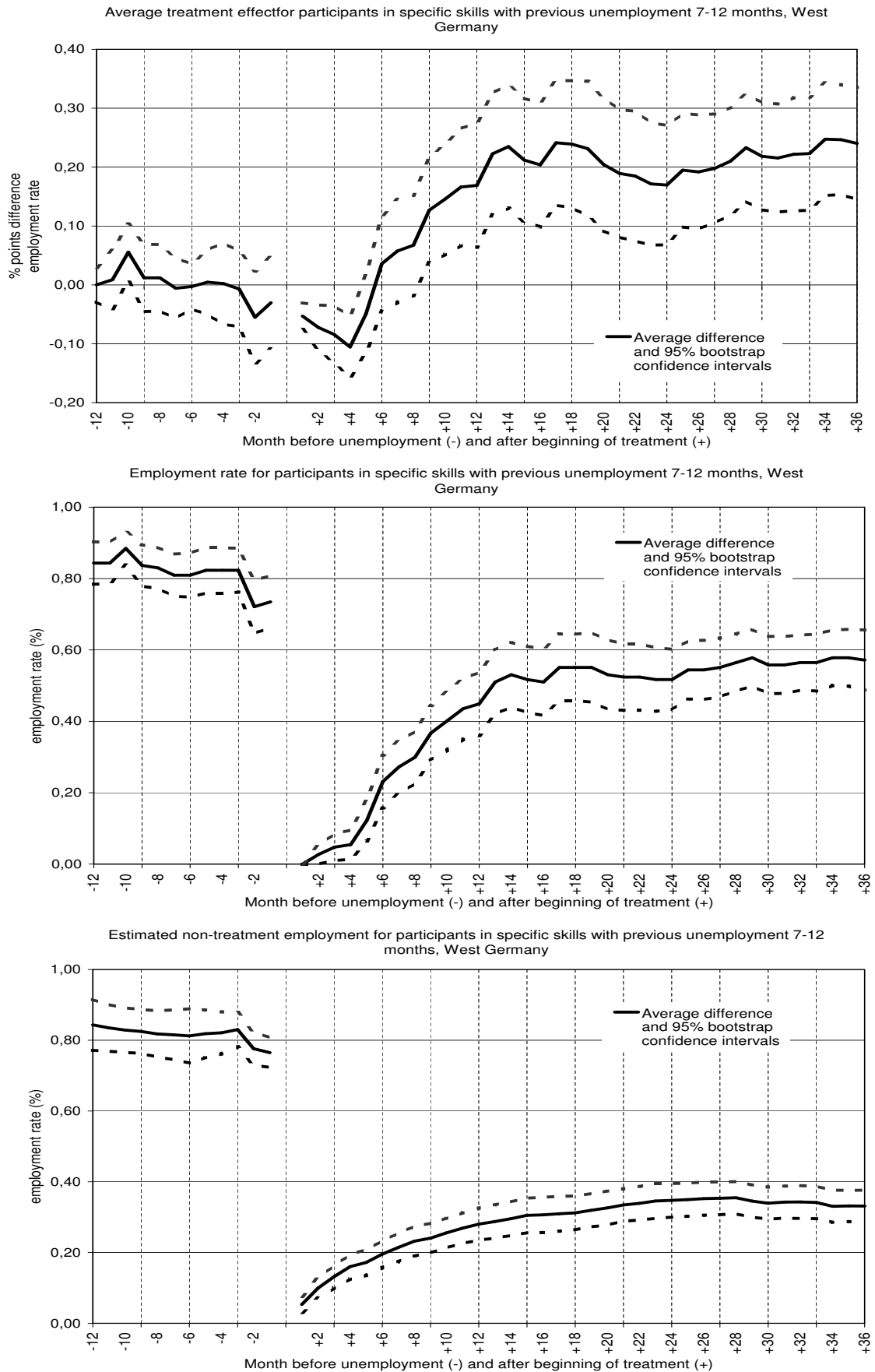




Figure 3: SPST Treatment West Germany Month 13–24

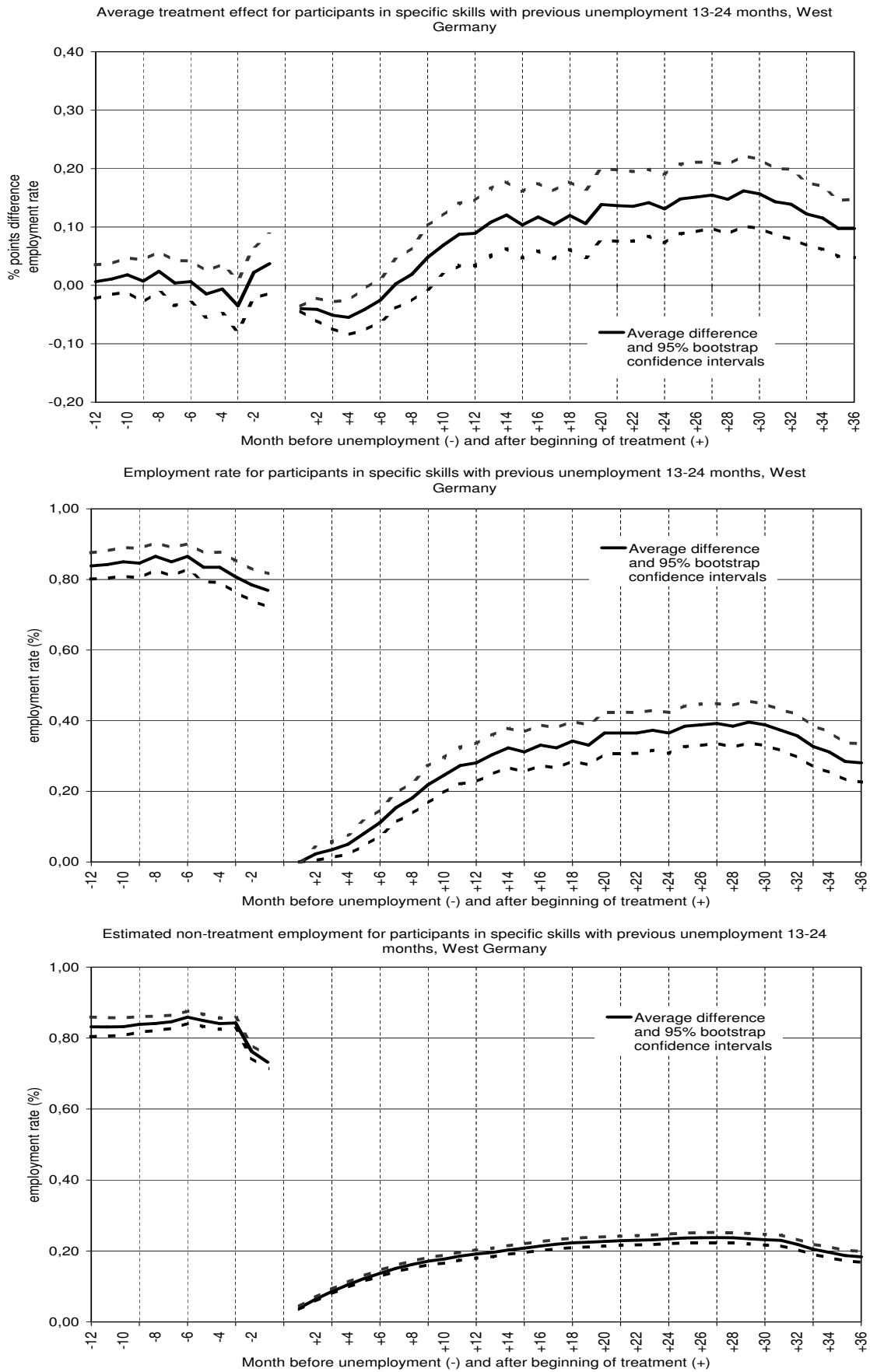
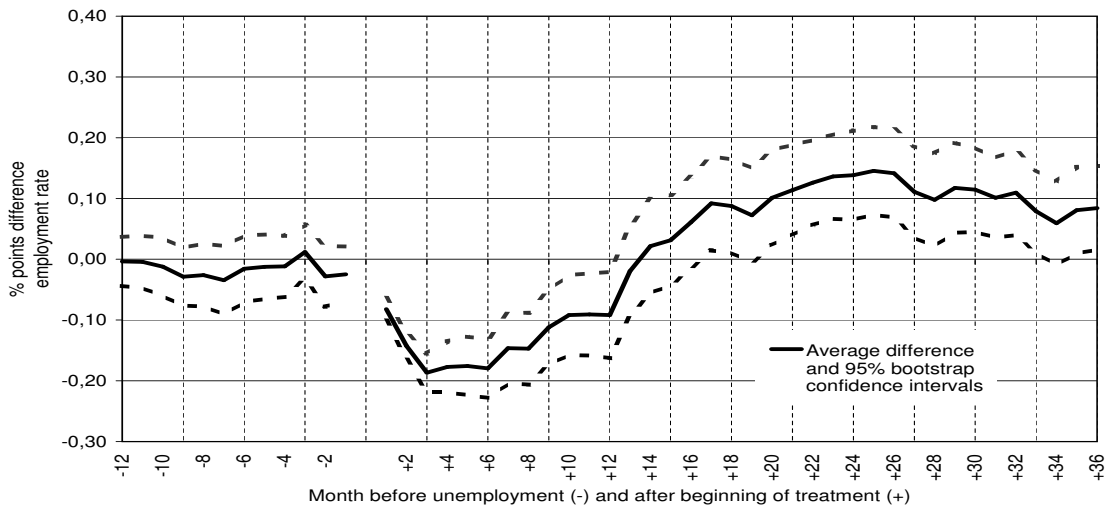
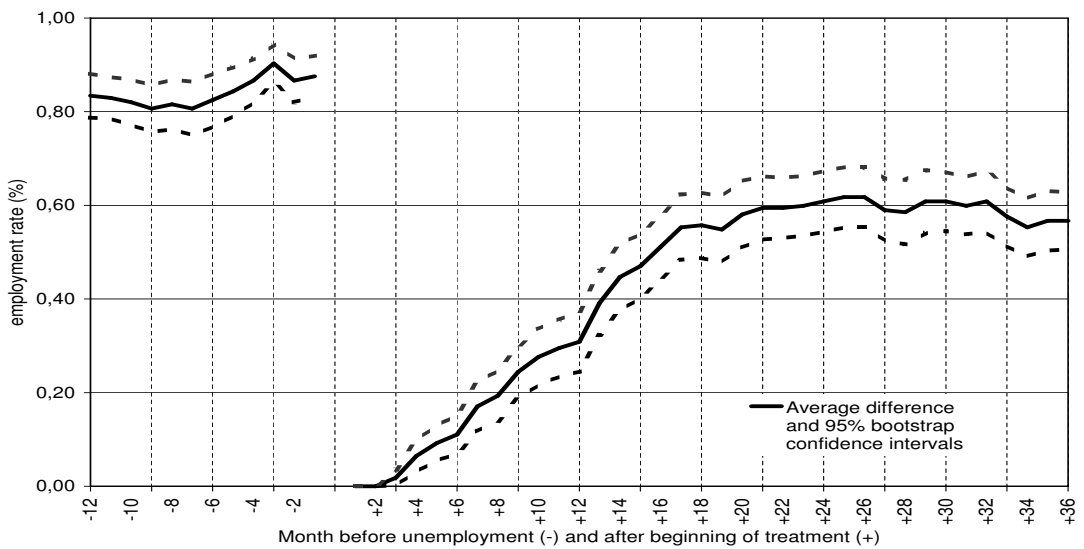


Figure 4: SPST Treatment East Germany Month 1-6

Average treatment effect for participants in specific skills with previous unemployment 1-6 months, East Germany



Employment rate for participants in specific skills with previous unemployment 1-6 months, East Germany



Estimated non-treatment employment for participants in specific skills with previous unemployment 1-6 months, East Germany

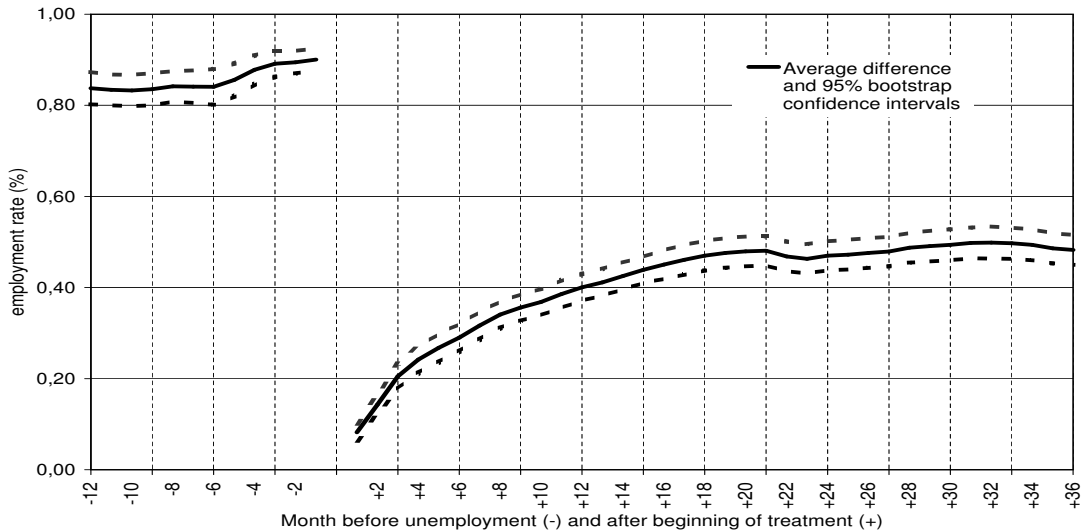


Figure 5: SPST Treatment East Germany Month 7-12

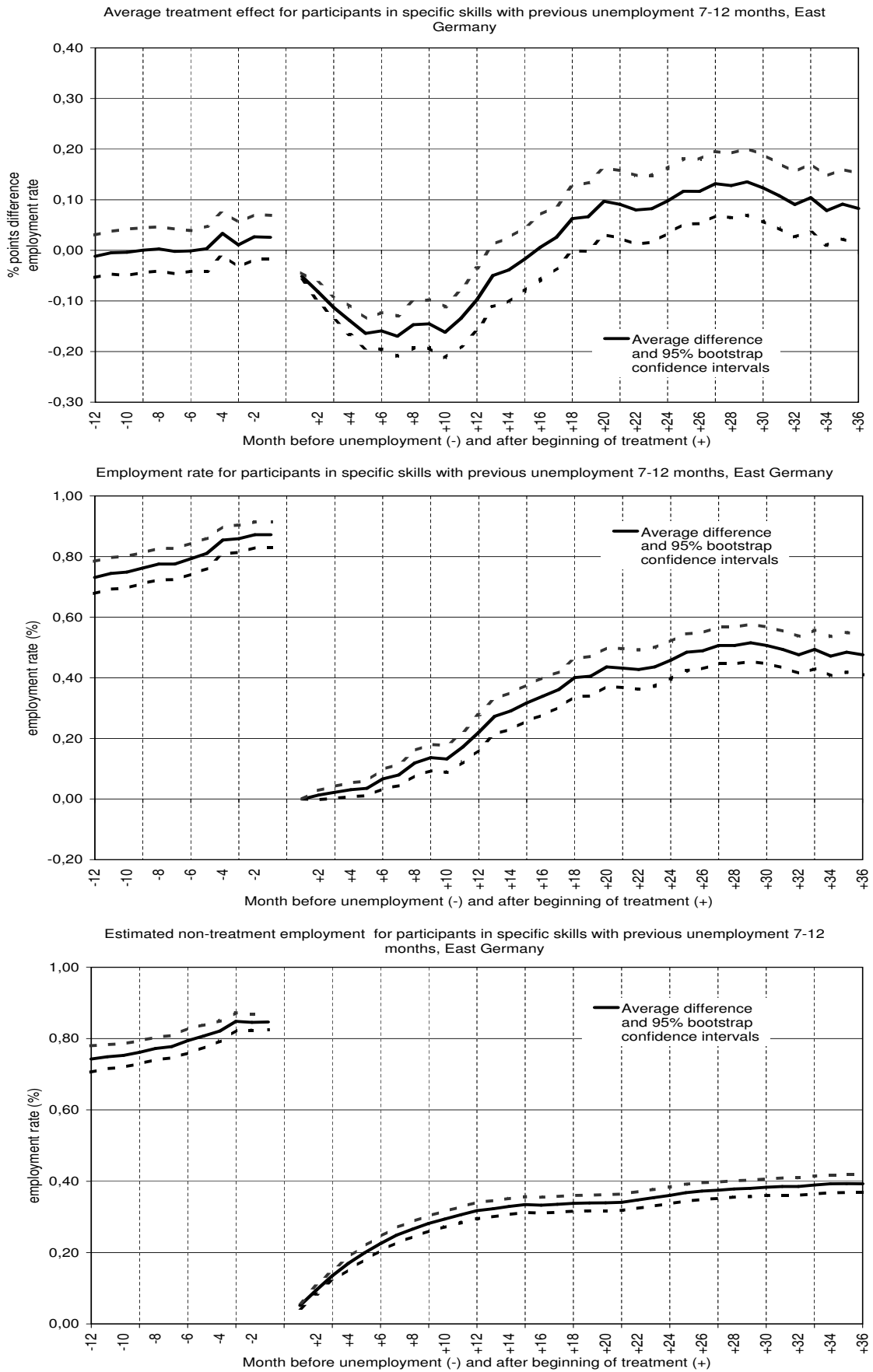
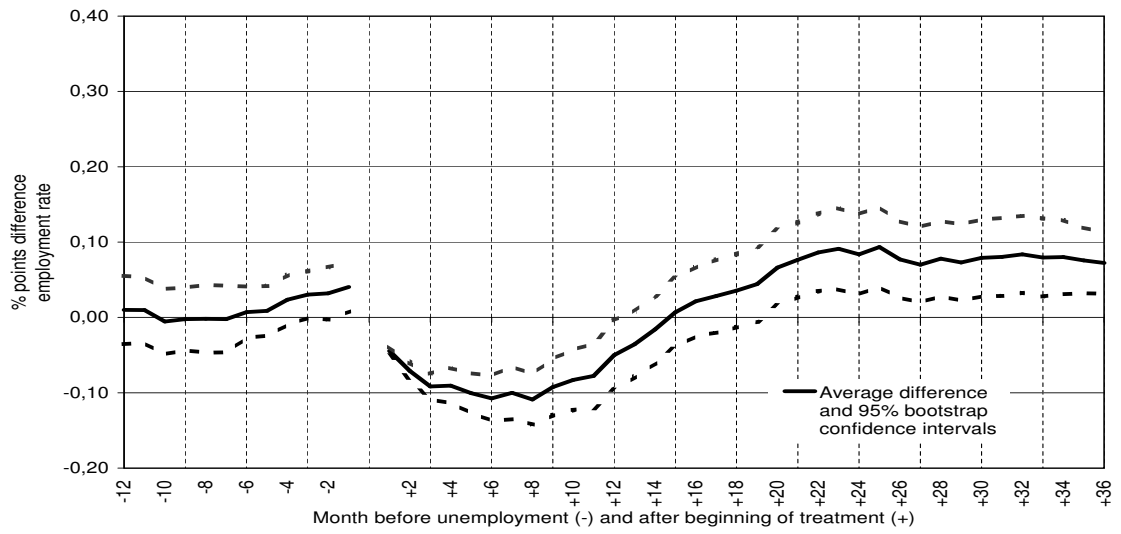
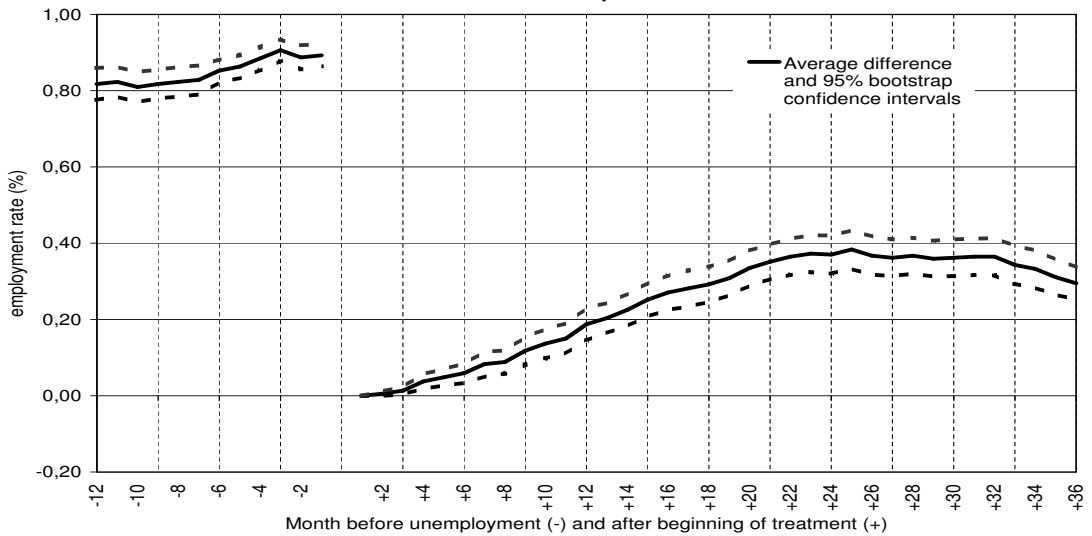


Figure 6: SPST Treatment East Germany Month 13-24

Average treatment effect for participants in specific skills with previous unemployment 13-24 months, East Germany



Employment rate for participants in specific skills with previous unemployment 13-24 months, East Germany



Estimated non-treatment employment for participants in specific skills with previous unemployment 13-24 months, East Germany

